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(54) **Toothbrush**

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EP 0 601 574 B1

Description

The invention relates to a toothbrush consisting of a handle with a coupling end, and of a brush head with a coupling end, it being possible for the brush head to be firmly but releasably connected to the handle by engagement of their coupling ends.

A toothbrush of this type is known from EP 0,326,363 A1. In this toothbrush, the brush handle has a conical shape at its front end and the rear end of the brush head facing the brush handle has a recess corresponding to the conical end of the brush handle. The cone on the brush handle is provided with an annular bead which engages in an annular groove in the recess of the brush head and thus forms a snap-in holding device which fixes the brush head on the brush handle in the axial direction. Longitudinal ribs provided on the cone engage in corresponding longitudinal grooves in the recess of the brush head in order to provide a connection which is fixed in terms of rotation.

The invention is based on the object of improving a toothbrush of the known generic type stated, in such a way that the brush head is firmly clamped in the axial direction in its connection to the brush handle. As a result, a hygienically satisfactory connection between the brush head and the handle is to be ensured. Furthermore, when positioning the bristles of the brush head on the teeth at the place to be treated, a correspondingly secure grip in the hand holding the brush is to be imparted to the user. In this case, the toothbrush is to be easy to handle and quick to assemble for the user.

To achieve this object, the invention is characterised by

an actuating member which is secured movably on the handle;

a gearing which is arranged inside the handle and has a driving gear, which is firmly connected to the actuating member, and a driving gear;

a spindle which is mounted axially movably and rotatably in the handle, one end of the spindle being connected for rotary movement to the driving gear of the gearing inside the handle, and the other end of the spindle being mounted in the coupling end of the handle and having a first part of the device for the releasable connection of the handle to the brush head;

a second part of the device in the coupling end of the brush head for the releasable connection to the first part of the device at the other end of the spindle.

The gearing is preferably a speed-transforming transmission whose driving gear is coupled to the actuating member and whose output gear meshes with a pinion which is formed by the inner end of the spindle. The driving gear of the speed-transforming transmission may be an inner gear. In this case, it is expediently

mounted with its cylindrical circumferential surface in a sliding bearing, formed by the handle, so as to be rotatable and fixed against axial movement. However, the driving gear of the speed-transforming transmission can also be an outer gear. In this case, it can have a shaft end which is mounted rotatably but axially non-movably in a bracket formed by the handle approximately parallel to the pinion of the spindle.

The coupling of the actuating member to the speed-transforming transmission advantageously consists of a bevel gearing whose driving bevel gear is firmly connected to the actuating member and whose output bevel gear forms a unit with the driving gear of the speed-transforming transmission. The driving bevel gear may be provided with a shaft end which is mounted rotatably transversely to the longitudinal axis of the handle in a side wall thereof. A ring gear may be located with spacing coaxially opposite the driving bevel gear and be provided on the end side facing away from the driving bevel gear with a shaft end which engages rotatably in a sliding bearing of a second side wall of the handle located opposite the first side wall. In this case, the driving bevel gear is advantageously constructed as an integral constituent of the actuating member.

The actuating member may be a lever whose swivel axis is formed by the shaft ends of the driving bevel gear and the ring gear. In this case, in its position which locks the brush head, the lever may fill an opening in an inside wall of the handle, such that the outside of the lever is flush with the outer surface of the handle on its inside or underside.

The end of the lever facing away from the neck of the handle preferably has on the inside of said lever a lever arm whose forked, free end is formed by the driving bevel gear and the ring gear. With the lever, the lever arm preferably encloses an acute angle which opens towards the handle neck.

The spindle is expediently provided with a guiding spindle which is mounted with screw motion in a threaded bearing inside the neck of the handle. In this case, the guiding spindle may be arranged on a central longitudinal portion of the spindle. Furthermore, longitudinal portions at the two ends of the spindle may have a smooth outer surface and be mounted rotationally and axially displaceably in each case in a sliding bearing in the neck of the handle. The end of the spindle mounted in the neck may advantageously be provided with a thread corresponding to a thread in an insertion opening in the coupling part of the brush head, the thread being arranged in the bottom of the insertion opening of the brush head.

The neck of the handle is advantageously provided with a socket whose length and cross-section correspond approximately to the depth and the cross-section of the insertion opening in the brush head. In this case, the plug-in connection for the coupling parts of the brush head and of the handle is provided with a centring device. Said centring device preferably consists of a non-round cross-section of the insertion end on the

handle and of a corresponding cross-section of the insertion opening in the brush head. Furthermore, it is useful to construct the plug-in connection between the insertion opening in the brush head and the socket on the handle as an easy-fitting lock-in connection. As a result, making the positive-fitting, axial plug-in connection is perceptible for the user, said connection being a prerequisite for the subsequent axial locking of the brush head with the handle by rotating the spindle.

The invention is described in detail below with reference to the diagrammatic drawings of an exemplary embodiment.

- Figure 1 shows a lateral view of the toothbrush, partially in longitudinal section, with a brush head mounted, a gearing with an inner gear, and an actuating member in the locking position;
- Figure 2 shows a view of the toothbrush similar to Figure 1, in which, however, the brush head is separate from the handle and the actuating member is shown in the unlocking position;
- Figure 3 shows a second embodiment of a toothbrush in a view similar to Figure 1, a gearing being provided with an outer gear;
- Figure 4 shows a view similar to Figure 3 with a brush head which is unlocked and moved out of the handle;
- Figure 5 shows a cross-section along the line V-V in Figure 1;
- Figure 6 shows the brush head according to Figures 1 and 2 in a plug-on position;
- Figures 7a, 7b and 7c show different centring devices for centring the brush head on the handle of the toothbrush, each in a diagrammatic cross-section along the line VII-VII in Figure 4 on an enlarged scale.

Figure 1 shows a plastic toothbrush 20 which consists of a handle 22 and a brush head 24 with a bristle zone 26. A neck 28 of the handle 22 has a coupling end 30. The brush head 24 has a coupling end 32. The brush head 24 and the handle 22 are connected firmly but releasably to one another by engagement of the two coupling ends 30, 32.

According to Figures 1 and 5, the handle 22 and its neck 28 consist of a hollow box profile 34 with an outside wall 36, an inside wall 38, a side wall 40 on the left and a side wall 42 on the right in Figure 5. A front longitudinal portion of the inside wall 38 extending up to the

handle neck 28 has an opening 44 which is filled by an actuating member 46 which may be constructed as a lever 48 (Figures 1, 2 and 5). The end of the lever 48 facing away from the handle neck 28 has on the inside a lever arm 50 which, with the longitudinal axis of the lever 48, forms an acute angle which opens in the direction of the handle neck 28.

The inner end of the lever arm 50, protruding into the hollow space of the box profile 34, is branched. According to Figure 5, the branch consists of a ring gear 52 and a driving bevel gear 54 of a bevel gearing 68. The ring gear 52 and the driving bevel gear 54 are arranged spaced apart on a common imaginary axis 56 which extends at a central height along the side walls 40, 42 of the box profile 34 perpendicular thereto.

The ring gear 52 is formed integrally with a shaft end 58 on its side facing away from the driving bevel gear 54. The inside of the side wall 42 of the box profile 34 located opposite the shaft end 58 is provided with a sliding bearing 60 which consists of a circular-cylindrical depression in which the shaft end 58 of the ring gear 52 engages rotatably.

The driving bevel gear 54 is likewise integrally constructed with a shaft end 62 on its side facing away from the ring gear 52. The inside of the left side wall 40 of the box profile 34 located opposite the shaft end 62 has a sliding bearing 64 which is constructed coaxially opposite and corresponding to the sliding bearing 60. The shaft end 62 of the driving bevel gear 54 engages rotatably in said sliding bearing 64. Consequently, the two shaft ends 58, 62 of the ring gear 52 and driving bevel gear 54 form a swivel axis for the lever 48, said swivel axis being coaxial with the imaginary axis 56, and the ring gear 52 and the driving bevel gear 54 executing a rotary movement when the lever 48 is swivelled.

According to Figures 1 and 2, the bevel gearing 68 is formed by the driving bevel gear 54 with an output bevel gear 66. The output bevel gear 66 is arranged on the end side of an inner gear 70 facing away from the handle neck 28 and forms a plastic part with said inner gear. The inner gear 70 is the driving gear for a pinion 72 and, with the latter, forms a speed-transforming transmission 74 for a spindle 76. The inner gear 70 has a smooth cylindrical circumferential surface 71 and is mounted rotatably, but axially non-displaceably in a sliding bearing 78 whose imaginary axis 80 runs approximately parallel to the longitudinal axis of the handle 22. The sliding bearing 78 is arranged in the region of the front end of the handle 22 behind the handle neck 28 and surrounds the inner gear 70 in the manner of a bracket or ring. The sliding bearing 78 is formed integrally with the handle 22 from plastic material. The inner gear 70 is of cup-shaped design, a cylindrical cutout 82, coaxial with the axis of rotation 80 of said inner gear, facing the handle neck 28 and the cylindrical wall of the cutout 82 being provided with an internal tooth gearing 84.

The pinion 72 forms the inner end of the spindle 76 and extends only over a length thereof which is dimen-

sioned to be slightly larger than the axial depth of the cutout 82 of the inner gear 70 having the internal tooth gearing 84. The front end of the pinion 72 forming the inner end of the spindle 76 is arranged with a greater or lesser axial spacing from the bottom of the cutout 82 of the inner gear 70 depending on whether the spindle 76 is in its position retracted into the handle 22 or its position moved out of the handle.

A longitudinal portion 86 of the spindle 76, said portion having smooth walls, is provided ahead of the pinion 72 in the direction of the brush head 24. With this longitudinal portion 86, whose diameter corresponds approximately to that of the pinion 72, the spindle 76 is supported axially movably and rotatably in a sliding bearing 88 which, in turn, is produced integrally with the handle 22 from plastic material. The sliding bearing 88 is arranged in the vicinity of the inside of the outside wall 36 of the handle 22, such that the longitudinal portion 86 and the pinion 72 are disposed with slight spacing from the inside of the outside wall 36 approximately parallel to the latter. At the same time, the sliding bearing 88 forms an abutment for the pinion 72 which, as a result of the described position of the rear end of the spindle 76, engages in the internal tooth gearing 84 of the inner gear 70 at that point at which the inner gear 70 assumes the smallest spacing from the outside wall 36. The longitudinal portion 86 having smooth walls is, of course, dimensioned to be of such a length that the spindle 76 is also mounted satisfactorily in any of its end positions. Since the sliding bearing 88 has a convex bearing surface in cross-section, as shown in Figures 1 and 2, the longitudinal portion 86 having smooth walls is supported substantially only on one line of contact with the least possible friction.

As can be seen from the figures, the spindle 76 is curved so that it can adapt to the physiologically related and therefore desired curvature of the handle neck 28. For this purpose, the spindle 76 is produced from flexible material which may preferably be plastic material or even spring steel. The flexibility of the spindle 76 is assisted by the fact that the diameter of the circular cross-section of the spindle 76 is reduced over a substantial part of its length in relation to the longitudinal portion 86 and the pinion 74. This flexible main longitudinal portion is denoted by reference numeral 90; its curved longitudinal portion is denoted by 92 and is situated with slight axial spacing from the smooth-walled longitudinal portion 86 of the spindle 76. The main longitudinal portion 90 has a circular cross-section and is likewise constructed with smooth walls.

On an approximately central longitudinal region between the two sliding bearings 88, 96, the main longitudinal portion 90 of the spindle 76 is provided with a guiding spindle 100 whose coarse-pitch thread is mounted with screw motion in a corresponding internal thread of a threaded bearing 102 in the handle neck 28. The coarse-pitch thread allows a relatively large axial movement of the spindle 76 with, in contrast, a relatively small angle of rotation of the spindle 76 of preferably

less than 180°. Once again, the threaded bearing 102 is produced integrally with the handle neck 28 from plastic material.

One end 94 of the main longitudinal portion 90 of the spindle 76, said end being at the front in the direction of the brush head 24, is once again mounted axially displaceably and rotatably in a sliding bearing 96 which is formed by the front end of the handle neck 28 and a socket 98 constructed uniformly with the latter. The sliding bearing 96 thus extends over a substantial length, by means of which a satisfactory, precise guiding of the spindle 76 is ensured, which in turn is important for a secure attachment or fastening of the brush head 24 to the handle 22.

The front end 94 of the main longitudinal portion 90 of the spindle 76 has an outer end 104 which, in the assembled state of the toothbrush 20 in Figure 1, protrudes out of the socket 98 of the coupling end 30 of the handle neck 28 but, in the disassembled state of the toothbrush 20 according to Figure 2, is arranged and protected inside the socket 98. The outer end 104 of the spindle 76 is provided with a thread 106 whose pitch corresponds to that of the coarse-pitch thread of the guiding spindle 100. The socket 98 is greatly decreased or reduced in the cross-section in relation to the coupling end 30 of the handle neck 28 which is tapered towards the brush head 24, such that an annular shoulder 108 is formed. Directly ahead of the shoulder 108, the socket 98 is provided with an annular lock-in groove 110 (Figures 2 and 6).

In the rear region of the bristle zone 26, the coupling end 32 of the brush head 24 has a thickening 112, such that two longitudinal rows of bristles are dimensioned to be shorter than the other bristles in increasing stages towards the rear end of the bristle zone. Since the shorter bristles are more resistant to bending, a better cleaning effect can be achieved with this rear, central region of the bristle zone over a prolonged period, which is facilitated, inter alia, by the arrangement of an insertion opening 114 in the end side facing the handle neck 28. In contrast, the longitudinal rows of bristles on the two outer sides of the bristle zone are of equal length, that is to say not shortened, over the entire length of the bristle zone. This allows gentle cleaning of the gum pockets.

The inside wall of the insertion opening 114 is provided in the region of the opening edge of the latter with an annular lock-in bead 116. The depth of the insertion opening 114 is adapted to the length of the socket 98. The cross-sections of the socket 98 and of the insertion opening 114 are matched to one another precisely. In the bottom 115 of the insertion opening 114 there is a threaded bore 118 whose thread is likewise a coarse-pitch thread which corresponds to the thread 106 at the outer end 104 of the spindle 76. However, the threaded bore 118 has a greater depth in comparison to the length of the thread 106, such that the brush head 24 can be clamped firmly in the axial direction against the neck 28 of the handle 22 by means of the screw connec-

tion of its threaded bore 118 to the thread 106 at the outer, front end 104 of the spindle 76 (Figure 1).

The lock-in groove 110 of the socket 98 and that of the lock-in bead 116 of the insertion opening 114 serve the purpose of producing a locking resistance which is perceptible for the user of the toothbrush and which, when it is overcome in the insertion direction, shows the user that the brush head 24 can be screwed to the handle 22 by swivelling the lever 48 from the unlocking position shown in Figure 2 into the locking position illustrated in Figure 1 (see also Figure 6). When the screw connection has been released by swivelling the lever 48 from the locking position shown in Figure 1 into the unlocking position illustrated in Figure 2, the fact that the locking resistance has been overcome indicates the complete separation of the brush head 24 from the handle 22.

Figures 3 and 4 show a second embodiment of a toothbrush 220 in which a 2 is placed in front of the reference numerals for parts which are similar to parts of the toothbrush in Figures 1 and 2. This second embodiment differs from the first embodiment in Figures 1 and 2 only by a speed-transforming transmission 274 having an outer gear 270 and being connected downstream of a bevel gearing 268. In the present case, a pinion 272 of a spindle 276 is arranged between the inside of an outside wall 236 of a handle 222 and the outer gear 270 and engages in its end-face tooth gearing 284. In this case, too, an output bevel gear 266 is mounted as an integral constituent of the outer gear 270 firmly on its front side facing away from the handle neck 228. The front side of the outer gear 270 facing the handle neck 228 has a shaft end 271 whose free end has a plate-type widening 273. The shaft end 271 extends in the longitudinal direction of the handle 222 and is mounted rotatably, but axially non-displaceably in a sliding bearing 278. The sliding bearing 278 is formed by a bracket 275 which in turn is an integral constituent of the handle 222. At the same time, the bracket 275 is part of a sliding bearing 286 for a longitudinal portion 288, having smooth walls, of the spindle 276 which is guided snugly along the inside of the outside wall 236, as shown in Figures 1 and 2.

Figures 7a, 7b and 7c illustrate different possibilities of centring the brush head 224 on the handle 222. According to Figure 7a, the cross-section of the socket 298 and its lock-in groove 210 may have a rectangular contour 120 which is rounded at the corners and whose side edges 122, 124 enclose an acute angle which opens upwards. In contrast, the upper and lower edges 126, 128 are only slightly curved outwards.

In Figure 7b, the cross-section of the socket 298 has a horizontal, upper side edge 130 to which two opposite side edges 132, 134 run at right angles. A lower side edge 136 is curved outwards. Once again, the corners of the transverse profile are rounded.

Figure 7c shows a circular cross-section 138 of the socket 298 which has an axial centring shoulder 140. In this case, the insertion opening 214 in Figure 4 is pro-

vided on its front side with an axial cutout (not illustrated) which receives the centring shoulder 140 when the coupling ends 230, 232 are plugged into one another and fixes the brush head 224 on the handle 222 securely against rotation. Accordingly, in all the cases described, an attachment of the brush head 24 or 224 to the handle 22 or 222 is achieved which is secured against relative rotation and axial movement of said brush head.

As has been mentioned, all the parts of the toothbrush 20; 220 preferably consist of plastic material. The handle 22 or 222 is expediently made by injection moulding from two symmetrical semi-shells which are connected to one another by bonding or welding in the region of the longitudinal centre plane of the handle.

The above description shows clearly that the toothbrush according to the invention allows rapid and reliable secure and exchange of a brush head on the handle, secure, satisfactory alignment of the brush head on the handle being achieved. An essential prerequisite for this purpose is formed by the relatively large translation of the swivel movement of the lever into a rapid screw motion of the spindle by means of its coarse-pitch thread.

List of reference numerals

20	Toothbrush
22	Handle
24	Brush head
26	Bristle zone
28	Handle neck
30	Coupling end handle
32	Coupling end brush head
34	Box profile
36	Outside wall
38	Inside wall
40	Side wall, left
42	Side wall, right
44	Opening
46	Actuating member
48	Lever
50	Lever arm
52	Ring gear
54	Driving bevel gear
56	Axis, imaginary
58	Shaft end
60	Sliding bearing
62	Shaft end
64	Sliding bearing
66	Output bevel gear
68	Bevel gearing
70	Inner gear
71	Circumferential surface, smooth cylindrical
72	Pinion
74	Speed-transforming transmission
76	Spindle
78	Sliding bearing
80	Axis, imaginary

82	Cutout, cylindrical		ment of their coupling ends, characterised by
84	Internal tooth gearing		
86	Longitudinal portion, having smooth walls		an actuating member (46) which is secured
88	Sliding bearing		movably on the handle (22);
90	Main longitudinal portion, flexible	5	a gearing (68, 74) which is arranged inside the
92	Longitudinal portion, curved		handle (22) and has a driving gear (54), which
94	End, front		is firmly connected to the actuating member
96	Sliding bearing		(46), and a driving gear (70);
98	Socket		a spindle (76) which is mounted axially movably
100	Guiding spindle	10	and rotatably in the handle (22), one end of
102	Threaded bearing		the spindle (76) being connected for rotary
104	End, outer		movement to the driving gear (70) of the gearing
106	Thread		(68, 74) inside the handle (22), and the
108	Shoulder, annular		other end of the spindle (76) being mounted in
110	Lock-in groove, annular	15	the coupling end (30) of the handle (22) and
112	Thickening		having a first part of the device for the releasable
114	Insertion opening		connection of the handle (22) to the brush
115	Bottom		head (24);
116	Lock-in bead		a second part of the device in the coupling end
118	Threaded bore	20	(32) of the brush head (24) for the releasable
120	Contour		connection to the first part of the device at the
122	Side edge		other end of the spindle (76).
124	Side edge		
126	Edge, upper		2. Toothbrush according to Claim 1, characterised in
128	Edge, lower	25	that the gearing (68; 74) has a speed-transforming
130	Side edge, upper		transmission (74) whose driving gear (70) is coupled
132	Side edge, left		movably to the actuating member (46) and
134	Side edge, right		whose driving gear is a pinion (48) which forms the
136	Side edge, lower		inner end of the spindle (76).
138	Cross-section, circular	30	
140	Centring shoulder		3. Toothbrush according to Claim 2, characterised in
210	Lock-in groove		that the driving gear of the speed-transforming
214	Centring shoulder		transmission (74) is an inner gear (70).
220	Toothbrush		
222	Handle	35	4. Toothbrush according to Claim 3, characterised in
224	Brush head		that the inner gear (70) of the speed-transforming
228	Handle neck		transmission (74) has a smooth cylindrical circumferential
236	Outside wall		surface (71) with which the inner gear (70)
266	Output bevel gear		is mounted rotatably, but axially non-displaceably in
268	Bevel gearing	40	a sliding bearing (60).
270	Outer gear		
271	Shaft end		5. Toothbrush according to Claim 2, characterised in
272	Pinion		that the driving gear of the speed-transforming
273	Widening, plate-type		transmission (274) is an outer gear (270).
274	Speed-transforming transmission	45	
275	Bracket		6. Toothbrush according to Claim 5, characterised in
276	Spindle		that the outer gear (270) has a shaft end (271)
278	Sliding bearing		which is mounted rotatably, but axially non-displaceably
284	End-face tooth gearing		in a bracket (275) approximately parallel
286	Sliding bearing	50	to the pinion (272) of the spindle (276).
288	Longitudinal portion, with smooth walls		
298	Socket		7. Toothbrush according to Claim 2, characterised in

Claims

1. Toothbrush, consisting of a handle whose neck has a coupling end, and of a brush head with a coupling end, it being possible for the brush head to be firmly but releasably connected to the handle by engagement of their coupling ends, characterised by
 - an actuating member (46) which is secured movably on the handle (22);
 - a gearing (68, 74) which is arranged inside the handle (22) and has a driving gear (54), which is firmly connected to the actuating member (46), and a driving gear (70);
 - a spindle (76) which is mounted axially movably and rotatably in the handle (22), one end of the spindle (76) being connected for rotary movement to the driving gear (70) of the gearing (68, 74) inside the handle (22), and the other end of the spindle (76) being mounted in the coupling end (30) of the handle (22) and having a first part of the device for the releasable connection of the handle (22) to the brush head (24);
 - a second part of the device in the coupling end (32) of the brush head (24) for the releasable connection to the first part of the device at the other end of the spindle (76).
2. Toothbrush according to Claim 1, characterised in that the gearing (68; 74) has a speed-transforming transmission (74) whose driving gear (70) is coupled movably to the actuating member (46) and whose driving gear is a pinion (48) which forms the inner end of the spindle (76).
3. Toothbrush according to Claim 2, characterised in that the driving gear of the speed-transforming transmission (74) is an inner gear (70).
4. Toothbrush according to Claim 3, characterised in that the inner gear (70) of the speed-transforming transmission (74) has a smooth cylindrical circumferential surface (71) with which the inner gear (70) is mounted rotatably, but axially non-displaceably in a sliding bearing (60).
5. Toothbrush according to Claim 2, characterised in that the driving gear of the speed-transforming transmission (274) is an outer gear (270).
6. Toothbrush according to Claim 5, characterised in that the outer gear (270) has a shaft end (271) which is mounted rotatably, but axially non-displaceably in a bracket (275) approximately parallel to the pinion (272) of the spindle (276).
7. Toothbrush according to Claim 2, characterised in that the coupling of the actuating member (46) to the speed-transforming transmission (74; 274) consists of a bevel gearing (68; 268) whose driving bevel gear (54) is firmly connected to the actuating member (46).
8. Toothbrush according to Claim 7, characterised in

that the driving bevel gear (54) is provided with a shaft end (62) which is mounted rotatably transversely to the longitudinal axis of the handle (22) in a side wall (40) thereof.

9. Toothbrush according to Claim 8, characterised in that a ring gear (52) is located with spacing co-axially opposite the driving bevel gear (54) and is provided on the end side facing away from the driving bevel gear (54) with a shaft end (58) which engages rotatably in a sliding bearing (60) on the inside of the other side wall (42) of the handle (22).

10. Toothbrush according to Claim 9, characterised in that the driving bevel gear (54) and the ring gear (52) are of integral construction with the actuating member (46).

11. Toothbrush according to one of Claims 7 to 10, characterised in that the actuating member (46) is a lever (48) whose swivel axis (56) is formed by the driving bevel gear (54) and the ring gear (52).

12. Toothbrush according to Claim 11, characterised in that, in its position which locks the brush head (24), the lever (48) fills an opening (44) in an inside wall (38) of the handle (22), and the end facing away from the handle neck (28) has on its inside a lever arm (50) on whose forked end the driving bevel gear (54) and the ring gear (52) are arranged.

13. Toothbrush according to Claim 12, characterised in that the lever (48) and its lever arm (50) form an acute angle which opens towards the handle neck (28).

14. Toothbrush according to Claim 1, characterised in that the spindle (76) is provided with a guiding spindle (100) which is mounted with screw motion in a threaded bearing (102) inside the neck (28) of the handle (22).

15. Toothbrush according to Claim 14, characterised in that the thread (100) is arranged on a central longitudinal region of the guiding spindle (76).

16. Toothbrush according to Claim 14 or 15, characterised in that the ends of the spindle (76) are mounted in each case in a sliding bearing (78, 88) inside the handle (22) and the handle neck (28).

17. Toothbrush according to Claim 1 or one of the following claims, characterised in that the part of the device consists of a thread (106) at the end of the spindle (76) mounted in the coupling end (30) of the handle (22) for connection to the brush head (24).

18. Toothbrush according to Claim 17, characterised in that the thread (106) at the end mounted in the cou-

pling end (30) of the handle (22) is a coarse-pitch thread.

19. Toothbrush according to Claim 1 or one of the following claims, characterised in that the coupling end (30) on the neck (28) of the handle (22) is a socket (98) whose cross-section is of smaller dimension than that of the handle neck (28).

20. Toothbrush according to Claim 19, characterised in that the socket (98) is provided with one part of a centring device for the brush head (24) on the handle.

21. Toothbrush according to Claim 1 or one of the following claims, characterised in that the coupling end (32) of the brush head (24) has an insertion opening (114) whose cross-section and depth are adapted to the cross-section and the length of the socket (98).

22. Toothbrush according to Claim 1 or one of the following claims, characterised in that the part of the device at the coupling end (32) of the brush head (24) for connection thereof to the handle (22) consists of a threaded bore (118) which is provided in the bottom of the insertion opening (114) and whose internal thread is adapted to the thread (106) of the socket (98).

23. Toothbrush according to one of Claims 19 to 22, characterised in that the socket (98) has an annular lock-in bead (110) at its front end, and the insertion opening (114) is provided at its opening edge with an annular lock-in bead projecting radially inwards in such a way that the socket (98) can be inserted in the insertion opening (114) and removed therefrom only with perceptible locking resistance.

Patentansprüche

1. Zahnbürste, bestehend aus einem Handgriff, dessen Griffhals ein Kupplungsende aufweist, und einem Bürstenkopf mit einem Kupplungsende, wobei der Bürstenkopf mit dem Handgriff durch ineinandergreifen ihrer Kupplungsenden fest, aber lösbar verbunden werden kann, gekennzeichnet durch

ein Betätigungsorgan (46), das an dem Handgriff (22) beweglich befestigt ist;

ein Getriebe (68, 74), das innerhalb des Handgriffs (22) angeordnet ist und ein Antriebsrad (54), das mit dem Betätigungsorgan (46) fest verbunden ist, sowie ein Antriebsrad (70) aufweist;

eine Spindel (76), die im Handgriff (22) axial beweglich und drehbar gelagert ist, wobei das eine Ende der Spindel (76) innerhalb des

- Handgriffs (22) mit dem Antriebsrad (70) des Getriebes (68, 74) drehbeweglich verbunden ist und das andere Ende der Spindel (76) im Kupplungsende (30) des Handgriffs (22) gelagert ist und ein erstes Vorrichtungsteil zur lösbaren Verbindung des Handgriffs (22) mit dem Bürstenkopf (24) aufweist;
 5 ein zweites Vorrichtungsteil im Kupplungsende (32) des Bürstenkopfes (24) zur lösbaren Verbindung mit dem ersten Vorrichtungsteil am anderen Ende der Spindel (76).
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2. Zahnbürste nach Anspruch 1, dadurch gekennzeichnet, daß das Getriebe (68; 74) ein Übersetzungsgetriebe (74) aufweist, dessen Antriebsrad (70) mit dem Betätigungsorgan (46) beweglich gekoppelt ist und dessen Abtriebsrad ein Zahnritzel (48) ist, welches das innere Ende der Spindel (76) bildet.
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3. Zahnbürste nach Anspruch 2, dadurch gekennzeichnet, daß das Antriebsrad des Übersetzungsgetriebes (74) ein Innenrad (70) ist.
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4. Zahnbürste nach Anspruch 3, dadurch gekennzeichnet, daß das Innenrad (70) des Übersetzungsgetriebes (74) eine glatzylindrische Umfangsfläche (71) aufweist, mit welcher das Innenrad (70) in einem Gleitlager (60) drehbar, aber axial unverschieblich gelagert ist.
 25
 30
5. Zahnbürste nach Anspruch 2, dadurch gekennzeichnet, daß das Antriebsrad des Übersetzungsgetriebes (274) ein Außenrad (270) ist.
 35
6. Zahnbürste nach Anspruch 5, dadurch gekennzeichnet, daß das Außenrad (270) einen Wellenstumpf (271) aufweist, der etwa parallel zum Zahnritzel (272) der Spindel (276) in einer Konsole (275) drehbar, aber axial unverschieblich gelagert ist.
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7. Zahnbürste nach Anspruch 2, dadurch gekennzeichnet, daß die Kopplung des Betätigungsorgans (46) mit dem Übersetzungsgetriebe (74; 274) aus einem Kegelradgetriebe (68; 268) besteht, dessen Antriebskegelrad (54) mit dem Betätigungsorgan (46) fest verbunden ist.
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8. Zahnbürste nach Anspruch 7, dadurch gekennzeichnet, daß das Antriebskegelrad (54) mit einem Wellenstumpf (62) versehen ist, der quer zur Längsachse des Handgriffs (22) in einer Seitenwand (40) desselben drehbar gelagert ist.
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9. Zahnbürste nach Anspruch 8, dadurch gekennzeichnet, daß ein Tellerrad (52) dem Antriebskegelrad (54) im Abstand koaxial gegenüberliegt und an der dem Antriebskegelrad (54) abgekehrten Stirnseite mit einem Wellenstumpf (58) versehen ist, der in ein Gleitlager (60) an der Innenseite der anderen Seitenwand (42) des Handgriffs (22) drehbar eingreift.
10. Zahnbürste nach Anspruch 9, dadurch gekennzeichnet, daß das Antriebskegelrad (54) und Tellerrad (52) mit dem Betätigungsorgan (46) einteilig ausgebildet sind.
11. Zahnbürste nach einem der Ansprüche 7 bis 10, dadurch gekennzeichnet, daß das Betätigungsorgan (46) ein Hebel (48) ist, dessen Schwenkachse (56) von dem Antriebskegelrad (54) und Tellerrad (52) gebildet ist.
12. Zahnbürste nach Anspruch 11, dadurch gekennzeichnet, daß der Hebel (48) in seiner den Bürstenkopf (24) verriegelnden Stellung eine Durchbrechung (44) in einer Innenwand (38) des Handgriffs (22) ausfüllt und das dem Griffhals (28) abgekehrte Ende an seiner Innenseite einen Hebelarm (50) aufweist, an dessen gabelförmigem Ende das Antriebskegelrad (54) und das Tellerrad (52) angeordnet sind.
13. Zahnbürste nach Anspruch 12, dadurch gekennzeichnet, daß der Hebel (48) und dessen Hebelarm (50) einen spitzen Winkel bilden, der sich zum Griffhals (28) hin öffnet.
14. Zahnbürste nach Anspruch 1, dadurch gekennzeichnet, daß die Spindel (76) mit einer Leitspindel (100) versehen ist, die in einem Gewindelager (102) innerhalb des Griffhalses (28) des Handgriffs (22) schraubbeweglich gelagert ist.
15. Zahnbürste nach Anspruch 14, dadurch gekennzeichnet, daß das Gewinde (100) auf einem mittleren Längenbereich der Leitspindel (76) angeordnet ist.
16. Zahnbürste nach Anspruch 14 oder 15, dadurch gekennzeichnet, daß die Enden der Spindel (76) in je einem Gleitlager (78, 88) innerhalb des Handgriffs (22) und des Griffhalses (28) gelagert sind.
17. Zahnbürste nach Anspruch 1 oder einem folgenden, dadurch gekennzeichnet, daß das Vorrichtungsteil an dem im Kupplungsende (30) des Handgriffs (22) gelagerten Ende der Spindel (76) zur Verbindung mit dem Bürstenkopf (24) aus einem Schraubgewinde (106) besteht.
18. Zahnbürste nach Anspruch 17, dadurch gekennzeichnet, daß das Schraubgewinde (106) an dem im Kupplungsende (30) des Handgriffs (22) gelagerten Ende ein Steilgewinde ist.
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19. Zahnbürste nach Anspruch 1 oder einem der folgenden, dadurch gekennzeichnet, daß das Kuppelungsende (30) am Griffhals (28) des Handgriffs (22) eine Steckbuchse (98) ist, deren Querschnitt kleiner als derjenige des Griffhalses (28) bemessen ist. 5
20. Zahnbürste nach Anspruch 19, dadurch gekennzeichnet, daß die Steckbuchse (98) mit einem Teil einer Zentriervorrichtung für den Bürstenkopf (24) am Handgriff versehen ist. 10
21. Zahnbürste nach Anspruch 1 oder einem der folgenden, dadurch gekennzeichnet, daß das Kuppelungsende (32) des Bürstenkopfes (24) eine Einstecköffnung (114) aufweist, deren Querschnitt und Tiefe dem Querschnitt und der Länge der Steckbuchse (98) angepaßt sind. 15
22. Zahnbürste nach Anspruch 1 oder einem der folgenden, dadurch gekennzeichnet, daß der Vorrichtungsteil am Kuppelungsende (32) des Bürstenkopfes (24) zur Verbindung desselben mit dem Handgriff (22) aus einer Gewindebohrung (118) besteht, die im Boden der Einstecköffnung (114) vorgesehen ist und deren Innengewinde dem Schraubengewinde (106) der Steckbuchse (98) angepaßt ist. 20
23. Zahnbürste nach einem der Ansprüche 19 bis 22, dadurch gekennzeichnet, daß die Steckbuchse (98) an ihrem Vorderende einen ringförmigen Rastwulst (110) aufweist und die Einstecköffnung (114) an ihrem Öffnungsrand mit einem ringförmigen, radial nach innen vorstehenden Rastwulst versehen ist, derart, daß die Steckbuchse (98) nur unter fühlbarem Rastwiderstand in die Einstecköffnung (114) einsetzbar und aus dieser herausbewegbar ist. 25

Revendications 40

1. Brosse à dents, constituée d'un manche dont le col comporte une extrémité d'accouplement, et d'une tête de brosse ayant une extrémité d'accouplement, la tête de brosse étant susceptible d'être reliée de façon ferme mais démontable au manche par engagement de leurs extrémités d'accouplement, caractérisée par 45
- un organe d'actionnement (46) fixé de façon démontable sur le manche (22);
- un jeu d'engrenages (68, 74) disposé à l'intérieur du manche (22) et ayant un engrenage d'entraînement (54) relié rigidement à l'organe d'actionnement (46), et un engrenage d'entraînement (70); 50
- une broche (76) montée de façon axialement déplaçable et de façon susceptible de tourner dans le manche (22), une extrémité de la bro-

che (76) étant reliée, pour permettre un mouvement rotatif, à l'engrenage d'entraînement (70) du jeu d'engrenages (68, 74) monté à l'intérieur du manche (22), et l'autre extrémité de la broche (76) étant montée dans l'extrémité d'accouplement (30) du manche (22) et ayant une première partie du dispositif prévu pour assurer une liaison désolidarisable du manche (22) à la tête de brosse (24);

une deuxième partie du dispositif prévue dans l'extrémité d'accouplement (32) de la tête de brosse (24), pour établir la liaison désolidarisable à la première partie du dispositif prévue à l'autre extrémité de la broche (76).

2. Brosse à dents selon la revendication 1, caractérisée en ce que le jeu d'engrenages (68; 74) a une transmission à transformation de vitesse (74) dont l'engrenage d'entraînement (70) est accouplé de façon mobile à l'organe d'actionnement (46) et dont l'engrenage d'entraînement est un pignon (48) constituant l'extrémité intérieure de la broche (76).
3. Brosse à dents selon la revendication 2, caractérisée en ce que l'engrenage d'entraînement de la transmission à transformation de vitesse (74) est un engrenage à denture intérieure (70).
4. Brosse à dents selon la revendication 3, caractérisée en ce que l'engrenage à denture intérieure (70) de la transmission à transformation de vitesse (74) a une surface circonférentielle (71) cylindrique lisse, par laquelle l'engrenage à denture intérieure (70) est monté en rotation, mais de façon non déplaçable axialement, dans un palier à glissement (60).
5. Brosse à dents selon la revendication 2, caractérisée en ce que l'engrenage d'entraînement de la transmission à transformation de vitesse (274) est un engrenage à denture extérieure (270).
6. Brosse à dents selon la revendication 5, caractérisée en ce que l'engrenage à denture extérieure (270) a une extrémité de tige (271) montée de façon tournante, mais sans possibilité de déplacement axial, dans un support (275) approximativement parallèle au pignon (272) de la broche (276).
7. Brosse à dents selon la revendication 2, caractérisée en ce que l'accouplement de l'organe d'actionnement (46) à la transmission à transformation de vitesse (74; 274) est constitué d'un jeu d'engrenages conique (68; 268) dont l'engrenage conique d'entraînement (54) est relié rigidement à l'organe d'actionnement (46).
8. Brosse à dents selon la revendication 7, caractérisée en ce que l'engrenage conique d'entraînement

- (54) est pourvu d'une extrémité de tige (62) montée tournante transversalement par rapport à l'axe longitudinal du manche (22), dans une paroi latérale (40) de celui-ci.
9. Brosse à dents selon la revendication 8, caractérisée en ce qu'une couronne dentée annulaire (52) est placée avec un espacement coaxialement à l'opposé de l'engrenage conique d'entraînement (54) et est pourvue du côté d'extrémité opposé à l'engrenage conique d'entraînement (54), d'une extrémité d'arbre (58) qui s'engage de façon tournante dans un palier à glissement (60) prévu à l'intérieur de l'autre paroi latérale (42) du manche (22).
 10. Brosse à dents selon la revendication 9, caractérisée en ce que l'engrenage conique d'entraînement (54) et la couronne dentée annulaire (52) sont réalisés d'une seule pièce avec l'organe d'actionnement (46).
 11. Brosse à dents selon l'une des revendications 7 à 10, caractérisée en ce que l'organe d'actionnement (46) est un levier (48) dont l'axe de pivotement (56) est constitué par l'engrenage conique d'entraînement (54) et la couronne dentée annulaire (52).
 12. Brosse à dents selon la revendication 11, caractérisée en ce que, dans sa position qui verrouille la tête de brosse (24), le levier (48) remplit une ouverture (44) prévue dans une paroi intérieure (38) du manche (22), et l'extrémité opposée au col de manche (28) a intérieurement un bras de levier (50), sur l'extrémité fourchue duquel l'engrenage conique d'entraînement (54) et la couronne dentée annulaire (52) sont agencés.
 13. Brosse à dents selon la revendication 12, caractérisée en ce que le levier (48) et son bras de levier (50) forment un angle aigu allant en s'ouvrant en direction du col de manche (28).
 14. Brosse à dents selon la revendication 1, caractérisée en ce que la broche (76) est pourvue d'une broche de guidage (100) montée avec un mouvement à vis dans un palier fileté (102) à l'intérieur du col (28) du manche (22).
 15. Brosse à dents selon la revendication 14, caractérisée en ce que le filet (100) est disposé sur une zone longitudinale centrale de la broche de guidage (76).
 16. Brosse à dents selon la revendication 14 ou 15, caractérisée en ce que les extrémités de la broche (76) sont montées dans chaque cas dans un palier à glissement (78, 88) prévu à l'intérieur du manche (22) et du col de manche (28).
 17. Brosse à dents selon la revendication 1 ou l'une des revendications suivantes, caractérisée en ce que la partie du dispositif est constituée d'un filet (106) réalisé à l'extrémité de la broche (76) montée dans l'extrémité de couplage (30) du manche (22), pour assurer une liaison à la tête de brosse (24).
 18. Brosse à dents selon la revendication 17, caractérisée en ce que le filet (106) prévu à l'extrémité montée dans l'extrémité de couplage (30) du manche (22) est un filet à pas grossier.
 19. Brosse à dents selon la revendication 1 ou l'une des revendications suivantes, caractérisée en ce que l'extrémité d'accouplement (30) prévue sur le col (28) du manche (22) est une douille (98) dont la section transversale est de dimension inférieure à celle du col de manche (28).
 20. Brosse à dents selon la revendication 19, caractérisée en ce que la douille (98) est pourvue d'une partie d'un dispositif de centrage destiné à centrer la tête de brosse (24) sur le manche.
 21. Brosse à dents selon la revendication 1 ou l'une des revendications suivantes, caractérisée en ce que l'extrémité de couplage (32) de la tête de brosse (24) a une ouverture d'insertion (114), dont la section transversale et la profondeur sont adaptées à la section transversale et à la profondeur de la douille (98).
 22. Brosse à dents selon la revendication 1 ou l'une des revendications suivantes, caractérisée en ce que la partie du dispositif prévient à l'extrémité d'accouplement (32) de la tête de brosse (24), pour établir la liaison de celle-ci avec le manche (22), est constituée d'un trou taraudé (118), qui est prévu au fond de l'ouverture d'insertion (114) et dont le filet de taraudage est adapté au filet (106) de la douille (98).
 23. Brosse à dents selon l'une des revendications 19 à 22, caractérisée en ce que la douille (98) a une nervure annulaire de verrouillage (110) à son extrémité avant et l'ouverture d'insertion (114) est pourvue à son bord d'ouverture d'une nervure annulaire de verrouillage, faisant saillie radialement à l'intérieur, de telle sorte que l'on puisse insérer la douille (98) dans l'ouverture d'insertion (114) et l'enlever, seulement en surmontant une résistance de verrouillage perceptible.

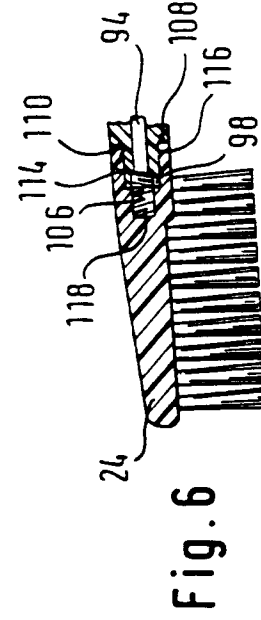
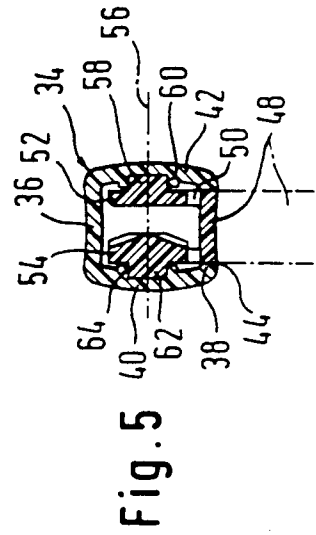
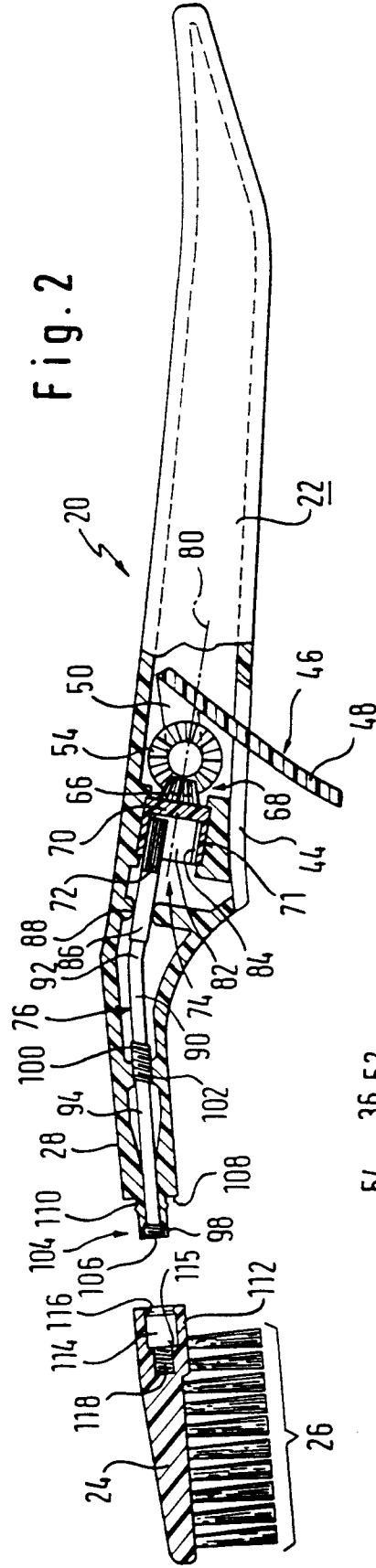
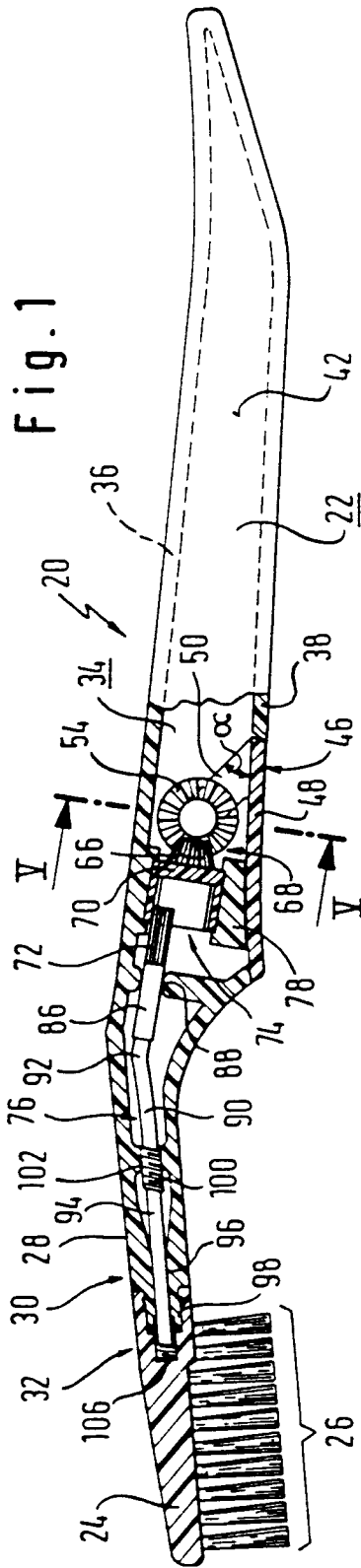


Fig. 3

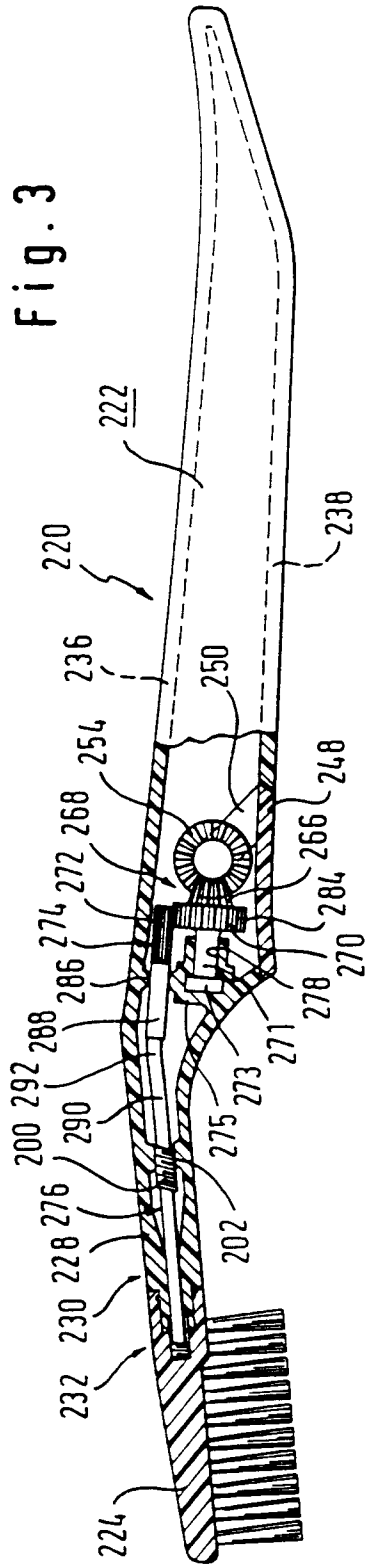


Fig. 4

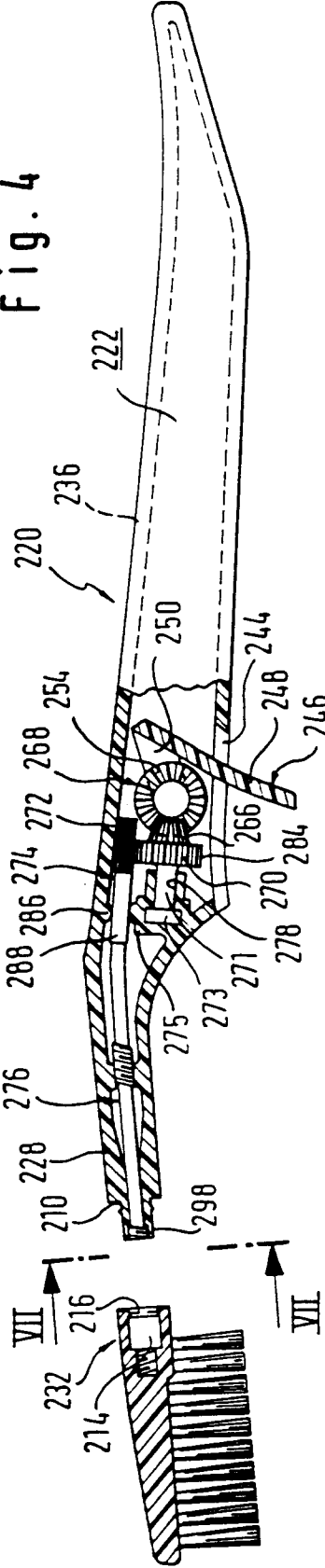


Fig. 7c

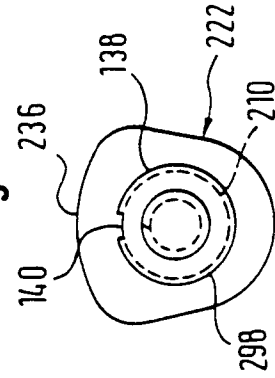


Fig. 7b

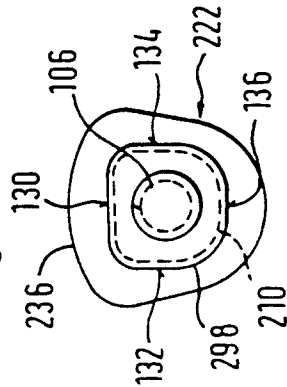


Fig. 7a

