This invention relates to power driven toothbrushes and more particularly to a toothbrush construction adapted for use with power toothbrushes marketed by the leading manufacturers.

As is well known, there are a relatively large number of electrical toothbrushes presently available on the market. As a rule, each of these units is sold with several toothbrush heads which can be removably fitted by the individual user onto the drive shaft of the power unit. The drive shaft of each of the various makes of electrical units has a particular, and often distinctive, configuration to matingly engage a corresponding configuration in the shank of the toothbrush heads provided with the unit. It will, therefore, be apparent that in replacement of worn brushes it is necessary to purchase a brush head which will properly fit the shaft of the particular power unit in question. At the present time, replacement heads for a particular make of power unit are generally derived from the same source of origin as the power unit and/or the original brush heads.

Under the present circumstances, it will be realized that both the brush manufacturers and brush retailers are faced with the considerable task of providing and stocking replacement brush heads to fit the various makes and models of power units. In addition to the relatively large number of different electrical toothbrush heads, the problems are compounded by other considerations of toothbrush design, such as bristle block size, configuration, and bristle hardness and material, i.e., nylon or hog bristle. Thus, for a particular brush design, the manufacturer must provide numerous brush head designs, molded specifically to fit the power units of the various makes available on the market. When considered in terms of different mold cavities for each make or type of brush head, there is little wonder that many of the desirable types of manually operated toothbrushes are not presently available for use on electrical toothbrush power units. Moreover, at the retail level there are, of course, the problems of ordering, stocking, display and sale of brush heads which will properly fit the myriad of electric brush units now on the market.

It is the principal object of this invention to provide a single brush head, with adapters, to fit the leading makes of electrical power units for toothbrushes. In this way the manufacture and handling are greatly simplified. Moreover, the retail merchandising of the brush is much facilitated, since the retailer and purchaser can be certain that the one package will fit properly the drive shafts of any of the leading makes of power units, such as Broxodent, Py-Co-Pay, Tek, Sunbeam and Westinghouse.

The above and other objects of this invention will be more readily apparent from a reading of the following description with reference to the accompanying drawings, in which—

**FIG. 1** is a perspective view showing a toothbrush head embodying this invention positioned for fitting onto the shaft of an electrical toothbrush power unit;

**FIG. 2** is a top plan view partly in section, showing the coupling of the brush head and shaft of FIG. 1;

**FIG. 3** is a perspective view of an adapter for use in modifying the brush head of FIG. 1;

**FIG. 4** is a plan view of the adapter fitted into the brush head of FIG. 1;

**FIG. 5** is a section on an enlarged scale taken along line 5–5 of FIG. 4;

**FIG. 6** is an enlarged perspective view with parts cut away showing the adapter disposed to receive the shaft of a particular make of electrical toothbrush unit;

**FIG. 7** is a perspective view similar to FIG. 6 showing the adapter disposed to receive the shaft of another make power unit;

**FIG. 8** is a partial cross-sectional view of the FIG. 7 shaft inserted into the brush head fitted with an adapter;

**FIG. 9** is an enlarged perspective view showing another adapter disposed to receive another make of power unit shaft;

**FIG. 10** is an elevational view showing the parts of FIG. 9 in coupled relationship;

**FIG. 11** is a section taken along line 11–11 of FIG. 10;

**FIG. 12** is a section taken along line 12–12 of FIG. 11.

Referring in detail to the drawings, in FIG. 1 is shown the drive shaft 8 of a leading brand electrical toothbrush power unit, shown generally at 10. The drive shaft is similar to that of the Westinghouse or Tek electric toothbrushes. As shown, the shaft is tapered inwardly from the power unit to the outer end of the shaft. In cross section, the shaft has a flat upper section 12 and a convexly curved undersurface 14. Two diametrically opposed lugs 16 extend outwardly from opposite sides of the shaft, providing means for locking the shaft in place in the shank of a toothbrush head.

A brush head embodying this invention is shown generally at 18 in the drawings. Bristles 20 extend from the front surface of an integrally molded brush head having a cavity or socket 22 opening through the opposite or shank end of the brush head. A pair of oppositely disposed slots 24 and 26 extend through the front and back wall portions of the brush head which define the cavity 22. Each of these slots terminates in a hole 27 provided to relieve the stress developed by the outward fixture of the walls of the cavity when the toothbrush shaft is snapped into place in the cavity.

As best shown in FIG. 2, the inner end of the cavity 22 is provided with a socket 28 which has a configuration to snugly receive the inner end portion of the shaft 8. From the outer end of the socket 28 the cavity 22 opens to a substantially greater dimension, both in height and width than the socket 28. As a result there is a substantial clearance between the inner wall of the cavity and the shaft 8 from the tip portion which is fitted in the socket 28 to the lugs 16.

In cross section, socket 22 has a flat upper wall, depending side walls and a convexly curved bottom wall; the inner surface of the cavity is provided adjacent its outer end with a pair of spaced parallel ribs 30 which extend completely around the inner surface of the cavity. The ribs are spaced apart sufficiently to accommodate snugly therewithin the lugs 16 of the power unit shaft.

Through the bottom wall of the cavity is a second opening 32, disposed well forwardly of the hole 27 and approximately midway between the inner and outer ends of the cavity 22. As will hereinafter be described, the opening 32 is provided for locating into place within the cavity 22 the adapters which will hereinafter be described. A similar opening may also be provided in the top wall generally opposite the opening 32 to provide additional interlocking of one adapter in the brush head.

As the shaft 8 is inserted into the shank end of the brush head 18, the lugs 16 engage the outer rib 30, FIG. 2, located outwardly of the slotted portion of the cavity 22. With continued insertion, the lugs are forced past the outer rib 30, deflecting outwardly the opposed side wall portions of the cavity defined by the slots 24 and 26.

The resilience of the synthetic plastic results in the lugs 16 being snapped into the groove between the two ribs 30. To remove the brush head it is only necessary to pull
it directly outwardly from the power unit. In this way, the outer rib 30 is again deflected outwardly by the lugs, resulting in disengagement of the lugs 16 from the groove between the two ribs 30.

The engagement of the lugs 16 in the groove between the ribs 30 and the fit of the inner end portion of the shaft 8 in the socket 26 provides a secure and firm gripping action of the brush head on the shaft, and also insures the utmost ease in coupling and uncoupling the brush and shaft. In addition, the inner configuration of the cavity 22 is of sufficient cross-sectional size to accommodate a plurality of adapters provided in the same package with the brush head 18.

To adapt the brush head 18 to another make of electric toothbrush, such as for example a Broxodent or Py-Co-Pay unit, the brush head cavity is modified by the insertion of an adapter 40, FIG. 3. As shown, the adapter has an external configuration corresponding generally to the internal configuration of the cavity 22.

As shown in FIGS. 3–7, the inner end of the adapter has a tip portion 42 which fits snugly into the socket 28 at the inner end of the brush head cavity 22. The adapter has generally flat upper and side walls and a generally concave undersurface. Each of the side walls of the adapter is provided with a lug 44 dimensioned to fit snugly between the ribs 30 in the brush head cavity 22. The top and bottom walls of the adapter 40 are provided with entry slots 46 and 48, respectively, which open through the end wall of the adapter. As will hereinafter be described, the slots have a width to snugly engage upstanding ribs or flanges of certain types of power unit shafts.

The upper slot 46 terminates inwardly of the lugs 44, and lower slot 48 is substantially shorter in length than the slot 46. Intermediate their ends, both slots are notched or recessed as shown at 50 (FIG. 6) at a point approximately in line with the outer edge of the locking lugs 44. The notches 50 provide means for lockingly interengaging lugs found on certain particular toothbrush power unit shafts, as will be described.

In the embodiment shown, the undersurface of the adapter 40 is provided with a lug 52 (FIGS. 4 and 5) disposed and dimensioned to fit into the opening 33 in the undersurface of the brush head 18. The lug tapers outwardly and rearwardly from the undersurface of the adapter 40, and thus acts in the manner of a wedge permitting a relatively easy insertion of the adapter into the cavity 22 of the brush head. However, once the lug snaps into place in the opening 32, the adapter is permanently locked in place, thereby securing the brush head cavity, and for all practical purposes cannot be removed. Outwardly of the lugs 44, the adapter 40 flares outwardly so as to provide a close fit with the inner wall of the cavity 22 at its outer portion beyond the outer rib 30.

Within the adapter, is a cavity 51, best shown in FIGS. 3, 6 and 7, which is generally of rectangular configuration. The bottom of the cavity 51 is provided with a centrally located longitudinally extending groove 49 which serves to accommodate the rib or flange extending downwardly from the shafts of certain makes of electric toothbrushes.

The slots 46 and 48 of the adapter are located to register with the slots 24 and 26 respectively of the brush head 18 (FIG. 1). With this alignment of the adapter and brush head slots, the outer-end portion of the adapter is capable of being flexed in the same manner as the outer side wall portions of the brush head. This, of course, facilitates insertion and removal of the shafts of various makes of electric toothbrushes. In addition, some power unit shafts have upstanding flanges, such as shown in FIGS. 6 and 7, and while these flanges will vary in height from one manufacturer to another, with the alignment of slots in the adapter and brush head, the shafts with higher upstanding flanges can be received in the adapter with their flanges extending outwardly through slots 24 and 26 of the brush head. Such a fit is shown at 60 in FIGS. 7 and 8 for a Py-Co-Pay type power unit shaft.

Shown in FIG. 6 is a shaft 53 of the type found on the Broxodent power unit. The body of the shaft is generally rectangular in cross section and its upper and lower surfaces are provided with ribs 54. The rib on the upper surface of the shaft terminates at its inner end in a lug 56 of generally circular configuration, having a diameter approximately equal to the circle formed in part by the notches 50 in the adapter. When the adapter is fitted onto the Broxodent shaft the slots 46 and 48 receive the upstanding ribs 54 of the shaft and with complete insertion the lug 56 snaps into place in the recesses 50 in the tip portions of the upper slot 46. The fit of the shaft in the recess of the adapter 48 is such that the motion of the shaft is accurately and uniformly transmitted to the toothbrush head. Moreover, the lugs 50 latch the adapter in place on the shaft.

An electric toothbrush shaft of the type found on the Py-Co-Pay unit is shown at 60 in FIG. 7. This fits into the cavity of the adapter as shown in FIG. 7. This shaft comprises a generally rectangular blade 61 with tapered outer end. Flanges 62 and lugs 64 extend in opposite directions from the upper and lower surfaces of the blade 61. The flanges and lugs are dimensioned to be received in the adapter with the notches 50 of the adapter 24 and 26 of the brush head. It will, of course, be realized that in FIGS. 6 and 7, the toothbrush head has been omitted for ease of illustration. It will be appreciated, however, that the adapter would be fitted into the toothbrush head if the user were desirous of using the brush with the various types of units described in connection with FIGS. 6 and 7.

In FIGS. 9–12 there is shown a second adapter 68 to fit into the cavity of the brush head 18. Externally the adapter is somewhat similar to the adapter described above. The adapter 68 includes in a power unit shaft portion 70 of reduced diameter, a generally flat upper surface and convexly curved undersurface. Lugs 72 are provided on the side walls and serve to interfit with the ribs 30 of the brush head. A tapered lock lug 74 is provided on the undersurface of the adapter and serves the same purpose as lug 52 of the adapter previously described. The outer end portion 76 of the adapter is flared outwardly to engage the inner wall of the brush head at its outer end. The upper surface of the adapter 68 includes at one end a cup-shaped recess 78 and adjacent the outer end portion an opening or port 80 which extends through the upper wall of the adapter and serves to communicate the inner cavity 82. The recess 78 and port 80 provide for economics of molding material and assist in the removal of the completed adapter from the cavity of the mold.

The cavity 82 comprises at its inner end a socket 84 of generally rectangular cross section, dimensioned to snugly receive the similarly shaped outer portion of a toothbrush power unit shaft, such as shown at 86 in FIG. 9. The shaft shown is one of the type, such as used on the Sunbeam toothbrush power unit. At the outer end of the socket 84, the cavity opens to a generally circular cross section of relatively larger diameter than a corresponding cylindrical portion 88 of the adapter shaft. This portion of the cavity 82 is of sufficiently large diameter to freely accommodate the cylindrical portion of the shaft 86, and insures the proper and complete seating of the outer end of the shaft in the socket 84.

Adjacent the outer end of the adapter, a number of projections or ribs 90 are provided, as best shown in FIGS. 11 and 12. As shown, the ribs are in the form of sectors, bridging portions of the circumference of the cavity 82, at locations spaced 90° apart. The ribs 90 are dimensioned to fit within a circumferential groove 92 on the shaft 86 of the power unit shaft 80 provided through the bottom wall of the adapter. This slot provides for flexibility of the outer end wall portions of the adapter to permit these wall portions to be flexed outwardly as the cylindrical portion 88 of the power unit shaft is in-
serted between the inwardly extending ribs 90. With complete insertion the ribs 90 snap in place in the groove 92. The ribs 90 and groove 92 thus serve to snugly latch the adapter and toothbrush power unit shaft for all the normal usage of brushing the teeth and massaging the gums. The outer rim of the groove 90 is beveled to permit removal of the brush head from the adapter, the end wall portions of the adapter being flexed outwardly on the retraction of the shaft 86.

Of course, it will be realized that the owner of a power tooth brush with a shaft such as shown at 86 in Fig. 9, would first insert an adapter, such as shown at 86, into the brush head 18 and lock it in place by means of the lug 74. Thereafter, the brush head, modified by adapter 68, can be readily snapped "on" and "off" the shaft of the power unit in the same manner as any conventional toothbrush head designed especially for the particular unit.

In accordance with this invention, there are provided with a single brush head, which best is capable of fitting leading makes of toothbrush power units, a plurality of adapters each capable of modifying the brush head to receive one or more other leading models of power unit. The purchaser need thus only select one adapter, which may be color coded, for his particular brand of power unit and lock it in place in the brush head. Once this is done, the brush head is used in precisely the same fashion as though it were molded specifically to fit the particular toothbrush shaft. Thus, in a single package a brush head is provided which can be made to fit all the leading toothbrush power unit models presently on the market.

Having thus described the invention, what is claimed is:

1. For power toothbrushes a removable brush head having a socket for coupling to a predetermined model of power unit, said socket including means for releasably interengaging the drive shaft of said power unit, said brush head including at least one slot opening into said socket at the coupling end of the brush head, at least one adapter of molded synthetic plastic material including means extending from the surface thereof for locking the adapter in place in said socket, said adapter having an internal cavity therein for releasably latching onto the shaft of at least one other power unit, said adapter having at least one slot disposed to register with the slot at the coupling end of the brush head.

2. For power toothbrushes a removable brush head having a socket for coupling to the shaft of at least one predetermined model of power unit, said brush head being formed of synthetic plastic material and including oppositely disposed slots opening into the socket at the coupling end of the brush head, at least one adapter of molded synthetic plastic material having a lug extending from one surface thereof, the socket of the brush head being provided with an opening for receiving said lug for locking the adapter in place in the brush head, said adapter having an internal cavity with means therein for releasably latching onto the shaft of at least one other model of power unit, said adapter having at least one slot disposed to register with one of said oppositely disposed slots of the brush head, said brush head and adapter both being made of flexible plastic material, whereby the slots in the brush head and the slot in the adapter permit flexure of the adapter and brush head upon insertion and removal of power unit shafts from the cavity when the adapter is locked in place in the socket of said brush head.

3. For power toothbrushes a removable brush head as set forth in claim 2 in which said cavity has a generally rectangular inner end portion, a generally cylindrical central portion and a plurality of ribs adjacent the outer end thereof for latching engagement with the shaft of said other power unit.

4. For power toothbrushes a removable brush head as set forth in claim 2 in which said adapter includes a pair of slots, each disposed to register with one of said oppositely disposed slots in the brush head, the registration of the slots in the adapter and brush head providing openings which extend from the cavity of the adapter outwardly through the wall of the brush head, said opening being dimensioned to snugly accommodate flanges provided on the shafts of certain power unit models, and further to provide flexure of the outer end portions of the brush head and adapter when assembled relation to facilitate insertion and removal of said power units from the cavity of the adapter.

5. For power toothbrushes a combination brush head and adapters, said brush head being provided with a socket for releasably coupling onto the shaft of at least one model of power unit, said brush head including oppositely disposed slots communicating with said socket and opening through the coupling end thereof, said adapters each having an internal cavity and means for releasably latching onto the shaft of at least one other model of power unit, each of said adapters including a lug extending from the surface thereof and being downwardly tapered toward the inner end of the adapter, the socket of said brush head being provided with an opening disposed to receive said lug for locking said adapters in place in said socket, said brush head and adapters being formed of flexible synthetic plastic material, each of said adapters including at least one slot disposing through its after end to register with one of said slots in the brush head, each of said adapters including at least one slot disposed through its after end to register with one of said slots in the brush head, each of said adapters further including means, projecting into the cavities thereof, for releasably interengaging corresponding projections on the shaft of at least one other model of power unit, the slots in the brush head and adapters providing for flexure of the after ends of the adapter and brush head when in an assembled relation to permit the shafts of the power units to be selectively coupled and uncoupled therefrom.

6. For power toothbrushes a combination brush head and adapters as set forth in claim 5 and in which said means projecting into said cavities includes a plurality of circumferentially spaced ribs in the form of sectors adjacent the outer end of one of said adapters.

References Cited

UNITED STATES PATENTS

3,182,245 5/1965 Smith 15—22 X
3,187,360 6/1965 Spohr 15—22

CHARLES A. WILLMUTH, Primary Examiner.
EDWARD L. ROBERTS, Examiner.