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(54) **PERSONAL HYGIENE IMPLEMENT FOR PERSONAL USE**

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**ABSTRACT**

A personal hygiene device is disclosed. The device includes a toothbrush; and a display for displaying interactive representations, which are controllable from the display by means of a control device. The control device includes a game controller for controlling a video game on the display and an information controller for making information available on the display, such that a switching device operable by a switching key located on at least the toothbrush or the display is provided for switching between the game presentation generated by the game controller and the information presentation generated by the information controller.

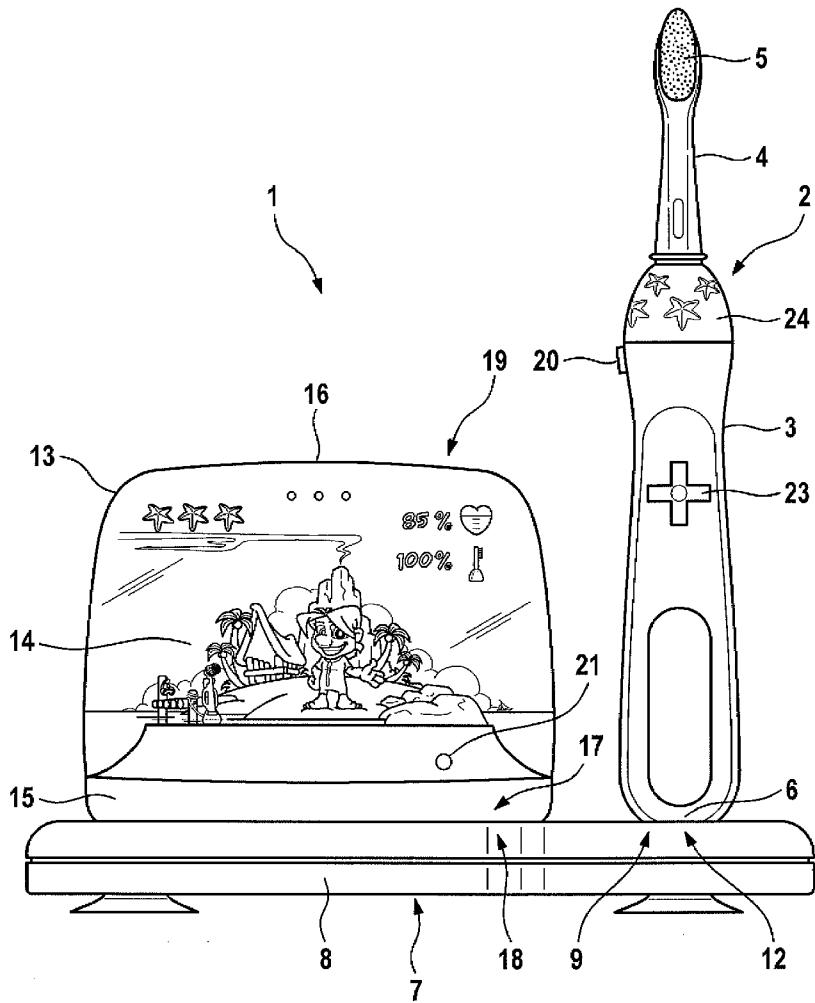
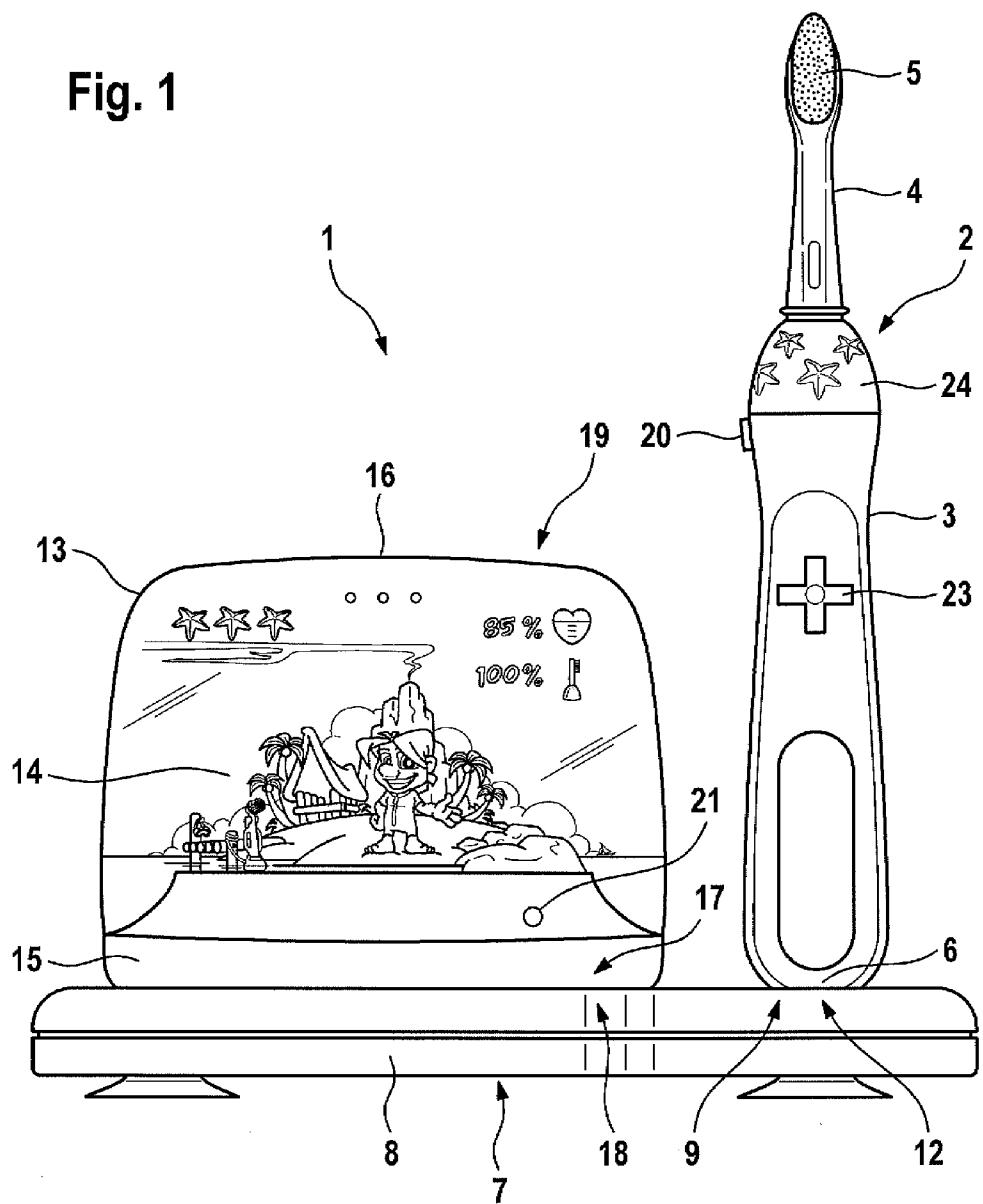


Fig. 1



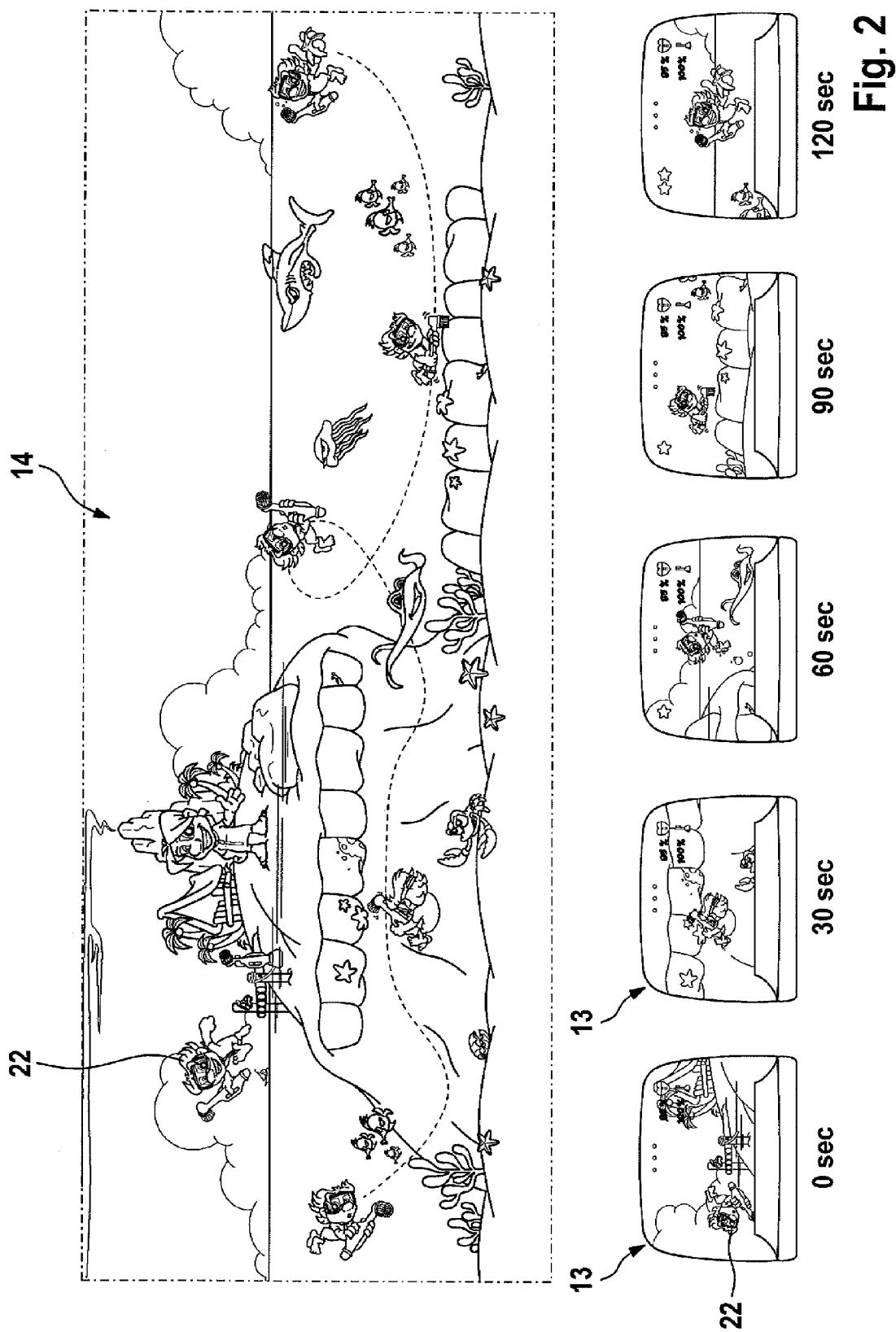
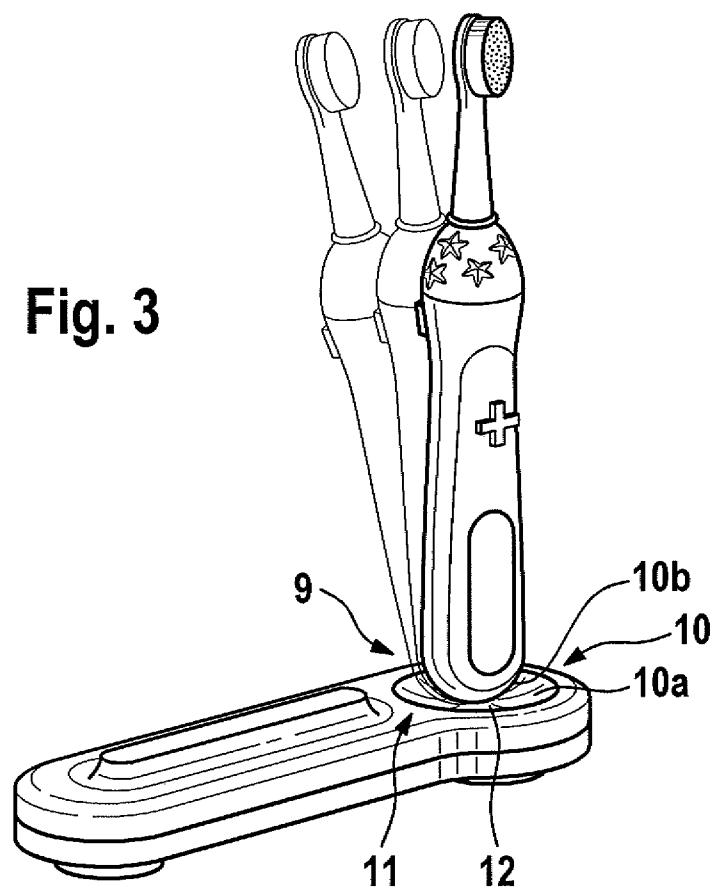
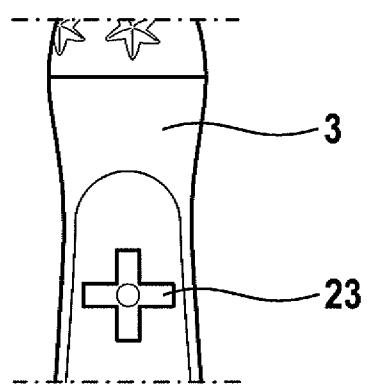


Fig. 2

**Fig. 3****Fig. 4**

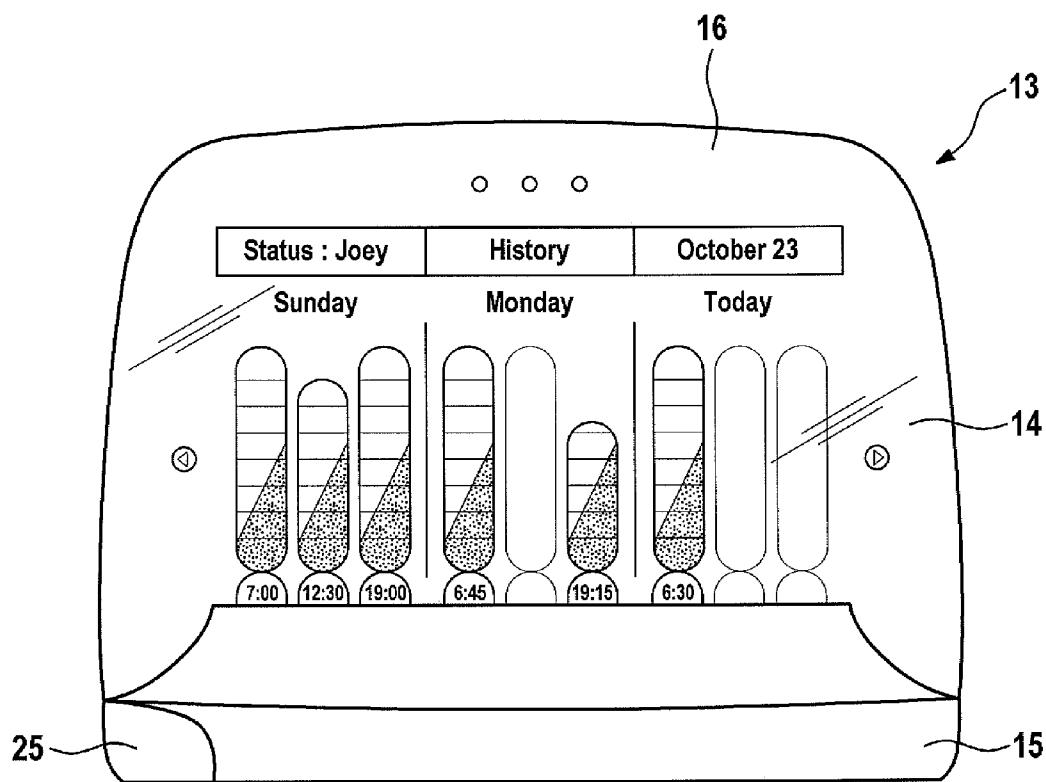


Fig. 5

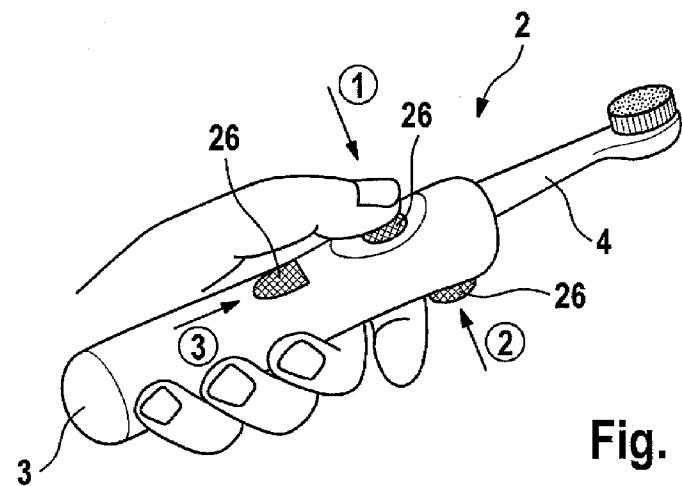


Fig. 6

## PERSONAL HYGIENE IMPLEMENT FOR PERSONAL USE

### CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of International Application No. PCT2010/052257, filed May 20, 2010, the substance of which is incorporated by reference in its entirety herein.

### FIELD OF THE INVENTION

[0002] The present disclosure relates to a personal hygiene implement for personal use. More particularly, the present disclosure relates to a personal hygiene implement in the form of a toothbrush as well as a display device for displaying interactive representations which can be interactively controlled from the personal hygiene instrument by means of a control device.

### BACKGROUND OF THE INVENTION

[0003] In order to encourage regular brushing of the teeth, screens or displays upon which video games are presented are provided on tooth brushing instruments; these can be interactively controlled from the toothbrush. Children, in particular, will be motivated by the added entertainment to brush their teeth regularly. As an alternative or an addition to the pure entertainment, instructions for efficient and effective cleaning of the teeth can be displayed, for example, such that the user of the toothbrush follows the sequenced images.

[0004] For example, WO 2007/112112 A1 describes a teeth brushing device in which on the base station used for charging the toothbrush a display is provided on which video games are shown while the teeth are being brushed. The video game can be controlled from the toothbrush. On the one hand, the toothbrush contains manually actuated input buttons for inputting commands for the video game. On the other, by means of various sensors, cleaning parameters such as contact pressure and the accelerations that occur during the cleaning movements are recorded, whereby the video game is controlled on the display with the aid of these recorded parameters. In order to show the video game that is appropriate for a particular user, the add-on portion of the toothbrush is identified by an identification code, as a function of which the video game or its rules are selected. Even though this allows a certain adaptation to an individual user, the degree of personalization and also the adaptability are limited by the particular needs.

[0005] US 2008/0102953 A1 also describes a toothbrush which is designed as an input device for controlling a game console from which a video game can be operated. A sensor that is attached to the toothbrush detects brush movements and the movement signals generated by the toothbrush control the movements of a virtual game object in the video game.

[0006] US 2006/0040246 A1 describes an electric toothbrush which can be stored and charged on a base station. The base station contains a display on which an interactive game such as, for instance, PAC-MAN® is presented. The toothbrush communicates wirelessly with the control device to operate the game, which becomes activated either when the toothbrush is removed from the base station or a start button located on the toothbrush is pressed. Sensors on the toothbrush record the movements of the toothbrush, which are then used to control movements of the game characters or the

game components on the screen. In order to operate other games, various storage modules can be employed. The more cleverly the game depicted on the screen is played, the more points are given to the player.

[0007] DE 10153863 A1 concerns a toothbrush, onto the end of the handle of which a ball-shaped display component may be attached, on which the results of the cleaning which have been recorded by means of sensors can be displayed or a game can be presented for children after the teeth-cleaning process has been completed. However, no provision is made for the game shown on the display to be interactively controlled from the toothbrush; instead the program presented on the display is controlled by input buttons located on the display component itself, so that the entertainment value and the learning effect are limited. The actual screen of the display component is fitted into the ball-shaped structure of the display component where it is covered by a dome-shaped, translucent cover made of scratch and acid resistant plastic.

[0008] Other teeth cleaning devices having a display on which interactively controllable games are presented are described by US 2008/0141478 and US 2008/0141476, whereby several toothbrushes can communicate with one another such that games like "Rock, Paper, Scissors" can be played competitively. However, in these designs the displays are located directly on the handles of the toothbrushes, which means that a game that motivates the proper cleaning of the teeth cannot be played during the actual cleaning process.

[0009] The goal of this invention is to create an improved personal hygiene instrument of the type described at the beginning, but one which avoids the disadvantages of state of the art instruments and simultaneously further develops the state of the art. In particular an improved adaptation of the way the display is used to the various needs must be achieved and the interaction between various users of the device and the display device must be made easier.

### SUMMARY OF THE INVENTION

[0010] In one embodiment, a personal hygiene device is provided. The device includes a toothbrush; and a display for displaying interactive representations, which are controllable from the display by means of a control device. The control device includes a game controller for controlling a video game on the display and an information controller for making information available on the display, such that a switching device operable by a switching key located on at least the toothbrush or the display is provided for switching between the game presentation generated by the game controller and the information presentation generated by the information controller.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The embodiments set forth in the drawings are illustrative in nature and not intended to limit the invention defined by the claims. The following detailed description of the illustrative embodiments can be understood when read in conjunction with the following drawings, where like structure is indicated with like reference numerals and in which:

[0012] FIG. 1: shows a schematic presentation of a personal hygiene instrument in the form of a teeth brushing device that incorporates a toothbrush as well as a display device for displaying an interactively controllable teeth brushing game, both of which can be recharged on a base station,

[0013] FIG. 2: shows a schematic representation of the running of the interactively controllable teeth brushing game on the screen of the display device, whereby the stated display device is shown in several representations at different points of time in the game;

[0014] FIG. 3: shows a schematic view of the toothbrush stored on the base station, which shows its ability to rock back and forth on the base station in order to describe the magnetically functioning holding setup;

[0015] FIG. 4: shows a sectional presentation of a manually actuated navigation key on the toothbrush which is used for controlling the avatar of the interactively controllable game;

[0016] FIG. 5: shows a schematic view of a switching key on the display device which is used for changing the screen contents;

[0017] FIG. 6: shows a schematic, sectional presentation of screen control keys on the handle of the personal hygiene instrument;

[0018] FIG. 7: shows a sequence diagram for the embodiment having an action key;

[0019] FIG. 8: shows a sequence diagram for controller having sensors and a trainings mode;

[0020] FIG. 9: shows a sequence diagram for adjusting an animation;

[0021] FIGS. 10.1 to 10.3: show sequence diagrams of section A without feedback or training mode; and

[0022] FIG. 11: shows an additional sequence diagram.

#### DETAILED DESCRIPTION OF THE INVENTION

[0023] The following text sets forth a broad description of numerous different embodiments of the present disclosure. The description is to be construed as exemplary only and does not describe every possible embodiment since describing every possible embodiment would be impractical, if not impossible. It will be understood that any feature, characteristic, component, composition, ingredient, product, step or methodology described herein can be deleted, combined with or substituted for, in whole or part, any other feature, characteristic, component, composition, ingredient, product, step or methodology described herein. Numerous alternative embodiments could be implemented, using either current technology or technology developed after the filing date of this patent, which would still fall within the scope of the claims. All publications and patents cited herein are incorporated herein by reference.

[0024] According to the present disclosure, a personal hygiene implement in the form of a toothbrush as well as a display device for displaying interactive representations is provided. In one embodiment, the screen of the display device may be used not only for the presentation, or the running, of a video game, but also for displaying other information and giving the user of the device the possibility of switching between the video game and display of the desired information. The nature of such information can vary; for example, it can provide the level of the device's battery charge or the amount of cleaning time that has already elapsed, or it can indicate which add-on part is being used.

[0025] In one embodiment, the user of the device can at his/her complete discretion switch back and forth between various display modes and in this way adapt the screen presentation to his/her needs. In accordance with one embodiment, the control device incorporates a game controller for operating a video game on the display device and also an information controller for displaying information on the dis-

play device, whereby a switching device which can be actuated by a switch key is provided for switching from the game display generated by the game controller to the information display generated by the information controller and/or vice versa. The aforementioned game and information controllers need not be separate hardware modules, but may be various software modules within a mutual microcontroller. Instead of the video game or in addition thereto, information and comments concerning the cleaning process and the current and/or previous cleaning times can be presented. Also other adult functions that are designed more in terms of the information content for adults can be presented on the display device. An adult-version provides alternatively not only the possibility of switching from a game to information, but also from an initial display to a second display.

[0026] The information that can be displayed in addition to the video game can vary considerably in nature and can, for instance, provide fixed information that has been pre-stored or the current value of an operational parameter. In an advanced embodiment of the invention the display device can also show analyses that are generated from previously recorded operational parameters of the personal hygiene instrument and/or recorded ambient parameters. In another embodiment, the control device incorporates an analysis unit for evaluating recorded operational parameters and/or ambient parameters, whereby the switching device can be coupled to the analysis device such that whoever is operating the device may switch from the video game to the analysis presentations by pressing the switch key.

[0027] The switch key can basically be located any place. To enable simple operation even during cleaning and to enable easy switching during cleaning as well, a switch key is provided on the cleaning instrument so that the user of the device can switch the screen presentation as desired while manually operating the cleaning instrument. In one embodiment, the switch key is provided on the handle of the cleaning instrument, more precisely, in an area in which one of the user's finger tips comes to rest.

[0028] In another embodiment, a switch key can also be provided on the display device itself so that the desired screen presentation can be called up directly on the display device. This is particularly advantageous in connection with the previously mentioned analysis unit so that operational parameter analyses can be called up on the display device after the cleaning process has been completed. This enables, for example, parents to easily monitor the way in which their children are brushing their teeth by actuating the switch key and calling up the analysis data stored in the control device.

[0029] In another embodiment, a switch key can also be provided on the base station on which the cleaning instrument and/or the display device can be stored and/or docked and/or charged.

[0030] The material displayed on the screen can be switched in various ways and by various means. For example, the screen displays can be gradually faded over. In another embodiment, a simultaneous, miniaturized presentation of both screen representations can be accomplished by use of a split screen approach. In one embodiment, the particular desired screen contents are, however, replaced completely at random.

[0031] In another embodiment, the back and forth switching of the screen representations can be accomplished automatically. A switching control provided for this purpose actuates the switching device automatically whenever the

personal hygiene instrument is in a predetermined operational condition. In another embodiment, this can include a time control, for example, to the effect that after a predetermined time has elapsed, beginning—for example—with the start of a game the screen representation is automatically switched to the information screen. In another embodiment, the switch to the information screen can occur upon a predetermined game event in the video game controlled by the game controller, for example, such that a data analysis of the cleaning process is shown on the screen only after the game has been successfully completed.

[0032] In another embodiment, the switching device can also inlay an information display whenever an analysis unit detects and analyzes an incorrect or less than perfect use of the personal hygiene instrument. For example, an instructions display can be inlaid to replace a video game, whenever a teeth cleaning process is being carried out with too much contact pressure along with incorrect movements of the toothbrush.

[0033] In another embodiment, such instructions can also be inlaid in the form of a change in the content of the video game, for example, for the purpose of changing the gestures and facial expressions of an animated character, changing the coloring of a body part that is to be cared for, or inlaying special pictograms into the presentation of the video game, for example, in the form of a Stop sign, a crossed-through arrow, or the like.

[0034] The switching device can be manually actuated in different ways. In an embodiment, the input device that is provided can have an actuation key for actuating the switching device by pressing on the key, touching it, and/or coming close to it. More precisely, a mechanical pressure key and/or a graphic touch screen key can be used.

[0035] In another embodiment, to an actuation key that works tactilely, the input device can be designed such that it functions without contact, for example, the input device can be equipped with a movement sensor for detecting movement of a body part. In one embodiment, the switch key can have various actuation modes for actuating the switching device in various switching directions and/or in various switching types. More precisely, the switch key can be actuated in various ways in order to effect various switching processes. For example, whenever the switch key is actuated just once, the next screen presentation in a series of different screen images can be brought up. Conversely, for example, when the switch key is double-clicked or actuated two times, the screen images in the series can be run through in reverse. In another embodiment, when the key is depressed and held down for a period of time it can bring up a main presentation, i.e., a video game.

[0036] In order to enable a better adaptation of the representations shown on the display device to the particular operator of the device, more precisely, to be able to adapt the game running on the device to the particular user, a selection device for selecting several games to be shown on the display device can be provided in one embodiment, so that the game that is suited for the user of the equipment can be presented. For this purpose, several games and associated presentation data can be stored in a storage device, so that after being selected by the selection device they can be appropriately brought to the display device from the game controller and operated. For example, a simpler game may be selected for a young child than one which would be selected for an older child.

[0037] In another embodiment, the personal hygiene instrument can contain a removable storage and/or an interface into which various storage media containing various games can be placed, so that the selection can be handled by various storage media. The storage and/or the interface can basically be located at various places, for example, it can be positioned directly on the display device. In another embodiment, an interface for importing new game software and/or downloading the software can be provided.

[0038] In another embodiment, a simple individualization of the game being presented on the display device can also be achieved by assigning the particular storage medium to an add-on component that can be placed on a handle of the personal hygiene instrument and/or docked on it. For example, a RFID chip can be available on the add-on component, which stores appropriate game information which can be called up and transferred to the games controller, which takes the respective games information to the display device for presentation.

[0039] In another embodiment, just an identification code can be stored on the mentioned add-on component, with which pertinent game information that is linked to it is deposited in a storage at another place, so that by scanning the identification code of the add-on component that is docked at the time at another place the stored game information can be called up.

[0040] In one embodiment, the stored data can be programmably addressed so that a user of the device can determine which set of data is brought to the display device for viewing upon identification of a particular add-on component. To enable an even more extensive individualization of the screen presentations, in a further embodiment, not only is selection between previously configured screen representations possible, but also modification, altering and/or generation of screen representations are/is made possible.

[0041] In one embodiment, the stored representations that are to be shown on the display device by means of an input device located on the personal hygiene instrument may be designed individually modifiable and/or formable in order to be stored in the storage module linked to an individual code. The individual programmability of the representations beyond the selection of previously stored variations allows multiple adaptation of the use of the display device to various needs. The modifiability of the representations can in this regard be designed in various ways. For example, stored representations can have a non-modifiable basic section and at least one supplemental insertion section for supplementing the stored presentation by an individually formed presentation. For example, name windows can be individually programmable in the stored representations to identify, for example, an animated avatar by a special name, which is then presented together with the avatar on the display device. This makes it possible, for example, to generate individually identified figures in video games.

[0042] The previously mentioned input device for individually modifying and/or forming the representations can basically be designed in different ways. For example, a touch screen can be provided to input the individual modifications and/or forms, whereby, more precisely, the display device can itself have a display element in the form of such a touch screen, so that alterations of the representations can be made individually.

[0043] In another embodiment, an input device can be provided in the form of a programming control key, for example,

in the form of a cursor control key for clicking display switch buttons and/or input commands, whereby such a programming control key can be located on the display device and/or a base station. Such a programming control key can also be located on the personal hygiene instrument so that the representations can be formed on the display device from the personal hygiene instrument.

**[0044]** In another embodiment, such a control key can, especially when it is located on the personal hygiene instrument, be variably wired such that as a function of the presentation being shown on the screen, for example, such that at the end of a video game it serves on the display device as a control key for operating the video game, more precisely, it serves as a navigation key for navigating a virtual screen element and/or an avatar across the display device and/or across the background image presented thereon. If on the other hand, instead of such a video game a configuration menu is being displayed on the display device, the control key in question can serve on the personal hygiene instrument as a navigation key for controlling via the menu, which for example, permits clicking on various menu areas. The control key on the personal hygiene instrument consequently has a double or multiple function.

**[0045]** In another embodiment, the individually modified and/or generated representations and/or information can be stored individually, for example, together with a code identifying a particular add-on component of the personal hygiene instrument and/or in a storage module provided on the add-on component so that when the individual add-on component is added on, the individually generated data can be called up and brought to the screen of the display device to be displayed.

**[0046]** In one embodiment, in spite of the fact that it can be controlled from the personal hygiene instrument the display device is not affixed permanently to either the base station or the personal hygiene instrument, but rather, it is freely locatable so that it can be situated upon what is the most favorable location at any given time. In one embodiment, the display device forms an individually positionable module separated from the base station and the personal hygiene instrument, which has a communication interface for communicating with the base station and/or the personal hygiene instrument even when separated from them. When designed as a stand-alone module the display device can, regardless of the position of the base station, be positioned in a place that can be clearly seen by a child or even an adult so that it is clearly visible even when the personal hygiene instrument is moved back and forth as required by the directions—in the case of a toothbrush in accordance with the cleaning movements within the mouth. Nevertheless, the screen presentation can—in the form of a video game—be controlled interactively from the personal hygiene instrument via the display communication interface. For this purpose the personal hygiene instrument can have a communication connection directly to the display module or it can communicate indirectly via the base station.

**[0047]** In order to have a simple and efficient power supply for the display device without the need to be within a certain radius from the base station and in spite of being able to position the display device at will, in one embodiment, the display device is equipped with a rechargeable battery which can be recharged by docking the display device at the base station. In another embodiment, both the display device and personal hygiene instrument can be recharged at the base station.

**[0048]** The display device has in an advanced embodiment of the invention means for placing the device on a flat surface as well as a means of storage that is fitted to the base station for storing the display snugly on the base station. Using the form-fitted means of storage, the display device can be advantageously firmly docked in the base station. In an advanced embodiment of the invention the previously mentioned means for placing the display device on a flat surface and the means of storage for docking it on the base station can be integrated into one another and/or mutually supplementally designed. For example, projecting placement feet can be placed into a complementary cradle on the base station.

**[0049]** In order to be able to keep the transmission power at a low level and to avoid large-scale data traffic, a game controller for controlling a video game being shown on the display device can in one embodiment be integrated into the display device so that only operational commands for interactive operation need be transmitted via the communication interface. The transmitted operational commands, which come from the personal hygiene instrument, are directly processed on the display device by the games controller, even when it is located at a distance from the base station.

**[0050]** In another embodiment, the base station and/or the personal hygiene instrument may contain a game controller which handles at least some of the operational commands generated on the personal hygiene instrument and transforms them into graphic commands which are transmitted either directly or indirectly via the base station to the display device. Games that can be presented on the screen of the display device can have basically quite different forms. In particular, games with controllable avatars whose movements can be interactively controlled from the personal hygiene instrument, can be used. For such use, various different functions and modes of presentation can be designed such that they are modifiable. In one embodiment, navigation control means can be attached to the personal hygiene instrument by means of which an avatar can be navigated on the screen of the display device and guided across the screen or the background provided on the screen. The navigation control means can be designed in the form of a manually operated switch on the personal hygiene instrument and/or it can include detection means for detecting an operational parameter of the personal hygiene instrument, as a function of which the avatar is navigated on the screen. For example, a motion sensor, an inclination sensor, and/or an acceleration sensor can be built into the personal hygiene instrument; the signal from such a sensor will be converted to a navigation signal for the avatar of the game being presented on the display device. In one embodiment, the navigation signals—regardless of how they are generated—are synchronously converted to movements of the virtual image or avatar in order to enhance the learning effect and to enforce the incentive to play.

**[0051]** In addition to the aforementioned separately designed display device the personal hygiene instrument can incorporate a display device that is attached to the personal hygiene instrument, for example, to indicate special events or to convey other information supplementally to the separately designed display device. In one embodiment, the personal hygiene instrument can incorporate an indicator which can be automatically operated from a control device and/or as a function of an operational parameter of the personal hygiene instrument. For example, the indicator that is provided on the

personal hygiene instrument itself can be used to indicate particularly interesting or important game situations on the separate display device.

[0052] The display device on the instrument can be designed in various ways, whereby in one embodiment simpler display means are provided on the personal hygiene instrument itself than on the separate display device. In one embodiment, the personal hygiene instrument can have a lighted housing section and/or it can incorporate a lamp that can be placed on the housing of the instrument housing. If the personal hygiene instrument is a toothbrush, in one embodiment a light ring can be provided on the front side of the handle, which can be made available in various lighting states such as blinking and/or in differing colors.

[0053] If in one embodiment, the display on the instrument is controlled as a function of the running of the game on the separate display device, then, for example, whenever the game on the separate display device is expecting or requiring the input of an operational command, a signal can be given on the indicator attached to the instrument, for example, in the form of a blinking light. The indicator element on the separate display device may be more complexly designed. For example, an electronic indicator panel is provided, for example, in the form of an LCD screen.

[0054] In another embodiment, the display device can also form an electronic picture frame into which—Independent of the teeth brushing process—pictures can be inputted and shown from an attachable picture source. Advantageously a switchover can be accomplished by means of the aforementioned switch key, in particular, from the personal hygiene instrument.

[0055] In general, brushing teeth, while certainly necessary, is not equally loved by everyone. Above all, children often are not motivated to brush their teeth. In order to counteract this lack of motivation, the time required for teeth brushing can be made interesting by the above-described invention so that children can learn to spend more time and more regularly brush their teeth, and to maintain the habit. This can have a positive effect upon the health of the teeth.

[0056] The present disclosure concerns an electric toothbrush which interactively controls an external display. Various kinds of information are available on this display; details are provided in the following paragraphs.

[0057] The present disclosure concerns a toothbrush which in addition to function switches such as an On-Off switch, a mode selection switch, etc. has a switch with which an interaction can be carried out while the teeth are being cleaned. The action key on the handle does not interfere with the primary function of the device (cleaning), but instead offers the possibility during the cleaning to control various functionalities. It can, for example, be a game or it can even serve to make certain information available during the cleaning (cleaning statistics, switchover from pressure control to cleaning time, to level of battery charge, etc. . . .). The interaction switch can, for example, be located on the back side of the toothbrush or at another place.

[0058] One can inquire about the statistics using the statistics-query button. A statistics-query can result in the following information being made available: length of cleaning time, cleaning time (morning-noon-evening), contact pressure, cleaning movements, cleaning positions, etc. This information is detected for the specific user, evaluated, stored, and displayed. The user is identified by standard means via the brush head.

[0059] In one embodiment, the “status switch” may be located on the charging station or on the display device. In some embodiments, it can be located on the toothbrush. Using a child’s toothbrush as an example, the parents can monitor the length of cleaning time and cleaning times for the preceding 5 days by pushing a button.

[0060] A device is provided for recognizing changes in condition and the energy-save mode, which the functions of the toothbrush, which activates the functions of the toothbrush, the display, etc. only when the user is using the toothbrush. By this means energy can be saved and battery operation periods lengthened. Removal of the toothbrush from the charging station is detected and evaluated as follows. The following sequence is possible: Removal from the charging station>creates a decrease of the current in the charging coil>the charge management or controller detects this condition and evaluates it. Starting up of the required functions: for example, wireless protocol transmission to the display device; execution of the functions: for example, the display device turns itself on, greetings. This activation recognition can also be used for making information available, for example, greetings, announcement of the time of day, etc.

[0061] In another embodiment, the navigation is handled on the display device while an animation or navigation is handled within a menu.

[0062] 1. Navigation is accomplished by a mechanically actuated navigation button. This button is wired to handle every direction (4 directions: up, down, right, left) in the device, having for each one key which registers the actuated direction in each case.

[0063] 2. Navigation is accomplished via the direction and movement detection by means of acceleration and position sensors located in the handle.

In another embodiment, the presentation of an animation is a function of the cleaning process. The following point concerns in general the shifting of pixels on the display screen as a function of the detected position/condition of the toothbrush. A sensor located in the toothbrush detects the movements of the toothbrush. This sensor may be an acceleration sensor. Use of optical means for detecting the position of the toothbrush in relation to the face is also possible. The data concerning movement are detected and transmitted to the display unit. The animated figure in the display unit is controlled, for example, simultaneously, as a function of the movements made in cleaning. This is particularly advantageous for children because by this means they immediately see which cleaning movements they are executing and they thus receive immediate feedback. This has a positive effect upon their motivation for cleaning their teeth. Thus, when a movement is made to the left, the animated figure also moves to the left and the same relationship exists for movements to the right and up and down.

[0064] If the toothbrush is moved to a different tooth, the animated figure also leaps to a different tooth. Thus, the user is guided from tooth to tooth and forgets less often to clean individual teeth or areas. This can be accomplished by a change in the color or the gleam of the symbolically presented tooth. Only after the user has cleaned the tooth for a sufficiently long period of time does the tooth change its color, for example, from beige to white.

[0065] The same thing can be done with parameters other than the position and movement of the toothbrush. Thus, the animation can be controlled by the contact pressure of the toothbrush. In one embodiment, a figure within the animation

or a game can be caused to move by cleaning with the correct contact pressure. If the correct and recommended contact pressure is applied, the animated figure moves normally across the tooth and from tooth to tooth. If the contact pressure is too high or too low the animated figure changes its movements or its color. Thus, if the pressure is too high, the color can, for example, change to red. Other optical or acoustical signals are also possible. Thus, a previously defined acoustical signal or a stored signal can be rendered. Thus, a melody, a voice, tones, or other acoustical sounds can be recorded and reproduced.

[0066] The brush can also be controlled from a sensor which detects the surface of the teeth and detects places that have not been cleaned. As long as the tooth has not been sufficiently cleaned, no hint to move on to the next tooth is forthcoming. If the user nevertheless moves on, a warning or instruction can be actuated.

[0067] Example 1 Children: A ball is supposed to be balanced on a seesaw. If the contact pressure is too great, the ball rolls to the right; if too little it rolls to the left.

[0068] Example 2: A surfer is supposed to be kept on top of a wave. If too much pressure is applied, he falls off the wave; if too little pressure is applied, he is unable to ascend to the top of the wave.

[0069] Example 3 Adults: A display with different colors.

[0070] In one embodiment, the following learning mode is provided.

[0071] If the unit senses incorrect or unfavorable cleaning movements, this information can be conveyed to the user. This can be accomplished optically via the display by:

[0072] Text, which is inlaid,

[0073] Gestures/mimicking on the part of the animated character,

[0074] Discoloration of the tooth,

[0075] Acoustical signals such as chirping or voicing, or

[0076] Light emitting diodes or special symbols on the display (stop sign, crossed through arrow, etc.).

Another extension of the present disclosure concerns instructions for proper cleaning. These can, for example, be in the form of special learning modes, a combination of learning mode and cleaning mode, or they can be actuated only when the teeth are clearly being incorrectly cleaned.

[0077] In the learning mode the correct cleaning movement is shown and the user can immediately duplicate it. If, for example, circular movements are recommended, an arrow which describes a circle can be shown on the display screen. Another, differently colored line shows the present position of the toothbrush and the user can then attempt to make both lines coincide. If a pressure sensor is mounted on the toothbrush, the user can also be informed of both the recommended pressure and the pressure being currently applied. Here, too, any deviation can be illustrated graphically and in color.

[0078] In another version, contents of the game, animations, information, and programming are designed to be replaceable. By using different individually recognizable replacement brushes (refills) different games, animations and information can be transmitted or initialized. The brush recognizes the refill, which is coded. From the code a determination is made as to which refill is being used. Thus, the refill can be one that is designed for children, for adults, for polishing the teeth, or for special inter-dental cleaning. Different animations are initialized depending upon the function. Personalization of the refill is yet another possibility. In a set mode an animation is established for this refill. This can be

done via a touch screen or by using keys on the toothbrush or on the display. If the appropriate mode has been stored, this animation is automatically initiated whenever the device is turned on or removed from the charging station, whenever the refill has been inserted.

[0079] In another embodiment it is possible to change the animation by replaceable storage media containing programs (software). Thus, there are different characters and expansion stages and learning and evaluation possibilities. Each user can find and use the expansion stage and animation suitable for him/her. Regular updates maintain the excitement and the fun of cleaning.

[0080] Games for adults, quizzes, puzzles, crossword puzzles, etc. and learning programs such as a word trainer can be shown on the display device. In addition, one embodiment provides for a reward and point-awarding system when the teeth are cleaned regularly, to which statistical evaluation can be added. The cleaning parameters of the different family members are shown and statistically evaluated and can be displayed graphically. The data can also be transmitted to a computer via a suitable interface (USB). The presentation is actuated by the status head.

[0081] In another embodiment improvement points can be earned by the cleaning process as a function of length of cleaning, time of cleaning, regularity of cleaning, correct cleaning parameters, etc. With this points system children or parents and children can be animated to compete, the result of which can be thorough and detailed teeth hygiene.

[0082] The result is high scores for family members. Names for the individual refills can be stored via a PC or buttons or a touch screen display and then shown on the screen. Also, loading of digital images is possible. The interplay among all cleaning parameters is stored by means of a code that can be loaded on a home page, allowing a competition to be set up with other children or adults. In another embodiment the handles communicate not only with the display and evaluation unit, both also with one another. This has the advantages that the cleaning programs can be transmitted from one handle to the other.

[0083] Other versions concern a method for improving the motivation for teeth cleaning or for improving the cleaning process or result. It incorporates the following:

[0084] The handle of an electric toothbrush

[0085] Optionally one or more sensors which detect the current cleaning parameters in the handle

[0086] A base or charging station

[0087] A display unit that is separate from the handle and base element

[0088] A wireless data transfer from the handle to the display and/or the base station.

[0089] Optional touch screen for programming the operational conditions

[0090] Optional personalized refills through RFID.

[0091] An animated character or graphic that can be shown on the display

[0092] Interactive feedback from the character during cleaning

[0093] Optionally replaceable software and characters

[0094] Whereby the character is animated by

[0095] Actions of the user or

[0096] The cleaning parameters are interactively changed by the actions of the user,

[0097] whereby the user receives immediate feedback related to his actions.

In another embodiment, the personal hygiene instrument may be a razor.

[0098] Turning to the Figures, the teeth brushing device 1 shown in FIG. 1 includes an electric toothbrush 2 which incorporates a grip-shaped handle 3, which forms a grip, and also an add-on part 4 which is attached thereon, but can easily be removed and which in the depicted embodiment is a refill brush having an array of bristles 5, but can also in some cases have other cleaning elements such as plastic strips, interdental cleaner or the like.

[0099] Inside the handle 3 is a drive motor which can drive the array of bristles 5 of the add-on piece 4 via a suitably designed drive train. Also inside the handle 3 is an energy storage unit which is in the form of battery that can be recharged via the charging connection 6. In one embodiment, the charging connection 6 may be located on a rear end section of handle 3 with which the handle can be laid or placed on the base station 7 in order on the one hand to be out of the way when not in operation and on the other hand to be able to be charged.

[0100] As FIG. 3 shows, the toothbrush 3 stands upright on the station body 8 (which is essentially designed like a flat plate) of the base station 7, whereby in accordance with one embodiment the upright position is achieved without a locking form fit or the like, so that the upright standing toothbrush 2 can rock back and forth as FIG. 3 makes clear.

[0101] For this purpose, as a means of storage 9 a pair of form-fitted storage surfaces 10 is provided, which form a pair of multiple-axis, tilting surfaces whose surface pieces fit snugly together. In the embodiment shown, storage surface 10a for the station body 8 is specifically designed in the form of a rotationally symmetric basin, while the front end of the handle 3 of the toothbrush 2 forms an egg-shaped or dome-shaped surface piece (or a surface piece that is in some other manner rotationally symmetric, convexly domed), which snuggles into the aforementioned storage surface 10a or 10b or vaulted, or both have a leveled out area to enable the toothbrush to be stood up in the center.

[0102] To hold the docked toothbrush 2 in its upright position, magnetic holders 11 are provided in the area of the means of storage 9 between the toothbrush 2 and the base station 7, which have a centering effect and hold the said toothbrush 2 in its vertically standing position of rest. The magnetic holders 11 contain a permanent magnet in the base station 7 which attracts a metallic storage element, for example, in the form of a storage ring located in the end piece of the handle 3. The magnetic holders 11 are advantageously designed such that a reactionary force is applied to the handle 3, when the handle 3 is or becomes retracted from its usual centered position. In the depicted embodiment this reaction-inducing mechanism consists of the magnetic holders 11.

[0103] In this process the toothbrush 2 may be inductively charged from the base piece 7. For this purpose the charging connection 6 of the handle is designed to work inductively as is the charging connection 12, which is located on the base station 7 and works together with charging connection 6. Both charging connections 6 and 12 may be covered or encapsulated to protect them from their surroundings. More precisely, they can be mounted under the housing of the handle 3 or the base station 7, so that the charging current can be transmitted without direct contact. So that the magnetic fields of the standing device and the electromagnetic alternating field do reciprocally overlay one another, both devices can be mounted such that they are "nested" with each other. For

example, in one version the stand magnet is designed such that it surrounds the induction spools for the electromagnetic coupling (for transmitting the charging current). Also a reverse arrangement in which the coil encloses the stand magnets is provided in another embodiment. The stand magnet is mounted in the base station or in the lower section of the handle. This object of the inductive energy transmission can be arbitrarily combined with other designs.

[0104] The base station 7 further serves as a place to put the display device 13 which may incorporate an electronic display element 14 in the form of a screen or a display, which can, for example, be designed as an LCD screen. The aforementioned display device 13 is designed as a stand-alone unit separate from the base station 7, which can be docked on the base station 7 in order that it can be charged from the station, but it can also be operated separately at a distance from the base station 7.

[0105] In the depicted embodiment the display device 13 incorporates a base body 15, which forms the base of the display device 13 and holds the aforementioned display element 14. In one embodiment, a transparent capping bell 16 is turned upside down over the aforementioned display element 14; the capping bell covers the display element 12 or encapsulates it and may be water-tightly connected to the aforementioned base body 15 so that the display element 12 is imbedded under the covering bell 13.

[0106] In one embodiment, for the provision of energy to the display element 14 an energy storage device unit in the form of a battery is integrated into the base body 15; it can be charged from the base station 7 via a charging connection 17. The charging connection 17 on the display device 13 and the charging connection 18 on the base station 7, may be designed to work inductively, so that the charging current can be transmitted with without contact and the charging connecting 17 or 18 can be imbedded to protect it against dampness, more precisely they can be covered under the housing of the particular piece.

[0107] As FIG. 1 shows, the underside of the base body 15 of the display device 13 forms a surface upon which the display device 13 can be placed on any even surface. By means of a communication interface 19, which is not separately shown, the display device 13 can communicate with the toothbrush 2. For the purpose of wireless communication a sender-receiver module may be provided on the display device 13, with which an equivalent sender/receiver module on the toothbrush handle 3 can communicate, whereby data can be transmitted in both directions. For example, a Bluetooth interface can be provided on the display device 13 and on the toothbrush 2 in order to establish a Bluetooth connection between the two pieces.

[0108] The display device 13 also has a control device 20, which controls the representations on the display element 12 and converts the control signals received from the handle 3 of the toothbrush 2 to analogous graphic commands for the presentation on the screen. In particular, the control device 21 can present and control a video game on the display element 14 as is shown in the example in FIG. 2.

[0109] In one embodiment, as shown in FIG. 2, on the display element 14 an avatar 22 and/or a virtual element are/is presented, which can be moved or guided across the screen and/or is moveable or guideable across the screen background. In the depicted embodiment the avatar 22 is a figure of a child which can be moved across an island as well as within the underwater world in front of the island in order to

clean an underwater reef, which symbolizes the teeth of a dental plate that are to be cleaned.

[0110] The avatar 22 can be navigated across the screen presentation or the display element 14 by the toothbrush 2. For this purpose the handle 3 of the toothbrush 2 incorporates means for controlling the navigation used for generating the navigation commands, which are transmitted via the aforementioned communication interface 19 or 20 to the control device 21 which control the movements of the avatar 22 on the display element 14. As seen on FIG. 4, in the depicted embodiment the said navigation control means incorporate a manually actuated navigation key 23, which can basically be designed in several different ways and can be shaped in the style of the well-known mouse ball on a laptop, which recognizes actuations or applications of force in different directions, which it converts to navigation signals for movements in different directions.

[0111] In order to make it simpler for children to navigate the avatar 22, the navigation key 23 on the handle 3 is advantageously designed as a quadruple push button switch, which has four push button areas that are oriented in 4 directions, which may be positioned like a cross with respect to one another. Applying pressure to one or even two contiguous push button areas enables the generation of a navigation control signal (which can even be overlaid) for movement in the appropriate direction, which is converted to a movement of the avatar in the desired direction. In this regard a fixed direction assignment between the pushbutton areas and the screen can be prescribed, for example, such that applying pressure to the push button area aimed at add-on component 4 always effects a movement of the avatar 22 upwards toward the edge of the upper screen, etc. Alternatively the direction assignment can also be a function of the orientation of the brush depicted in the virtual presentation, so that the virtual presentation of the brush regardless of its rotational position on the screen, for example, is always moved to the right at right angles to the longitudinal axis of the virtual brush representation, whenever the push button section that is located on the right on the real tooth brush is depressed. This is, however, a complex control process, which is not well suited for children, but can nevertheless increase the motivation of adults to play.

[0112] Alternatively, the navigation key 23 can be a switch which must be actuated as soon as certain positions or configurations can be recognized on the display. In another alternative the navigation key 23 is also an on/off switch for the electric toothbrush, for example, using a longer period of depression for turning the toothbrush on and off than for operating the display functions. In another alternative the on/off switch of the electric toothbrush and the navigation key 23 are separate, for example, designed to be located on opposite or other sides of the toothbrush handle.

[0113] In another embodiment, navigation control signals on the handle 3 can also be derived from the operational parameters of the toothbrush 2. In particular, acceleration signals which correspond to the movements, in particular, the cleaning movements of the toothbrush 2 can be generated by means of suitable detection devices, for example, in the form of movement and/or acceleration sensors, so that the virtual representation of the avatar 22 and/or the virtual toothbrush being held by the avatar 22 is navigated in accordance with the actual movements of the toothbrush 2. In one embodiment, a tilt sensor, which detects the tilt or orientation of the toothbrush 2 in space, so that the avatar 22 does not move only

back and forth, but can also be tilted, can also be integrated into the toothbrush 2. In one embodiment, the screen representation of the avatar 22 moves synchronously with the movements and/or actuations of the push buttons on the toothbrush 2.

[0114] As FIG. 5 shows, the screen representation on the display device 13 can via a switch-over device be switched over from the video game showing the above-mentioned figures to an information presentation that is not connected to the video game, whereby in the manner mentioned at the beginning various information can be presented. In the depicted embodiment, a static evaluation of the cleaning period on particular days is presented, which is generated by an evaluation module in the control device 21. The following, for example, can be evaluated: Whether cleaning was done in the morning, at noon, and in the evening and how long the cleaning was done in each case (see the bar length) and whether a threshold value was exceeded. Other operational parameters could certainly be evaluated and presented. In one embodiment, the evaluated operational data are individually stored, i.e., they are stored separately for each user such that they may also be individually called up. This can be done in such a manner that the evaluated operational parameters and/or the other information are stored together with an identification code that is assigned to a toothbrush brushhead. In the depicted embodiment the cleaning times are those for a user named Joey.

[0115] The switch-over device for changing the screen presentation from the video game to the evaluation and vice versa can be actuated by a switching key 25, which is provided in the form of a push button switch located on the display device 13 in the embodiment depicted in FIG. 5. When various evaluation data sets have been generated by the evaluation module of the control device 21, for example, to make available various evaluations of various operational parameters of a user or the evaluated operational parameters of various users, one can switch from one screen representation to the other via the aforementioned switching key 25 by successively depressing the switch multiple times. As FIG. 6 shows, a screen control key 26, which can basically control various functions of the screen, can be provided on the handle 3 of the toothbrush 2. In particular, such a control key 26 can constitute a switching key by means of which what is being shown on the screen can be advanced and/or regressed in the manner and way described.

[0116] As FIG. 6 shows, the control key 25 can basically be mounted at different locations and/or several such control buttons 25 can be provided. In one embodiment, a control key can be mounted on the front side of the handle 3, more precisely, in the area where the thumb comes to rest. In another embodiment, a control key 26 can be located on the back side of the handle 3, more precisely in the area where a finger comes to rest.

[0117] In another embodiment, a control key 26 can also be provided in another section of the handle. The control key 26 can be basically designed to handle different functions, more precisely, it can be variably wired, for example, such that as a function of the operational condition of the toothbrush 2 and/or as a function of what is being shown on the display device 13 a control key 26 can serve as the aforementioned switching key for changing what is being shown on the screen. If, for example, a video game is running on the display device 13, a control key 26 can serve as the said switching key for changing what is being shown on the screen. The afore-

mentioned or another control key **26** can then alternatively, when a video game is running on the display device **13**, serve as a switch button for actuating game functions, for example, the actions of the avatar **22**. If in this regard, for example, the display device is being used as an electronic picture frame onto which images are being loaded from an image storage source, one of the aforementioned control buttons **26** can be wired such that it causes the images to switch from one image to the next. If on the other hand, a control menu is being displayed on the screen of the display device **13**, for example, before a game is begun, the control key **26** can serve as an ENTER key for actuating a switch button for the purpose of selecting a particular game.

[0118] In another embodiment, the previously mentioned navigation key **23** can also be wired to perform various tasks which, in particular, change as a function of the operational state of the personal hygiene instrument and/or as a function of what is being shown on the screen of the display device **13**. If, for example, a control menu is being displayed in the manner described above, the said navigation key **23** can serve as a navigation cursor in order to navigate via the control menu and to select appropriate switch keys by clicking on them, for example, by quick sequential double-clicking of an actuating link. If in this regard a video game is being run on the display device **13**, the aforementioned navigation key **23** can be used to control the avatar in the manner and way described above.

[0119] In another embodiment, the aforementioned control key **26** and/or the aforementioned navigation key **23** can be used in a program mode to change individually and/or to generate individually or to shape what is being shown on the screen, for example, by generating in a name window assigned to the avatar **22** an individually programmable name, which is then used in the screen presentations of the video game.

[0120] The technical design of the aforementioned navigation and control keys **23** and **26** on the handle **3** of the toothbrush **2** can basically be different. In one embodiment, each such switch is covered with a flexible soft component, which enables the actuation of the switch located beneath it and at the same time assures that the switch is sealed such that no fluid can enter. The flexible soft component can be an integral part of the housing of the handle **3**, which, for example, can be produced in a two-component injection molding process.

[0121] The flow diagrams shown in FIGS. 7 to 11 can be combined one with the other as desired or supplemented or changed by other sequences.

[0122] The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm."

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document incorporated by reference, the meaning or definition assigned to that term in this document shall govern.

[0124] While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

1. A personal hygiene device comprising:  
a toothbrush;  
a base station including a pair of form-fitted storage surfaces and a pair of magnetic holders for holding the toothbrush in an upright standing position; and  
a display for displaying interactive representations, which are controllable from the display by means of a control device; the display being a separately positionable module designed to be separate from a base station and the toothbrush;  
wherein the control device includes a game controller for controlling a video game on the display and an information controller for making information available on the display, such that a switching device operable by a switching key located on at least the toothbrush or the display is provided for switching between the game presentation generated by the game controller and the information presentation generated by the information controller.

2. A personal hygiene device according to claim 1, wherein the information controller includes an evaluation unit for evaluating recorded operational parameters.

3. A personal hygiene device according to claim 2, wherein the operational parameters are selected from the group consisting of length of care, time of care, care movements, care position, speed of toothbrush, acceleration of toothbrush, and contact pressure of toothbrush.

4. A personal hygiene device according to claim 1, wherein the control device includes a control key.

5. A personal hygiene device according to claim 1, wherein the display further includes a touch screen for inputting a user's individual information.

6. A personal hygiene device according to claim 1, the display further comprises a selection device for selecting several storable games for display on the display device.

7. (canceled)

8. A personal hygiene device according to claim 1, wherein the device includes charging connections provided on the display and the base station for charging the display.

9. A personal hygiene device according to claim 1, wherein the toothbrush includes a chargeable energy storage device and an inductive charging connection for for charging the toothbrush.

10. A personal hygiene device according to claim 1, wherein the display includes a game controller for controlling a video game displayable on the display, to which processed game control commands can be sent from the game controller via a communication interface.

11. A personal hygiene instrument according to claim 1, wherein the display includes a sequential control module for automatically sequentially switching the picture being displayed.

12. A personal hygiene instrument according to claim 1, wherein the toothbrush includes an additional display.