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(54) **DENTAL DEVICE**

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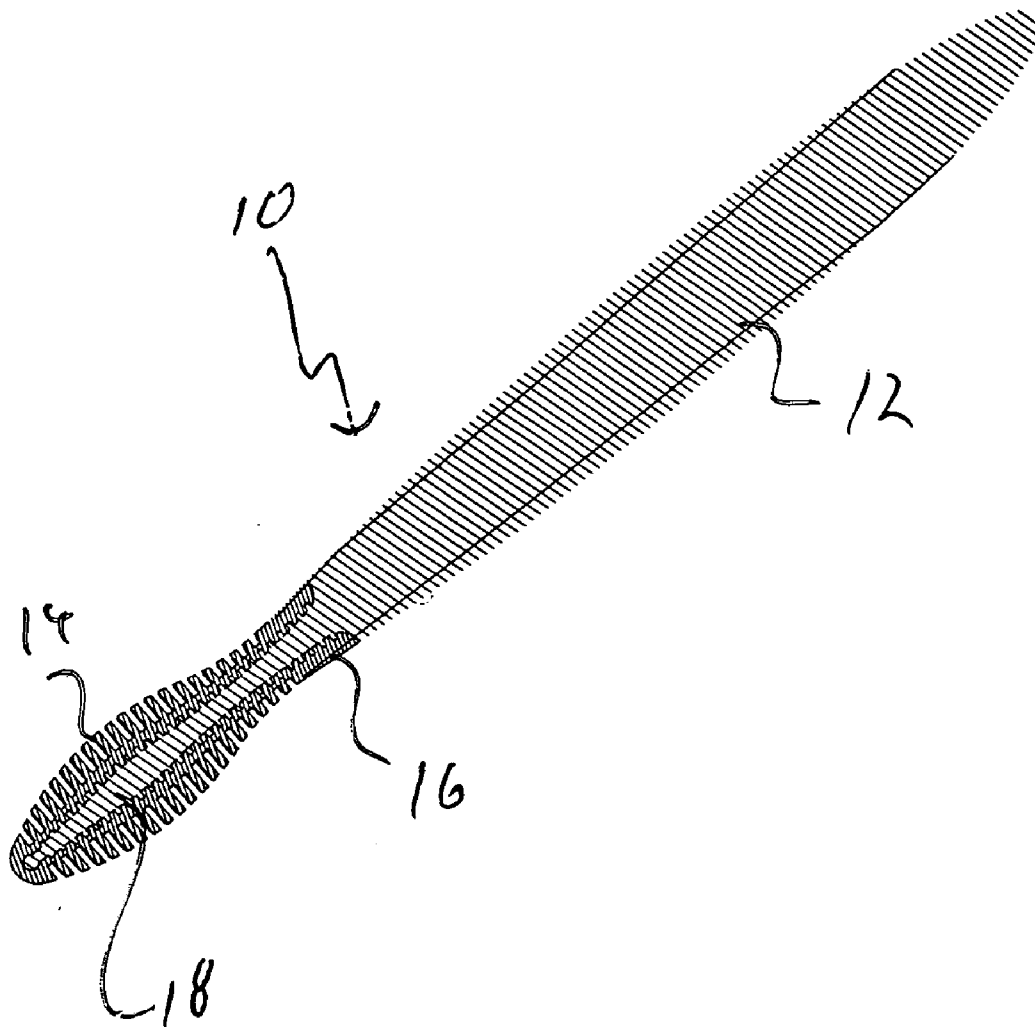
(57) **ABSTRACT**

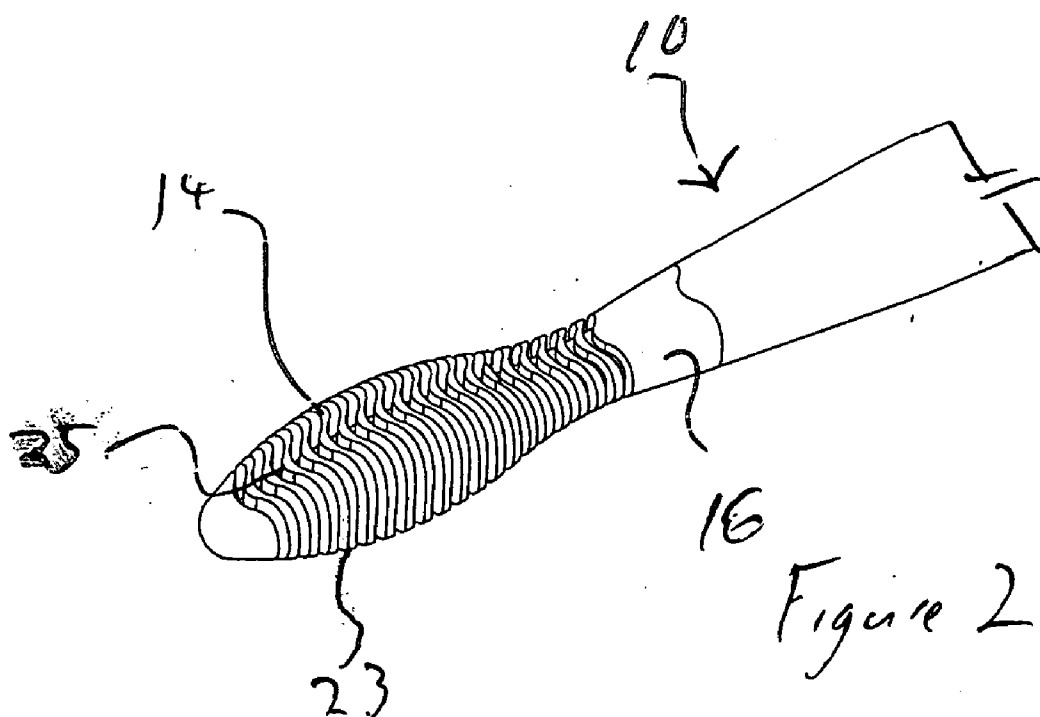
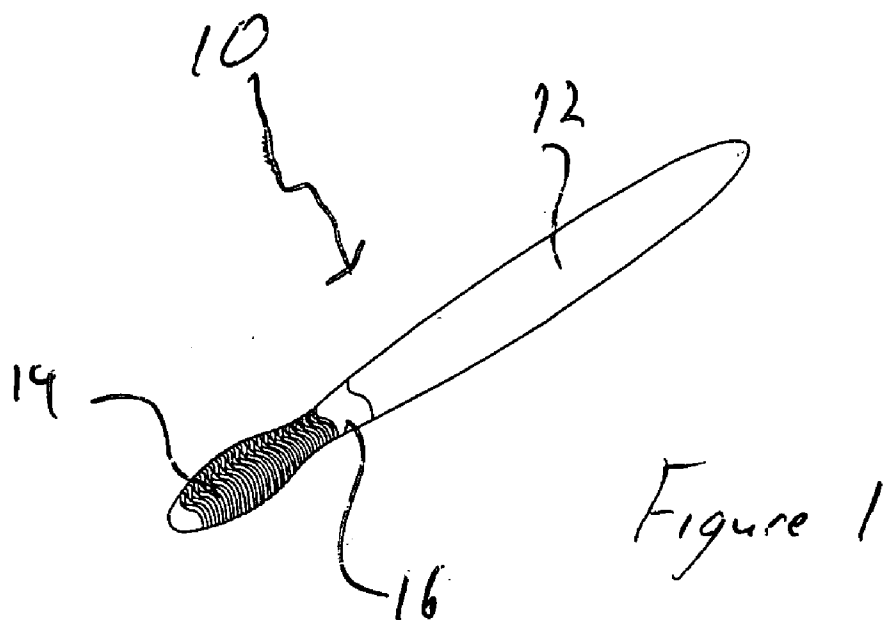
The present invention provides a dental device preferably for infants and small children. A dental device in accordance with the present invention includes a handle portion and a head portion joined by a joinder. The head portion includes a bristle substitute, which comprises a plurality of projections. The plurality of projections encircle the core in a 360 degree circumference. The plurality of projections can include, but are not limited to a plurality of raised wave-shaped projections, a plurality of circular disks, a plurality of circular grooves, a plurality of ribs, a plurality of spikes and combinations thereof.

(73) Assignee: **Product Council Ltd.**

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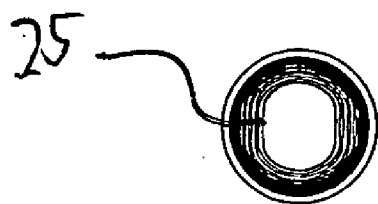


Figure 3

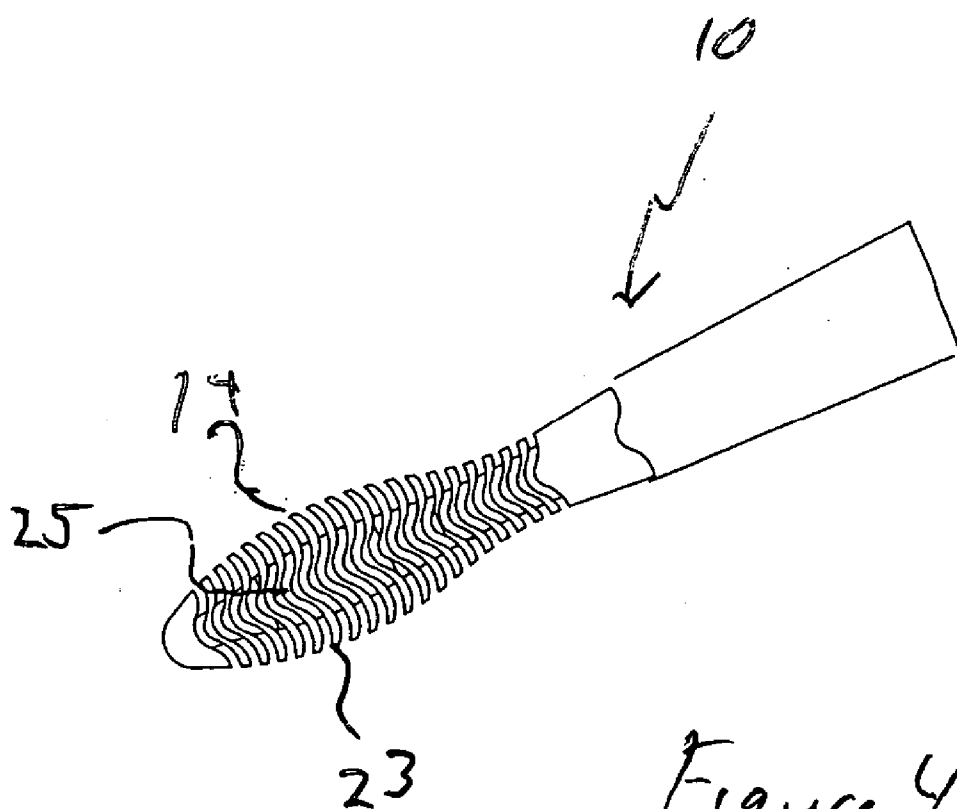
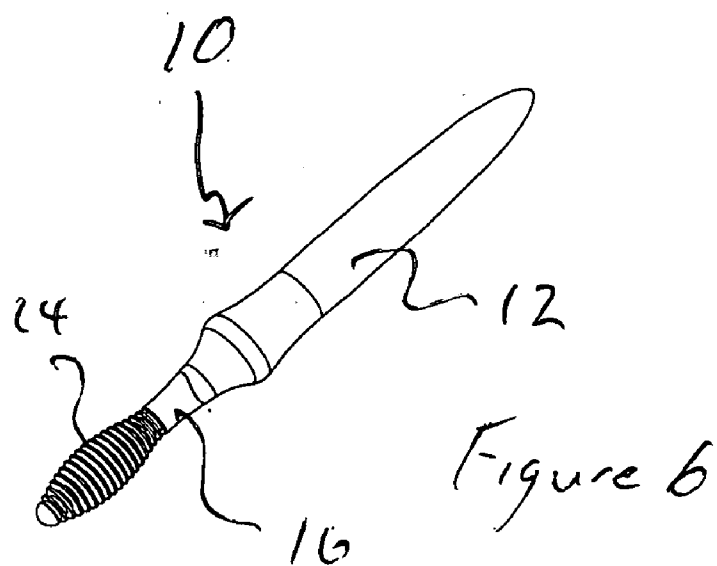
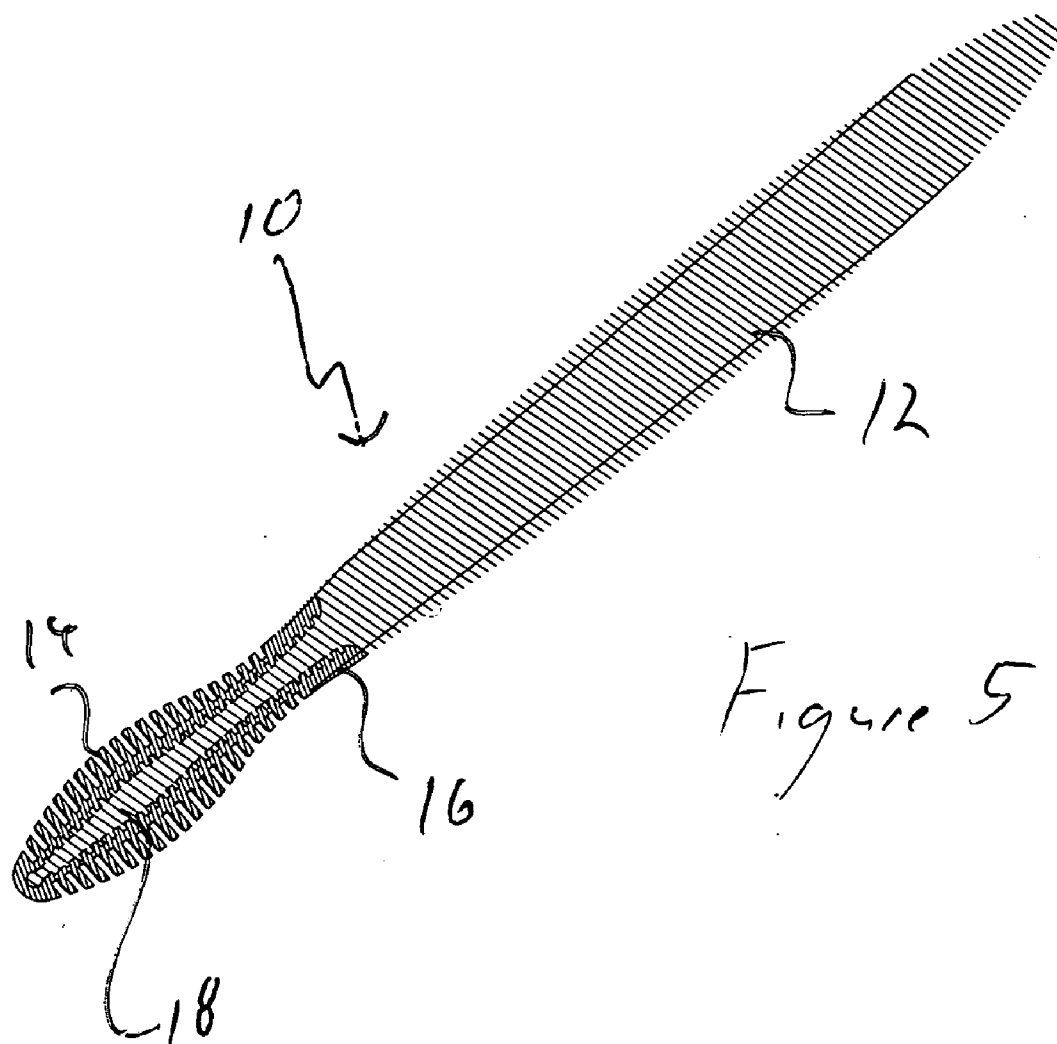


Figure 4



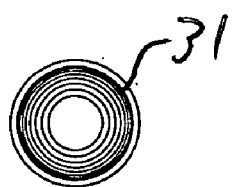
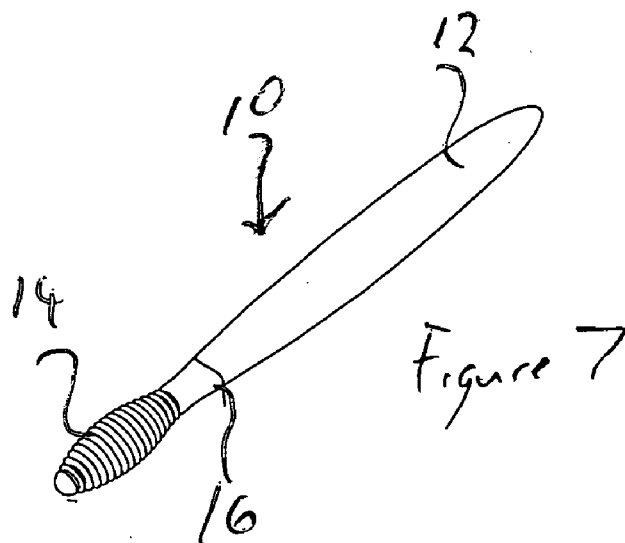


Figure 8

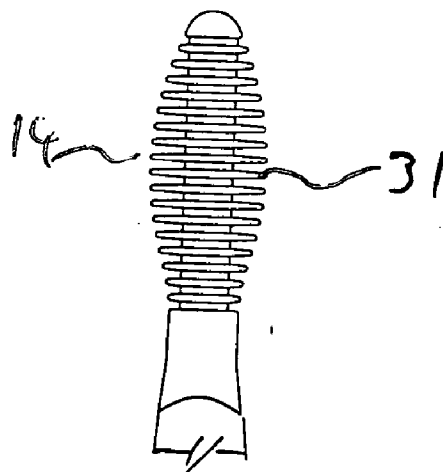


Figure 9

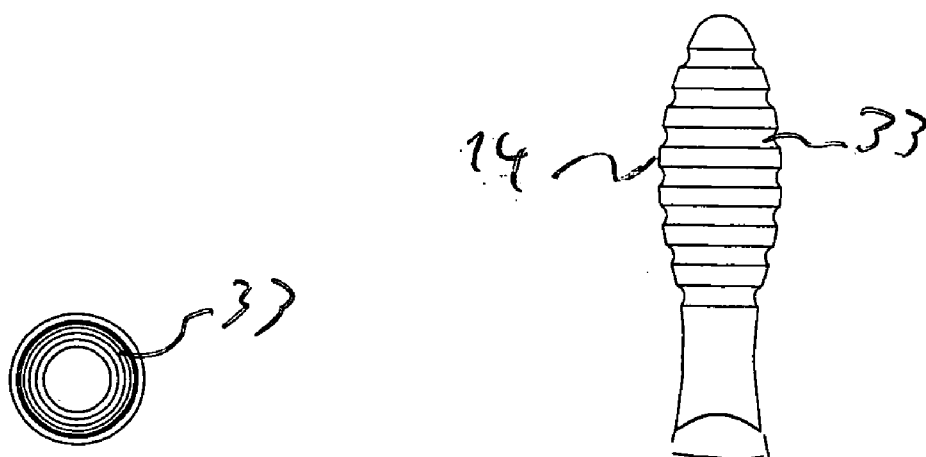
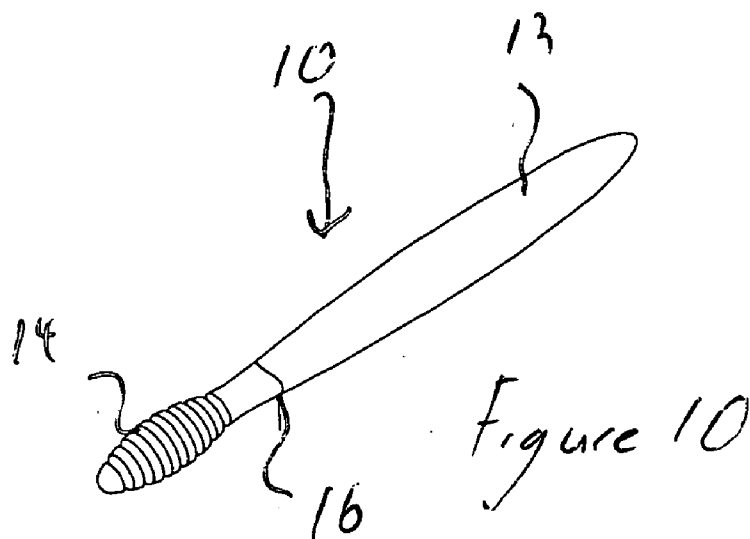
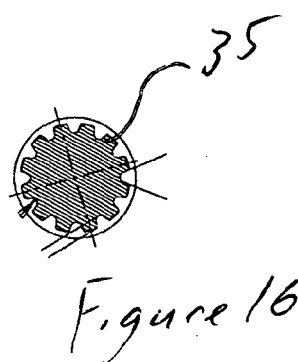
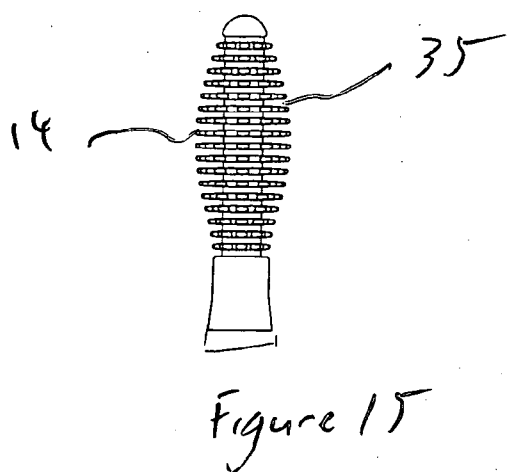
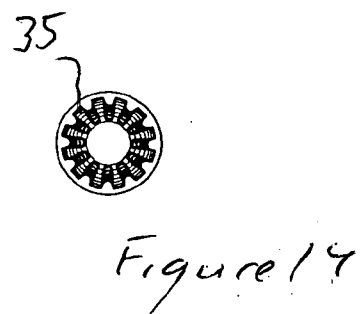
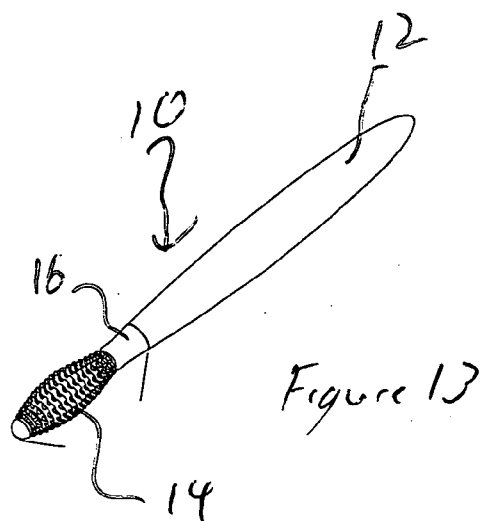


Figure 11

Figure 12



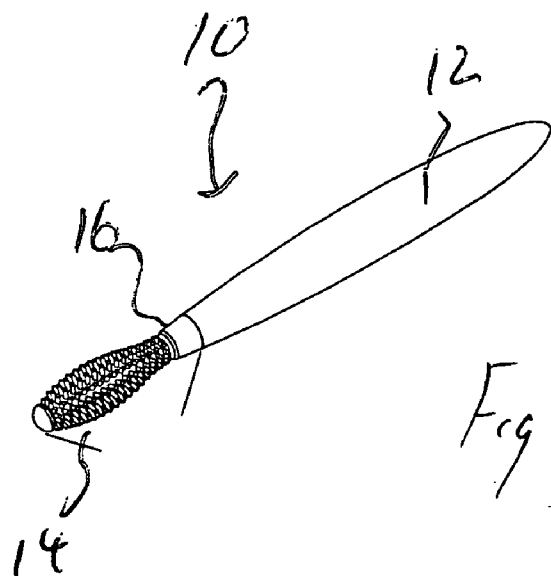


Figure 17

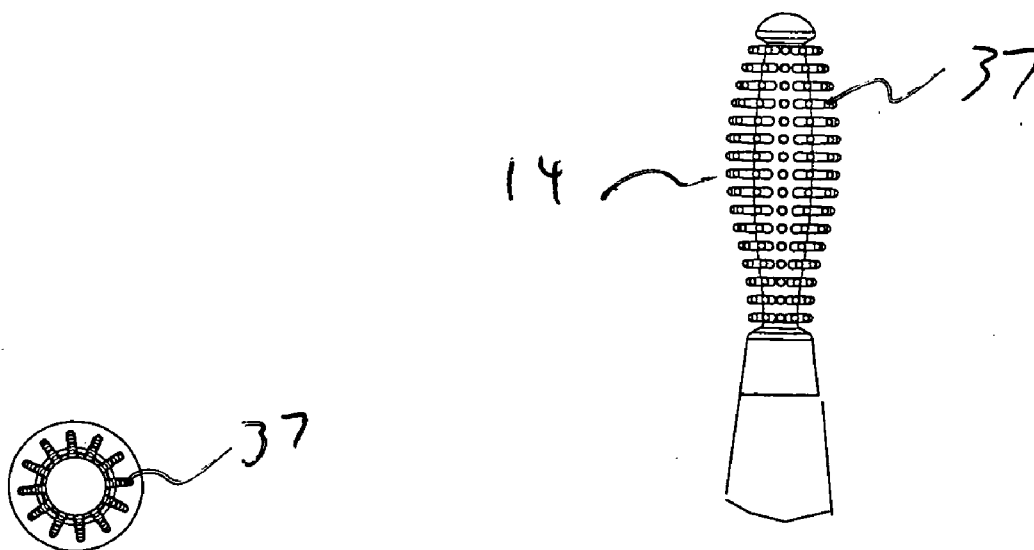


Figure 18

Figure 19



## DENTAL DEVICE

### FIELD OF THE INVENTION

[0001] The present invention relates to dental devices.

### BACKGROUND OF THE INVENTION

[0002] Teeth are covered with a sticky film of bacteria, called plaque. Within this film live thousands of different types of bacteria. Of all these many different types of bacteria, one causes tooth decay: that bacterium is called *Strep Mutans*.

[0003] After eating a meal, small crumbs of food are left in mouths. The *Strep Mutans* bacteria eat these crumbs and produce harmful acid. This acid can attack tooth enamel for as long as 20 minutes or more. Repeated acid attacks cause the enamel of the teeth to break down, resulting in tooth decay.

[0004] If left untreated, the decay will continue to progress through the tooth structure until it reaches the pulp. The pulp chamber houses the nerve and blood supply for the tooth. When decay reaches the pulp, an abscess ensues which is associated with tremendous pain. Once the decay is in the chamber, the only choice of treatments are root canal therapy or extraction of the tooth.

[0005] The best way to prevent decay from forming is by cleaning mouths, thus removing the stray bits of food. If there is no food for the *Strep Mutans* bacteria to digest, then the bacteria cannot create the acid needed to cause decay.

[0006] The earliest known toothbrush dates back thousands of years. Known as a "chew stick", this early brush was made by chewing or mashing small twigs or tree roots until the fibers at one end became loose enough to form a rough brush. The cleaning surface had much the same effect as chewing the end of a toothpick. Some native Australian and African people living traditionally still clean their teeth with chew sticks.

[0007] Ancient Chinese, Romans, and Greeks were also oral hygienists. Five thousand years ago, the Chinese thought dental decay was caused by white-colored dental worms with black heads that could be seen when a tooth was extracted. In those days, cures for toothache included purgatives, mouthwashes, massage, and pills. The pills, usually made of grated garlic and salt peter, were inserted into the ear opposite the side of the face affected by the dental pain.

[0008] The early Romans also had their own dental-care preferences. Pliny the Younger of Rome (61-113 A.D.) proclaimed that using a vulture quill as a toothpick would cause halitosis, but using a porcupine quill was acceptable because it "made the teeth firm." Ancient Roman patricians actually employed special slaves to clean their teeth.

[0009] The Greeks, however, were much more modern. In the third century B.C., Aristotle advised Alexander the Great to rub his teeth every morning with "a thin linen towel, which is somewhat rough." Using linen as a tooth cleaner is documented as late as 1602, when William Vaughan wrote in *Fifteen Directions to Preserve Health* that to keep teeth "white and uncorrupt [people should] wash the mouth after every meal, sleep with the mouth somewhat open and in the morning take a line cloth and rub the teeth well within and without."

[0010] In fifteenth-century Europe, picking the teeth was widely accepted until philosophers began to issue conduct warnings: Rhodes said: "Pick not thy teeth with thy knyfe, but take a stick, or some clean thyng, then doe you not offend."

[0011] The bristle brush was probably invented by the Chinese. This toothbrush was made of hairs from the neck of a Siberian wild boar which were fixed to a bamboo or bone handle. The bristle brush came to Europe during the seventeenth century. At the time, very few people in the Western world brushed their teeth, and those who did preferred horse hairs, which were softer than those of the wild boar.

[0012] French dentists, who were the most advanced in Europe at the time, advocated the use of toothbrushes in the seventeenth and early eighteenth centuries. It was actually the English in 1780 who gave the world the first modern toothbrush. The handle was made from bone and the bristles were wired into bored holes.

[0013] The toothbrush migrated to the United States and dentists urged pre-Revolutionary Americans to use the bristly toothbrushes in the eighteenth and early nineteenth centuries. In the 1880s, hand-cut and polished cattle thigh bones made excellent toothbrush handles while long-haired hog bristles were inserted by hand, one at a time.

[0014] The first mass-produced toothbrush was made by William Addis of Clerkenwald, England. The first American to patent a toothbrush was H. N. Wadsworth (U.S. Pat. No. 18,653). Companies began to mass-produce toothbrushes in America around 1885. The Pro-phy-lac-tic brush made by the Florence Manufacturing Company of Massachusetts is a good example of an early American made toothbrush. The same company was also the first to sell toothbrushes packaged in boxes.

[0015] In 1937, in the laboratories E. I. DuPont de Nemours & Company, nylon was invented by Wallace H. Carothers. (See, for example, U.S. Pat. No. 2,130,948). The first commercialization of this new material came in 1941 with the introduction of Dr. West's Miracle Tuft toothbrush with nylon bristles.

[0016] At first, even if there were many advantages to using this new brush instead of the one made with wild boar hairs (which fell out, did not dry very well and became full of bacteria), consumers were not entirely satisfied. This is because the nylon bristles were very stiff and hurt the gums. In 1950, Du Pont improved their toothbrush by giving it softer bristles and thus ushering in the modern toothbrush era.

[0017] Despite these dental advances, cleaning small children's teeth continues to be a problem. Between the ages of 6 months and around 3 years, the 20 primary or "baby" teeth erupt. The primary teeth are replaced by 32 permanent or "adult" teeth. The first 28 permanent teeth erupt between 6 and 13 years, the final four third molars, or "wisdom" teeth may erupt between 16-21 years.

[0018] Many parents assume that decay does not matter in primary teeth because the teeth will fall out anyway, but decay in primary teeth poses risks. If a child loses his primary teeth too early because of decay or infection, the permanent teeth will not be ready to erupt. Primary teeth act

as a guide for the permanent teeth: if primary teeth are lost too early, the teeth that are left may tip or move into the vacant space. When the permanent teeth are ready to come into the mouth, there may not be enough room. As a result, teeth may erupt out of their proper positions, leading to malocclusion, crooked or crowded. In addition, the primary teeth help a child learn proper speech.

[0019] Decay in infants is called nursing decay. It can destroy the teeth and most often occurs in the upper front teeth. Nursing decay is severe decay of child's top front baby teeth. It is caused when sugary liquids are frequently consumed from a nursing bottle for a prolonged period of time. Breast-fed children may be at risk if fed on demand during the night and especially if the child sleeps with the mother so that nursing can continue at will.

[0020] Decay occurs when sweetened liquids are given and are left clinging to an infant's teeth for long periods. Many sweet liquids cause problems, including milk, formula and fruit juice. Bacteria in the mouth use these sugars as food. They then produce acids that attack the teeth. Each time a child drinks these liquids, acids attack for 20 minutes or longer. After many attacks, the teeth can decay. This problem is exacerbated when a child falls asleep with a bottle during naps or at night. There is decreased salivary flow during sleep and clearance of the liquid from the teeth is slowed. The liquid pools around the upper front teeth and creates an excellent environment to promote the growth of decay-causing bacteria.

[0021] Traditional toothbrushes have proved difficult to adapt for use by parents in infant and small children's mouths, even when downsized. In addition, small children have trouble utilizing traditional toothbrushes to clean their own teeth because of the need to orient the brush perpendicular to the teeth. What is thus needed is device for use in cleaning teeth of infants and small children.

#### SUMMARY OF THE INVENTION

[0022] A device in accordance with the principals of the present invention provides parents with an improved tool to maintain dental hygiene in infants and small children. A device in accordance with the principals of the present invention also provides small children with an improved tool to clean their own teeth without the need to orient the brush perpendicular to the teeth. A device in accordance with the principals of the present invention provides small children with a tool to train as well, empowering children to brush their own teeth.

[0023] A dental device in accordance with the present invention includes a handle portion and a head portion joined by a joinder. The head portion includes a bristle substitute, which comprises a plurality of projections. The plurality of projections encircle the core in a 360 degree circumference. The plurality of projections can include, but are not limited to a plurality of raised wave-shaped projections, a plurality of circular disks, a plurality of circular grooves, a plurality of ribs, a plurality of spikes and combinations thereof.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0024] FIG. 1 is a perspective view of a dental device in accordance with the principles of the present invention.

[0025] FIG. 2 is a perspective close-up view of the head of the dental device of FIG. 1.

[0026] FIG. 3 is a top view of the dental device of FIG. 1.

[0027] FIG. 4 is a side view of the head of the dental device of FIG. 1.

[0028] FIG. 5 is a cross-sectional view of the dental device of FIG. 1.

[0029] FIG. 6 is a perspective view of the dental device of FIG. 1 showing an alternative handle in accordance with the principles of the present invention.

[0030] FIG. 7 is a perspective view of an alternative embodiment of a dental device in accordance with the principles of the present invention.

[0031] FIG. 8 is a top view of the dental device of FIG. 7.

[0032] FIG. 9 is a detailed side view of the head of the dental device of FIG. 7.

[0033] FIG. 10 is a perspective view of a second alternative embodiment of a dental device in accordance with the principles of the present invention.

[0034] FIG. 11 is a top view of the dental device of FIG. 10.

[0035] FIG. 12 is a detailed side view of the head of the dental device of FIG. 10.

[0036] FIG. 13 is a perspective view of an alternative embodiment of a dental device in accordance with the principles of the present invention.

[0037] FIG. 14 is a top view of the dental device of FIG. 13.

[0038] FIG. 15 is a detailed side view of the head of the dental device of FIG. 13.

[0039] FIG. 16 is a cut away view of the head of the dental device of FIG. 15.

[0040] FIG. 17 is a perspective view of an alternative embodiment of a dental device in accordance with the principles of the present invention.

[0041] FIG. 18 is a top view of the dental device of FIG. 17.

[0042] FIG. 19 is a detailed side view of the head of the dental device of FIG. 17.

#### DETAILED DESCRIPTION OF THE INVENTION

[0043] Referring to FIGS. 1-6, a view of a dental device 10 in accordance with the principles of the present invention is seen. FIG. 1 is perspective view of a dental device in accordance with the principles of the present invention. The dental device 10 includes a handle portion 12 and a joinder portion 16. The handle portion 12 is preferably comprised of rigid or semi-rigid materials such as, for example, plastic, composite, ceramic or metal.

[0044] The head 14 includes a small rigid or semi-rigid core 18 in the center. The core 18 can be seen in the cross-sectional view of FIG. 5. In the preferred embodi-

ment, the core is comprised of an extension of the handle portion **12**. The head portion **14** can preferably be co-molded with an elastomeric material or elastomeric foam over the core **18**. In alternative embodiments, alternative materials such as thermoplastic rubber or thermoplastic elastomer can be utilized.

**[0045]** One of the difficulties in cleaning or brushing small children's teeth is maintaining a traditional toothbrush in the proper orientation such that the bristled head is in contact with the teeth. This can be particularly cumbersome as the parent or other caregiver is used to brushing their own teeth and is called upon to attempt to brush the child's teeth in a backwards orientation from what the caregiver is used to. In addition, small children have trouble utilizing traditional toothbrushes to clean their own teeth because of the need to orient the brush perpendicular to the teeth. A device in accordance with the principals of the present invention also provides small children with an improved tool to clean their own teeth without the need to orient the brush perpendicular to the teeth. A device in accordance with the principals of the present invention provides small children with a tool to train as well, empowering children to brush their own teeth.

**[0046]** The head portion **14** comprises a plurality of projections **23**. **FIG. 2** is perspective close-up view of the head of the dental device of **FIG. 1**. **FIG. 3** is top view of the dental device of **FIG. 1**. **FIG. 4** is side view of the head of the dental device of **FIG. 1**. In the embodiment depicted in **FIGS. 1-6**, the projections **23** comprise a plurality of raised wave-shaped projections **25**. These projections **23** act as a bristle substitute to clean the gum and teeth. The use of these projections enables the child's caregiver to clean or brush the child's teeth holding the handle without particular concern of the exact orientation which is a particular benefit of a dental device in accordance with the principles of the present invention. When these projections are referred to herein as encircling the head in a 360 circumference, it is meant to be inclusive not only of these projections encircling the head in a 360 circumference or sufficiently encircling the head so as to achieve the functionality of enabling the user to clean or brush the child's teeth holding the handle without particular concern of the exact orientation.

**[0047]** Conventional bristles are mounted by molding holes with tufts of bristles pushed in place by little metal chips that act as staples. Because the dental device of the present invention is sized to be used for infants and small children, there is very limited room to create holes and have enough core material left to have a strong product. In addition, in order to mold the holes radiating out in 360 degrees, a complicated, costly molding tool and special machinery would be required. This is more complicated than a conventional brush where all the holes are molded from one side and then stapled from one side.

**[0048]** While different sized dental devices in accordance with the principles of the present invention are contemplated as within the scope of the present invention, the dental devices of the present invention are preferably sized for the mouth of a small child. The following exemplary dimensions are given as a non-limiting illustrative example of the size of a dental device in accordance with the principles of the present invention.

**[0049]** In this exemplary example, the handle portion is preferably about 3.9 inches in length, the joiner portion is

preferably about 0.2 inches in length, and the head is preferably about 1.15 inches in length with an about 0.22 inch radius. The width of the plurality of raised wave-shaped projections and the distance between each of the plurality of raised wave-shaped projections is about 0.03 inches.

**[0050]** Referring now to **FIG. 6**, a perspective view of the dental device of **FIG. 1** showing an alternative handle in accordance with the principles of the present invention is seen. The handle portion **12** includes a raised area **27** on which the user can place his or her thumb. The raised area **27** is positioned to approximate the correct distance to the back molars of the mouth of an infant or small child.

**[0051]** Referring to **FIGS. 7-10**, an alternative embodiment of a dental device in accordance with the principles of the present invention is seen. In this alternative embodiment, the projections **23** comprise a plurality of circular disks **31**. The circular disks **31** encircle the core in a 360 degree circumference. As a non-limiting illustrative example of the size of a dental device in accordance with the principles of the present invention, the width of the plurality of circular disks and the distance between each of the plurality of circular disks is about 0.03 inches.

**[0052]** Referring to **FIGS. 10-12**, an alternative embodiment of a dental device in accordance with the principles of the present invention is seen. In this alternative embodiment, the projections **23** comprise a plurality of circular groves **33**. The circular groves **33** encircle the core in a 360 degree circumference. As a non-limiting illustrative example of the size of a dental device in accordance with the principles of the present invention, the width of the plurality of circular groves and the distance between each of the plurality of circular groves is about 0.075 inches.

**[0053]** Referring to **FIGS. 13-16**, an alternative embodiment of a dental device in accordance with the principles of the present invention is seen. In this alternative embodiment, the projections **23** comprise a plurality of ribs **35** formed in a 360 degree circumference. As a non-limiting illustrative example of the size of a dental device in accordance with the principles of the present invention, the width of the plurality of ribs and the distance between each of the plurality of ribs is about 0.03 inches. **FIG. 16** shows a cut away view of the head of the dental device of **FIGS. 13-15**. It is seen that the plurality of ribs **35** are formed as a plurality of extensions on a circular disk. As a non-limiting illustrative example of the size of a dental device in accordance with the principles of the present invention, the depth of each of the plurality of ribs is about 0.02 inches with each of the plurality of ribs formed at an about 45 degree angle.

**[0054]** Referring to **FIGS. 17-19**, an alternative embodiment of a dental device in accordance with the principles of the present invention is seen. In this alternative embodiment, the projections **23** comprise a plurality of spikes **37** formed in a 360 degree circumference. As a non-limiting illustrative example of the size of a dental device in accordance with the principles of the present invention, the width of the plurality of spikes and the distance between each of the plurality of spikes is about 0.033 inches, with the angle between each adjacent of the plurality of spikes about 30 degrees.

**[0055]** It should be understood that various changes and modifications to the preferred embodiments described herein would be apparent to those skilled in the art. Such

changes and modifications can be made without departing from the spirit and scope of the present invention and without demising its attendant advantages. It is therefore intended that such changes and modifications be covered by the appended claims.

What is claimed is:

1. A dental device comprising:
  - a handle portion; and
  - a head portion, the head portion comprising a plurality of projections.
2. The dental device of claim 1 further wherein the handle portion is comprised of rigid or semi-rigid material.
3. The dental device of claim 2 further wherein the rigid or semi-rigid material is selected from the group comprising plastic, composite, ceramic, metal or combinations thereof.
4. The dental device of claim 1 further wherein the handle portion is comprised of rigid or semi-rigid material.
5. The dental device of claim 4 further wherein the rigid or semi-rigid material is selected from the group comprising plastic, composite, ceramic, metal or combinations thereof.
6. The dental device of claim 1 further wherein the head portion includes a small rigid or semi-rigid core in the center.
7. The dental device of claim 6 further wherein the core is comprised of an extension of the handle portion.
8. The dental device of claim 7 further wherein the head portion is co-molded with an elastomeric material or elastomeric foam over the core.
9. The dental device of claim 1 further wherein the head portion is selected from the group comprising thermoplastic rubber, thermoplastic elastomer or combinations thereof.
10. The dental device of claim 1 further wherein the plurality of projections encircle the core in a 360 degree circumference.
11. The dental device of claim 1 further wherein the plurality of projections comprise a plurality of raised wave-shaped projections.
12. The dental device of claim 11 further wherein the plurality of raised wave-shaped projections encircle the core in a 360 degree circumference.
13. The dental device of claim 1 further wherein the plurality of projections comprise a plurality of circular disks.
14. The dental device of claim 13 further wherein the plurality of circular disks encircle the core in a 360 degree circumference.
15. The dental device of claim 1 further wherein the plurality of projections comprise a plurality of circular groves.
16. The dental device of claim 15 further wherein the plurality of circular groves encircle the core in a 360 degree circumference.
17. The dental device of claim 1 further wherein the plurality of projections comprise a plurality of ribs.
18. The dental device of claim 17 further wherein the plurality of ribs encircle the core in a 360 degree circumference.
19. The dental device of claim 1 further wherein the plurality of projections comprise a plurality of spikes.
20. The dental device of claim 19 further wherein the plurality of spikes encircle the core in a 360 degree circumference.
21. The dental device of claim 1 further wherein the handle portion includes a raised area on which the adult user can place his or her thumb.

22. The dental device of claim 21 further wherein the raised area is positioned to approximate the correct distance to the back molars of the mouth of an infant or small child.

23. A dental device comprising:
  - a handle portion; and
  - a head portion, the head portion comprising a bristle substitute, the bristle substitute encircling the core in a 360 degree circumference.
24. The dental device of claim 23 further wherein the handle portion is comprised of rigid or semi-rigid material.
25. The dental device of claim 24 further wherein the rigid or semi-rigid material is selected from the group comprising plastic, composite, ceramic, metal or combinations thereof.
26. The dental device of claim 23 further wherein the head portion includes a small rigid or semi-rigid core in the center.
27. The dental device of claim 26 further wherein the core is comprised of an extension of the handle portion.
28. The dental device of claim 27 further wherein the head portion is co-molded with an elastomeric material or elastomeric foam over the core.
29. The dental device of claim 28 further wherein the head portion is selected from the group comprising thermoplastic rubber, thermoplastic elastomer or combinations thereof.
30. The dental device of claim 23 further wherein the bristle substitute comprises a plurality of projections.
31. The dental device of claim 30 further wherein the plurality of projections comprise a plurality of raised wave-shaped projections.
32. The dental device of claim 30 further wherein the plurality of projections comprise a plurality of circular disks.
33. The dental device of claim 30 further wherein the plurality of projections comprise a plurality of circular groves.
34. The dental device of claim 30 further wherein the plurality of projections comprise a plurality of ribs.
35. The dental device of claim 30 further wherein the plurality of projections comprise a plurality of spikes.
36. The dental device of claim 23 further wherein the handle portion includes a raised area on which the adult user can place his or her thumb.
37. The dental device of claim 36 further wherein the raised area is positioned to approximate the correct distance to the back molars of the mouth of an infant or small child.
38. A dental device comprising:
  - a handle portion; and
  - a head portion, the head portion including means for encircling the head in a 360 circumference, with a plurality of projections.
39. The dental device of claim 38 further wherein the plurality of projections comprise a plurality of raised wave-shaped projections.
40. The dental device of claim 38 further wherein the plurality of projections comprise a plurality of circular disks.
41. The dental device of claim 38 further wherein the plurality of projections comprise a plurality of circular groves.
42. The dental device of claim 38 further wherein the plurality of projections comprise a plurality of ribs.
43. The dental device of claim 38 further wherein the plurality of projections comprise a plurality of spikes.