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SPRING POWER OPERATED TOOTHBRUSH
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 Filed Mar. 10, 1965, Ser. No. 438,610
 4 Claims. (Cl. 15—22)

The present invention relates to a power operated toothbrush and more particularly to that type of toothbrush which has a brush portion driven by a spring motor.

It is well accepted in dental medicine that brushing of teeth is particularly beneficial in reducing dental decay. Brushing of the teeth has the advantage of removing food particles which may be lodged between the teeth or between a tooth and a gum portion. An additional advantage is obtained by brushing of teeth, and that is that the gums are massaged. It is generally well accepted that regular brushing of teeth is sufficient for most people, but many people do not do a thorough job of brushing of teeth, because they do not brush the teeth long enough to remove all of the food particles nor long enough to give sufficient massaging action to the gums. Inadequate brushing occurs particularly among children who need brushing more than adults, inasmuch as, the enamel on their teeth has not sufficiently hardened since emergence.

Power operated toothbrushes especially those which are electrically powered are beneficial in the care of teeth. These electrically powered toothbrushes have several disadvantages in that some of the electrically driven toothbrushes are bulky and are difficult for a child to hold and to manipulate with any amount of facility. Furthermore, some parents have a great deal of hesitancy in allowing a child to use an electrically powered toothbrush in a bathroom. Another distinct disadvantage of the electrically powered toothbrush is that a suitable electrical power source is not always readily available, for instance, a suitable source of electrical power is not always available on a camping trip or on a boat trip. Furthermore, in certain countries foreign to the United States, the electrical power source is distinctly different than that which is available in the United States so that the electrically powered toothbrush may not be operative with that type of electrical power. It is therefore a principal object of the instant invention to provide a spring motor driven toothbrush which is safe to use and may be used in almost any location.

It is another object of the present invention to provide a spring motor operated toothbrush which may be wound up by an adult or older youth for use by a younger child.

It is a still further object of the herein disclosed invention to provide a power operated toothbrush which reciprocates axially and rotationally to provide a massaging action to the gums.

It is another object of this invention to provide a construction for a power operated toothbrush which toothbrush is sealed against moisture.

It is still another object of the instant invention to provide an improved construction for a power operated toothbrush which is simple and economical to manufacture.

It is a still further object of the herein disclosed invention to provide a power operated toothbrush having a minimum of working parts in an arrangement to minimize wear.

Other objects and uses of the present invention will become readily apparent to those skilled in the art upon a perusal of the following specification in light of the accompanying drawing, in which:

FIGURE 1 is a side elevational view of a power oper-

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ated toothbrush embodying the herein disclosed invention and showing a toothbrush portion attached to a handle portion;

FIGURE 2 is a cross sectional side elevational view of the handle portion of the power operated toothbrush shown in FIGURE 1;

FIGURE 3 is a cross sectional view taken on line 3—3 of FIGURE 2;

FIGURE 4 is a cross sectional view taken on line 4—4 of FIGURE 2;

FIGURE 5 is a side elevation of a portion of a rod and a means for locking the rod in one position, but shown in an unlocked attitude;

FIGURE 6 is a perspective view of a cam wheel which constitutes a portion of a drive mechanism shown in FIGURE 2, and

FIGURE 7 is a plan view of a portion of a rod showing curved groove in the rod.

Referring now to the drawings and especially to FIGURE 1, a power operated toothbrush generally indicated by numeral 10 is shown therein. The toothbrush 10 generally consists of a toothbrush portion 12 and a handle portion 14 removably connected to the toothbrush portion 12. The handle portion 14 generally consists of an elongated handle 16 with a housing 18 rotatably connected to the handle and a spring motor 20 mounted inside the housing.

The handle 16 is hollow and has a flared portion 22 adjacent to one end which blends into housing 18 to provide an attractive appearance. At the other end of the handle, there is a guide portion 24, and a button aperture 26 is provided in the handle adjacent to the guide portion for reasons which will become apparent hereinafter. Extending from the flared portion 22 is a shank 28 which has a pin groove 30 formed therein.

The housing 18 includes ring 32 and a cup 34 which is adhesively secured to the ring. A housing pin 36 is fixed in the ring and is positioned in groove 30 so that the housing is free to rotate relative to the handle but may not move axially relative to the same handle. It should be noted that shank 28 mates with ring 32 so that there is no opportunity for the housing to cock relative to the handle. An O-ring 38 is positioned in the ring 32 for sealing engagement with shank 28 so that there is a water tight seal therebetween thereby providing a housing seal. The ring has a cup recess 40 which receives the cup 34.

The cup 34 is generally cylindrical in shape and mates with the cup recess of the ring and is fixed in position by a suitable adhesive. The cup has a spring shaft boss 42 formed integral with its bottom, and a spring pin boss 44 is formed adjacent to one side and is integral with one side of the cup. A shaft support 46 is formed integral with one side of the cup as is a shaft buttress 48 which is spaced from the shaft support.

As was mentioned above, the spring motor 20 is positioned within the housing 18. The spring motor includes a conventional coil drive spring 50 which has its outer end fixed to an end pin 52 which is fixed in the pin boss 44. The interior end of the drive spring is fixed to a drive spring shaft 54. The drive spring shaft has a bearing portion 56 which is rotatably mounted in the shaft support 46. Between the drive spring 50 and the bearing portion 56 is a pinion 58 which rotates with the drive shaft. A gear 60 meshes with the pinion and is fixed to one end of a cam shaft 62 which is rotatably mounted in the shaft support and has its other end rotatably mounted in shaft buttress 48. A cam wheel 64 is

fixed to the cam shaft 62 for rotation therewith. The cam wheel includes a wheel shank 66 and a cam flange 68 which is formed integral with the cam shank. Formed integral with the cam flange is a plurality of cams 70 which drive the toothbrush portion 12.

A rod 72 has a follower portion 74 formed integral therewith and held in engagement with the cam wheel. The rod 72 has a rod collar 76 fixed thereon, and a rod spring 78 is positioned between the rod collar and the guide portion of the handle to urge constantly the rod follower 74 into engagement with the cams 70. The rod 72 has an enlarged portion 80 which mates with the guide portion 24 of the handle in order to guide the rod 72. The enlarged portion of the rod has a curved groove 82 formed therein, and a rod pin 84 is fixed in the guide portion of the handle and rides in the groove 82 to rotate the rod relative to the handle as the rod moves axially relative to the handle. A conventional O-ring 86 is positioned in the guide portion in engagement with rod 72 to provide a seal therebetween. The enlarged portion 80 of rod 72 has an interior thread 88 at one end thereof to receive the toothbrush portion 12.

The toothbrush portion 12 is conventional in its construction in that it includes a stem 90 with conventional bristles 92 fixed thereon. The stem 90 has a threaded stud 94 which mates with the internal thread 88 of the rod 72 so that the toothbrush portion 12 may be readily engaged and disengaged relative to the handle portion 14.

A control means is provided within the housing to control the operation of the spring motor. The control means includes an interior circular rack 96 which is fixed to ring 32. The rack is conventional in its construction in that it contains a plurality of teeth which cooperate with a pawl 98. The pawl 98 has a dog 100 which engages the teeth of the rack. The pawl is pivotally mounted on a pawl shaft 102 which is fixed to one end of shank 28. A spring 104 is connected to the pawl and to the shank to urge constantly the dog into engagement with the teeth. The release means includes a lever 108 which is pivotally connected to handle 16 through a pin 110. The pin 110 is mounted in an ear 112 which ear is formed integral with the handle. The lever 108 has at one end a crescent shaped lock 113 formed integral therewith which lock is engageable with a groove 114 in the rod 72. It may be appreciated that by holding the rod between a pair of cams on the cam wheel, the cam wheel is prevented from rotating, thereby locking the spring motor. A button 115 is fixed to the other end of the lever. The button has button shank 116 fixed to the lever, and a button head 118 is formed integral with the shank. The shank extends through aperture 26 of the handle, and an O-ring 120 is positioned in the aperture to provide a seal between the button and the handle. A spring 122 is fixed to the interior of the handle and is in engagement with the lever to urge the lever toward the rod 72.

The power operated toothbrush 10 is operated in the following manner. The spring motor 20 is wound by holding the handle 16 and rotating the housing 18 relative to the handle. This rotation of the housing causes the drive spring 50 to be tightened. It may be appreciated that as the housing is rotated, the teeth of the rack 96 pass over the dog 100 in a conventional manner. However, the dog prevents rotation of the housing in the opposite direction inasmuch as the dog engages the teeth of the rack.

Once the spring motor is sufficiently wound, the toothbrush 10 is in condition for operation. In order to operate the toothbrush, it is only necessary to push down on button 115. Naturally, the bristles are placed adjacent to the operator's teeth, and the button 115 is pushed down against spring 122, to pivot lever 108 about pivot pin 110. Pivoting of the lever causes the lock 113 to disengage the rod 72 by assuming the attitude shown in FIGURE 5 to allow the cam to move the rod 72 axially

so that the spring motor may operate. Once the spring motor is free, the drive spring 50 through shaft 54 causes the pinion to rotate, and thus, the gear 60 also rotates. Rotation of the gear causes the cam shaft to rotate with the cam wheel. Rotation of the cam wheel causes the cams 70 to move relative to the cam follower 74. The cam follower being held in engagement with the cams 70 by spring 78 reciprocate axially relative to the handle 16. Inasmuch as the toothbrush 12 is fixed to rod 72, the toothbrush also moves axially. It should also be noted that since the rod 72 has curved groove 82 with pin 84 riding in the groove, axial movement of the rod also causes the rod to rotate relative to the handle thereby creating a rotating motion in the bristles relative to the handle. Thus, there is a twofold movement of bristles, that is, axial movement and a rotational movement. This combined reciprocation both axially and rotationally provides a particular beneficial effect in brushing the teeth.

It may be readily appreciated that the instant device is completely sealed against moisture so that there is no opportunity for moisture to seep into the device and thereby damage the interior construction.

It will also be readily appreciated that since the toothbrush is threadedly mounted onto the handle, the same handle portion may be used with a variety of toothbrushes. Thus, one handle portion may be used by an entire family. It should also be noted that the present device may be used any place where teeth are to be brushed, there is no need for electrically to drive the device and all that need be done is to wind up the spring motor and the device is ready for use.

Although a specific construction of the instant invention has been shown and described in detail above, it is readily apparent that those skilled in the art may make various modifications and changes without departing from the spirit and scope of the invention. It is to be expressly understood that the invention is limited only by the appended claims.

What is claimed is:

1. A power operated toothbrush comprising, in combination, a brush, a rod connected to said brush, a cam engageable with said rod for axially reciprocating said rod, a spring holding said rod in engagement with the cam, a gear drivingly connected to the cam, a pinion meshing with said gear, a drive spring drivingly connected to the pinion for rotating said gear to drive the cam, means for controlling the operation of said drive spring, a housing connected to said spring, a hollow handle rotatably connected to said housing and movably receiving said rod, and means for rotating the rod relative to the handle while the rod moves axially relative to the handle by the action of the cam.

2. A device of the character described comprising, in combination, a body, a housing movably connected to the body, a spring mounted in said housing, a pinion drivingly connected to the spring to be driven thereby, a gear meshing with the pinion, a plurality of cams drivingly connected to the gear, means for controlling the operation of said spring, a rod extending through said body and being engageable with the cams for axial displacement relative to the body and means engageable with said rod for controlling said drive spring.

3. A power operated toothbrush comprising, in combination, a hollow handle, a housing rotatably connected to the handle, a spring mounted in said housing, a pinion drivingly connected to the spring to be driven thereby, a gear meshing with the pinion, a plurality of cams drivingly connected to the gear, means for controlling the operation of said spring motor, a rod extending through said handle and being engageable with the cams for axial displacement relative to the handle, means for rotating the rod relative to the handle while the rod moves axially relative to the handle, and a brush attached to said rod to reciprocate simultaneously axially and rotationally relative to the handle.

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4. A power operated toothbrush comprising, in combination, a brush, a rod connected to said brush, a hollow handle reciprocally receiving said rod, a housing movably connected to said handle, a spring mounted in said housing, a pinion drivingly connected to the spring to be driven thereby, a gear meshing with the pinion, a cam drivingly connected to the gear and engageable with the rod to displace the rod axially relative to the handle, a cam spring holding the rod in engagement with the cam, a rack mounted within said housing, a dog pivotally mounted on the handle and engageable with the rack to limit rotation of the rack relative to the handle in one direction, a lever mounted in the handle and engageable with the rod to control operation of the rod, and means for rotating the rod relative to the handle while the rod moves axially relative to the handle to cause the brush to reciprocate axially and rotationally.

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