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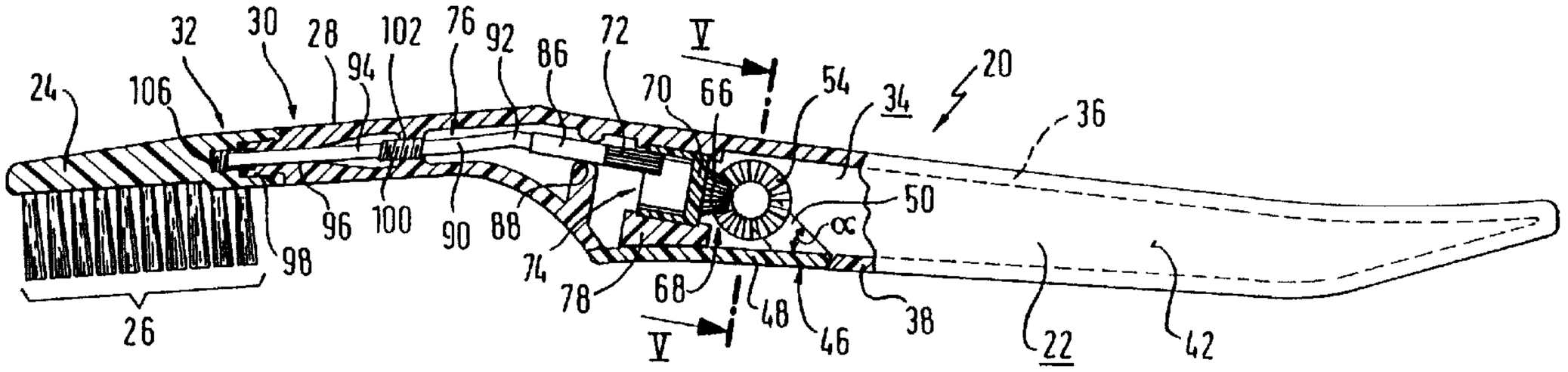

(57) Abrégé/Abstract:
The invention relates to a toothbrush consisting of a handle (22) whose neck (28) has a coupling end (30), and of a brush head (24) with a coupling end (32), it being possible for the brush head (24) to be firmly but releasably connected to the handle (22) by engagement of their coupling ends (30, 32). An actuating member (46) is secured movably on the handle (22). A gearing (68, 74) is arranged inside the handle (22). A first driving gear (54) is firmly connected to the actuating member (46) and has a second driving gear (70). A spindle (76) is mounted axially movably and rotatably in the handle (22). One end of the spindle (76) is connected with rotary movement to the second driving gear (70) of the gearing (68, 74) inside the handle (22), and the other end of the spindle (76) is mounted in the coupling end (30) of the handle (22) and has 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) serves for the releasable connection to the first part of the device at the other end of the spindle (76). The brush head can be assembled quickly and clamped firmly, thus providing a hygienically satisfactory connection.

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Toothbrush

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 first driving gear, which is firmly connected to the actuating member, and a second 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 second 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.

A broad aspect of the invention provides a toothbrush, comprising: a handle whose neck has a coupling end, and a brush head with a coupling end, permitting said brush head to be firmly but releasably connected to the handle by engagement of their coupling ends, characterised by an actuating member which is secured movably on the handle; a gearing which is arranged inside the handle and has a first driving gear, which is firmly connected to the actuating member, and a second driving gear; a spindle which is mounted axially movably and rotatably in the handle, the spindle having an inner end being connected for rotary movement to the second driving gear of the gearing inside the handle, and having an other end being mounted in the coupling end of the handle and adapted for the releasable connection of the handle to the brush head; and wherein the coupling end of the brush head is adapted for the releasable connection to the coupling end 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 as a third driving gear. The second 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 second 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 dimensioned 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 connection 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 provided 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
84	Internal tooth gearing
86	Longitudinal portion, having smooth walls
88	Sliding bearing

90	Main longitudinal portion, flexible
92	Longitudinal portion, curved
94	End, front
96	Sliding bearing
98	Socket
100	Guiding spindle
102	Threaded bearing
104	End, outer
106	Thread
108	Shoulder, annular
110	Lock-in groove, annular
112	Thickening
114	Insertion opening
115	Bottom
116	Lock-in bead
118	Threaded bore
120	Contour
122	Side edge
124	Side edge
126	Edge, upper
128	Edge, lower
130	Side edge, upper
132	Side edge, left
134	Side edge, right
136	Side edge, lower
138	Cross-section, circular
140	Centring shoulder
210	Lock-in groove
214	Centring shoulder
220	Toothbrush
222	Handle
224	Brush head
228	Handle neck
236	Outside wall
266	Output bevel gear
268	Bevel gearing
270	Outer gear
271	Shaft end

272 Pinion

273 Widening, plate-type

274 Speed-transforming transmission

275 Bracket

276 Spindle

278 Sliding bearing

284 End-face tooth gearing

286 Sliding bearing

288 Longitudinal portion, with smooth walls

298 Socket

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CLAIMS:

1. A toothbrush, comprising:

a handle whose neck has a coupling end, and

a brush head with a coupling end, permitting said brush head to be firmly but releasably connected to the handle by engagement of their coupling ends, characterised by an actuating member which is secured movably on the handle;

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

a spindle which is mounted axially movably and rotatably in the handle, the spindle having an inner end being connected for rotary movement to the second driving gear of the gearing inside the handle, and having an other end being mounted in the coupling end of the handle and adapted for the releasable connection of the handle to the brush head; and wherein the coupling end of the brush head is adapted for the releasable connection to the coupling end at the other end of the spindle.

2. A toothbrush according to claim 1, characterised in that the gearing has a speed-transforming transmission comprising the second driving gear and a third driving gear wherein the second driving gear is coupled movably to the actuating member and the third driving gear is a pinion which forms the inner end of the spindle.

3. A toothbrush according to claim 2, characterised in that the second driving gear of the speed-transforming transmission is an inner gear.

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4. A toothbrush according to claim 3, characterised in that the inner gear of the speed-transforming transmission has a smooth cylindrical circumferential surface with which the inner gear is mounted rotatably, but axially non-displaceably in a sliding bearing.

5. A toothbrush according to claim 2, characterised in that the second driving gear of the speed-transforming transmission is an outer gear.

6. A toothbrush according to claim 5, characterised in that the outer gear has a shaft end which is mounted rotatably, but axially non-displaceably in a bracket approximately parallel to the pinion of the spindle.

7. A toothbrush according to claim 2, characterised in that the actuating member is coupled movably to the speed-transforming transmission via a bevel gearing comprising the first driving gear wherein the first driving gear is driving bevel gear.

8. A toothbrush according to claim 7, characterised in that the driving bevel gear is provided with a shaft end which is mounted rotatably transversely to the longitudinal axis of the handle in a side wall thereof.

9. A toothbrush according to claim 8, characterised in that a ring gear is located with spacing co-axially opposite the driving bevel gear and wherein said ring gear is provided on the side facing away from the driving bevel gear with a shaft end which engages rotatably in a sliding bearing on the inside of the other side wall of the handle, located opposite the shaft end.

10. A toothbrush according to claim 9, characterised in that the driving bevel gear and the ring gear are of integral construction with the actuating member.

11. A toothbrush according to claim 9 or 10, characterised in that the actuating member is a lever whose swivel axis is formed by the driving bevel gear and the ring gear.

12. A toothbrush according to claim 11, characterised in that, in its position which locks the brush head, the lever fills an opening in an inside wall of the handle, and the end of the lever facing away from the handle neck has on the inside a lever arm on whose forked end the driving bevel gear and the ring gear are arranged.

13. A toothbrush according to claim 12, characterised in that the lever and its lever arm form an acute angle which opens towards the handle neck.

14. A toothbrush according to claim 1, characterised in that the spindle is provided with a guiding spindle which is mounted with screw motion in a threaded bearing inside the neck of the handle.

15. A toothbrush according to claim 14, characterised in that a thread is arranged on a central longitudinal region of the guiding spindle.

16. A toothbrush according to claim 14 or 15, characterised in that the ends of the spindle are mounted in each case in a sliding bearing inside the handle and the handle neck.

17. A toothbrush according to any one of claims 1 to 16, characterised in that a thread is defined at the end of

the spindle mounted in the coupling end of the handle for connection to the brush head.

18. A toothbrush according to claim 17, characterised in that the thread defined at the end of the spindle mounted in the coupling end of the handle is a coarse-pitch thread.

19. A toothbrush according to any one of claims 1 to 18, characterised in that the coupling end on the neck of the handle is a socket whose cross-section is of smaller dimension than that of the handle neck.

20. A toothbrush according to claim 19, characterised in that the socket is provided with one part of a centring device for the brush head on the handle.

21. A toothbrush according to claim 20, characterised in that the coupling end of the brush head has an insertion opening with a bottom defined therein and an opening edge facing the handle wherein said insertion opening has a cross-section and depth adapted to the cross-section and length of the socket.

22. A toothbrush according to claim 21, characterised in that the coupling end of the brush head includes a threaded bore which is provided in the bottom of the insertion opening and whose internal thread is adapted to a thread of the socket.

23. A toothbrush according to claim 21 or 22, characterised in that the socket has an annular lock-in bead, and the insertion opening is provided at its opening edge with an annular lock-in bead projecting radially inwards in such a way that the socket can be inserted in the insertion opening and removed therefrom only with perceptible locking resistance.

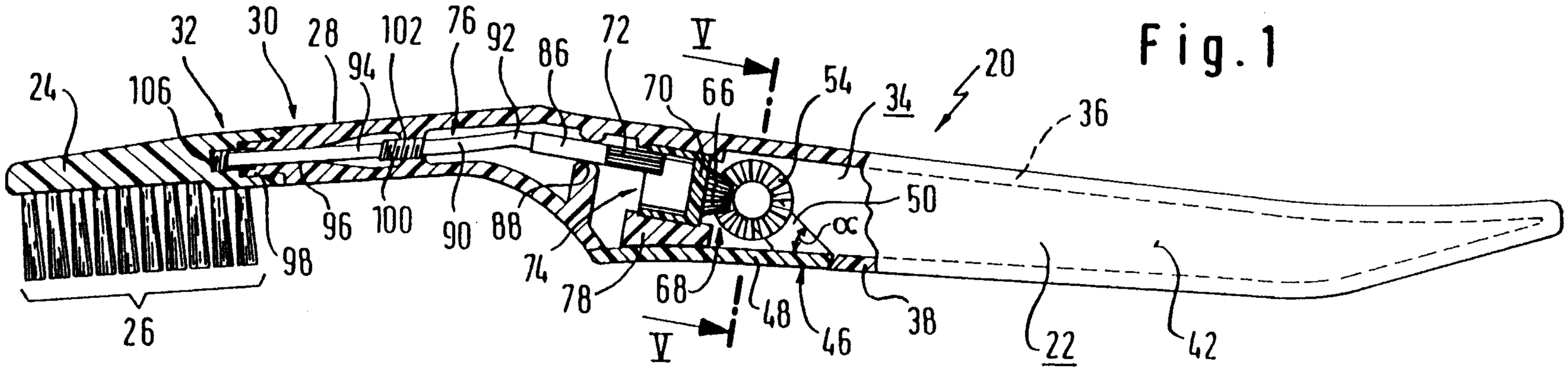

Fig.1

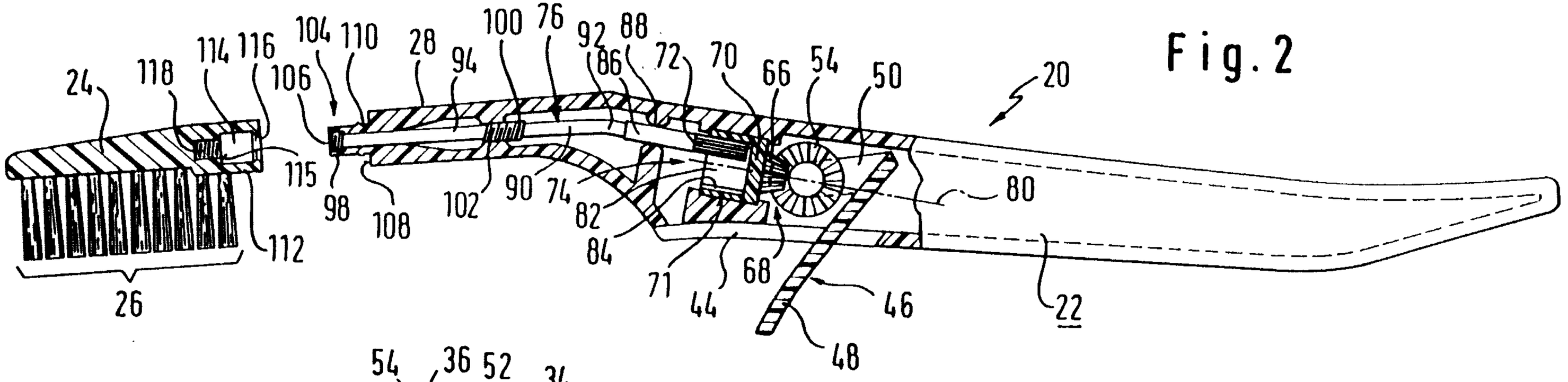

Fig.2

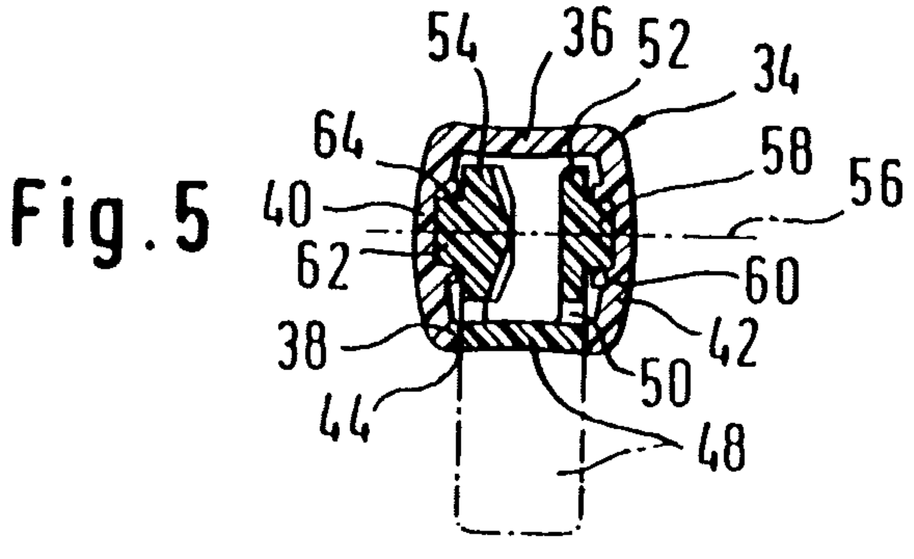

Fig.5

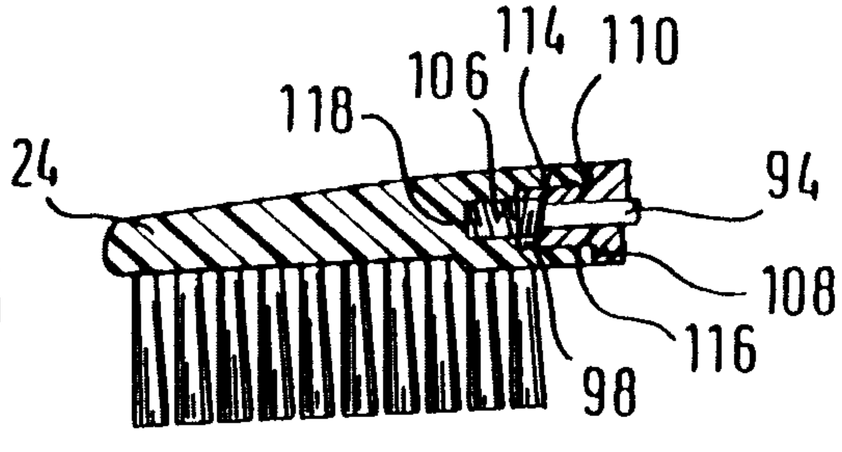

Fig.6

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Fig. 3

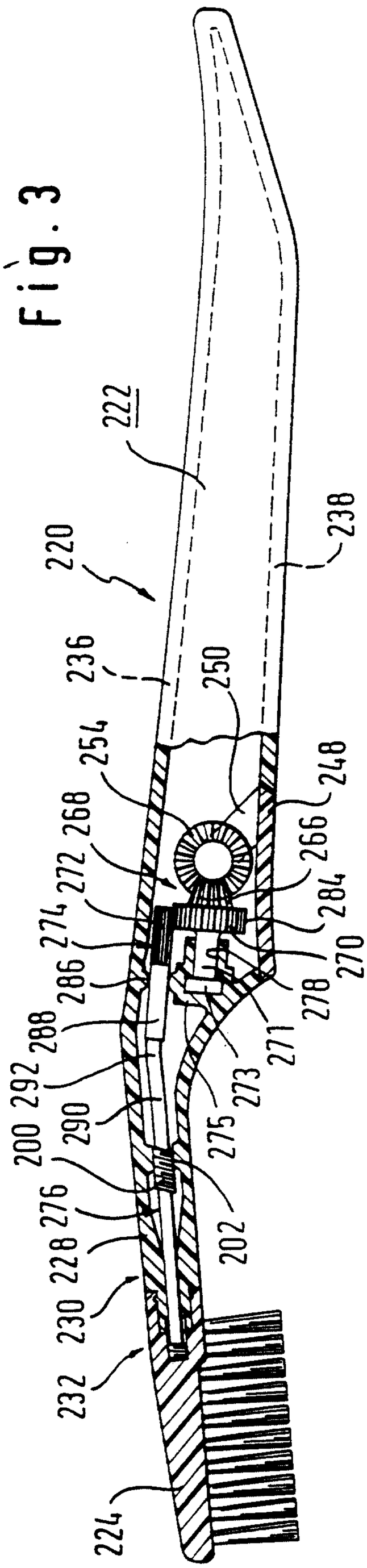


Fig. 4

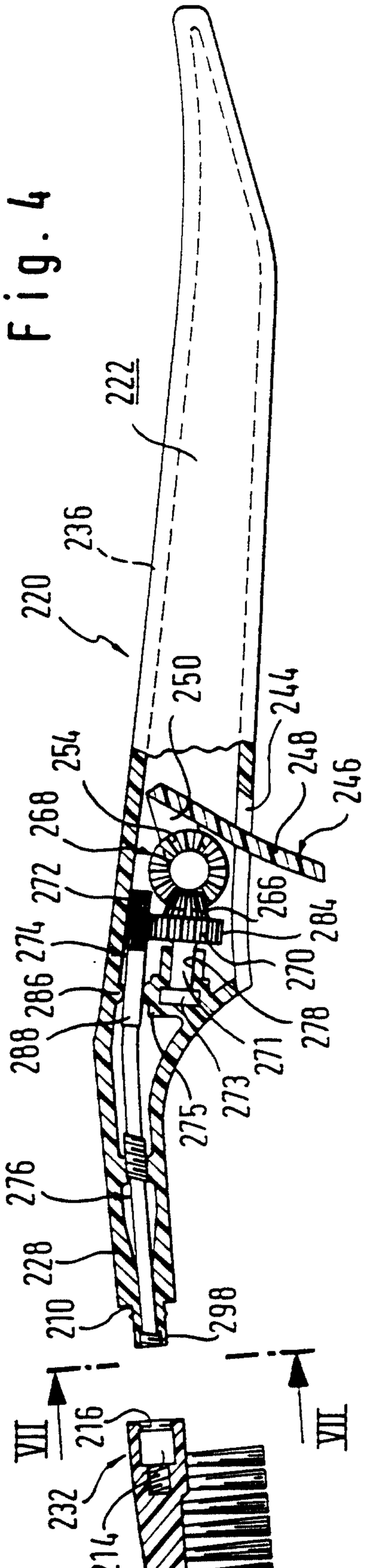


Fig. 7c

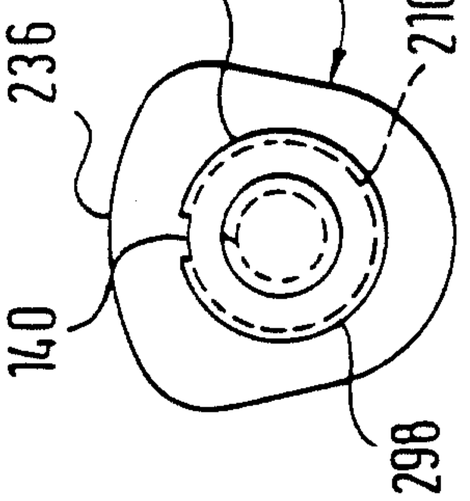


Fig. 7b

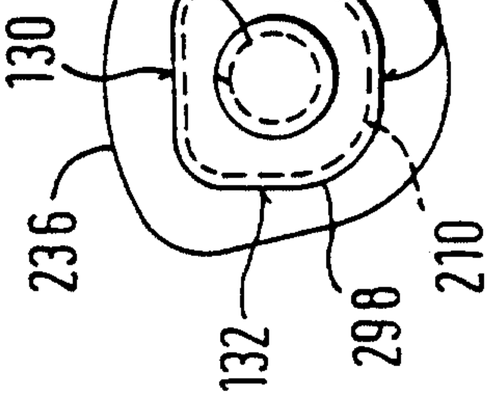
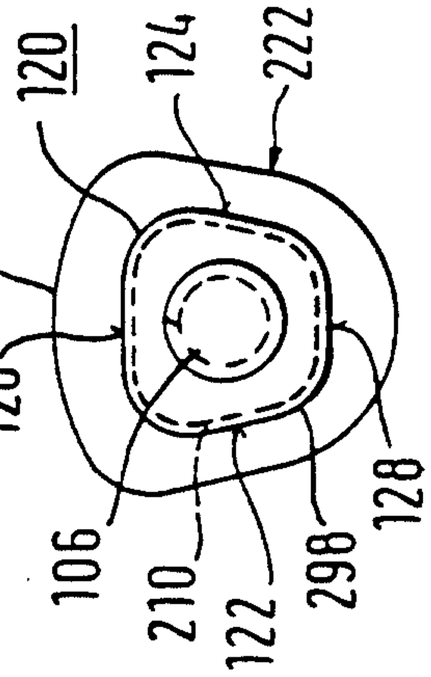
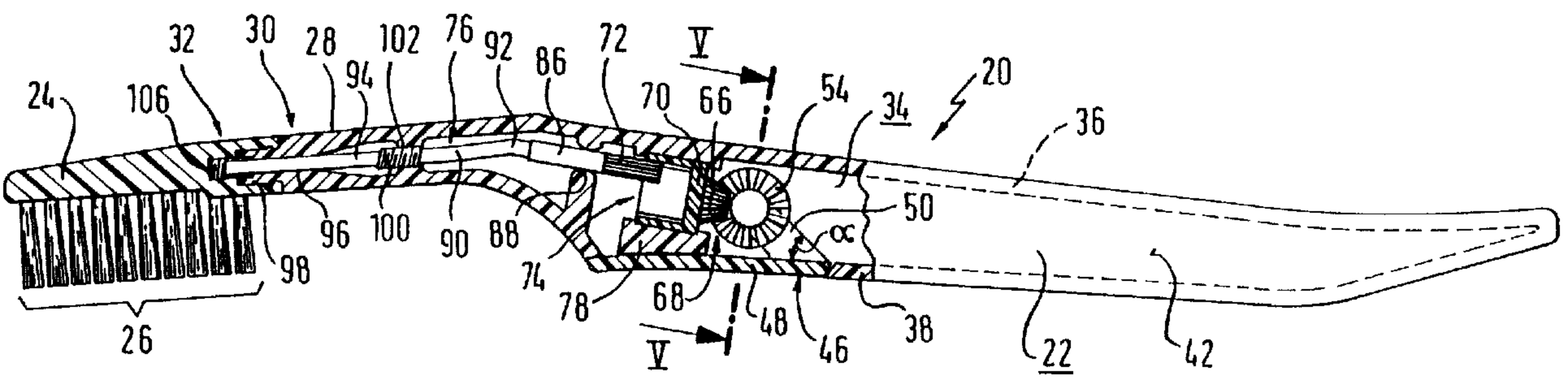


Fig. 7a

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