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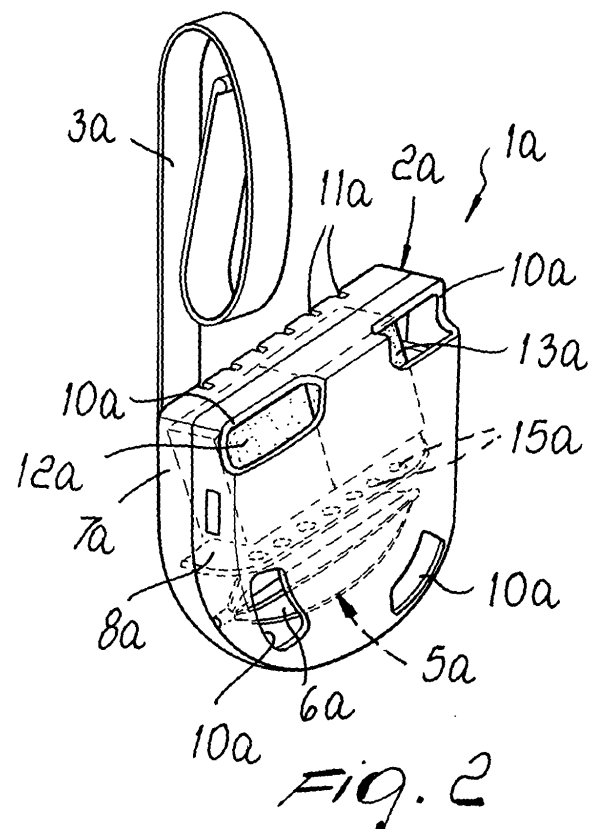
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(54) **Device for dispensing in the flushing water and/or for mixing with the flushing water detergent and/or sanitizing and/or deodorant products, in toilet bowls or hydraulic and sanitary fixtures in general**

(57) A device for dispensing into the flushing water and/or for mixing with the flushing water detergent and/or sanitizing and/or deodorant products, in toilet bowls or hydraulic and sanitary fixtures in general. The device (1a) comprises a supporting structure (2a) provided with engagement means (3a) which can engage the hydraulic and sanitary fixture in order to support the supporting structure (2a) in a region of the fixture that is affected by the flushing water flow. The supporting structure (2a) supports rotatably, about a rotation axis, at least one rotating element (5a), which interacts with the flow of flushing water in order to mix detergent and/or sanitizing and/or deodorant products introduced in the flushing water and/or adjust the dispensing of detergent and/or sanitizing and/or deodorant products connected to the supporting structure (2a) and/or vary the orientation of the flow of flushing water conveyed onto detergent and/or sanitizing and/or deodorant products connected to the supporting structure (2a). The detergent and/or sanitizing and/or deodorant products are external to the rotating element (5a).

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Description

[0001] The present invention relates to a device for dispensing in the flushing water and/or for mixing with the flushing water detergent and/or sanitizing and/or deodorant products, in toilet bowls or hydraulic and sanitary fixtures in general.

[0002] Devices for dispensing, within toilet bowls, detergent and/or sanitizing and/or deodorant products in the solid state, packaged in the form of water-soluble tablet or bar, are known. Such devices are constituted generally by a supporting structure, which is composed of an enclosure with a cage-like structure which defines internally a compartment for the tablet or bar and a hook-shaped suspension arm, which is connected to the enclosure and can engage the rim of the toilet bowl so as to support the enclosure below the rim of the toilet bowl, where the holes for dispensing the flushing water of the toilet bowl are provided. In this manner, every time the flushing system of the toilet bowl is operated, the flushing water strikes the enclosure, gradually dissolving the tablet or bar and therefore mixing the detergent and/or sanitizing and/or deodorant products with the flushing water.

[0003] When using such devices, very often a scarcely uniform wear of the tablet or bar is observed, because the flushing water strikes in a different manner the various regions of the tablet or bar. This scarcely uniform wear has the effect of producing very often an unwanted breakup of the tablet or bar, with the release of undissolved pieces into the flushing water and therefore with a scarcely effective wear of the tablet or bar in terms of washing the toilet bowl.

[0004] Moreover, with such devices the substances that compose the tablet or bar dissolve in the flushing water in a scarcely satisfactory manner, and foam generation is limited and is usually enhanced by increasing the content of surfactants in the products that compose the tablet or bar.

[0005] Devices for dispensing into toilet bowls detergent and/or sanitizing and/or deodorant products in the liquid or gel state are also known. Such devices are provided with at least one tank, which is hung from the rim of the toilet bowl and contains the detergent and/or sanitizing and/or deodorant products, and the products are dispensed into the flushing water usually by utilizing the washing action of the water on a preset region of the device, onto which a certain quantity of the cited products is dispensed generally by gravity.

[0006] Even with these devices, very often the mixing of the detergent and/or sanitizing and/or deodorant products in the flushing water is not fully satisfactory and foam generation is limited and conditioned by the shape of the toilet bowl, by the force of the water jet, and by the direction of the flushing water on the device.

[0007] In toilet bowls served by a cistern for storing the flushing water, the flushing water can receive the addition of detergent and/or sanitizing and/or deodorant products, which are placed inside said cistern.

[0008] In this case also, very often the mixing of the detergent and/or sanitizing and/or deodorant products in the flushing water is not fully satisfactory and foam generation is limited.

5 **[0009]** The aim of the present invention is to provide a device for dispensing into the flushing water and/or for mixing with the flushing water detergent and/or sanitizing and/or deodorant products, in toilet bowls or hydraulic and sanitary fixtures in general, which ensures optimum mixing of the detergent and/or sanitizing and/or deodorant products with the flushing water.

10 **[0010]** Within this aim, an object of the invention is to provide a device which, for equal detergent and/or sanitizing and/or deodorant products used, achieves a greater generation of foam and a longer retention of the generated foam with respect to known types of devices.

15 **[0011]** Another object of the invention is to provide a device which can be manufactured at competitive costs and is simple to use.

20 **[0012]** This aim and these and other objects, which will become better apparent hereinafter, are achieved by a device for dispensing into the flushing water and/or for mixing with the flushing water detergent and/or sanitizing and/or deodorant products, in toilet bowls or hydraulic and sanitary fixtures in general, which comprises a supporting structure provided with engagement means which can engage the hydraulic and sanitary fixture in order to support the supporting structure in a region of the fixture that is affected by the flushing water flow, characterized in that said supporting structure supports rotatably, about a rotation axis, at least one rotating element, which interacts with the flow of flushing water in order to mix detergent and/or sanitizing and/or deodorant products introduced in the flushing water and/or adjust the dispensing of detergent and/or sanitizing and/or deodorant products connected to said supporting structure and/or vary the orientation of the flow of flushing water conveyed onto detergent and/or sanitizing and/or deodorant products connected to said supporting structure, said detergent and/or sanitizing and/or deodorant products being external to said at least one rotating element.

35 **[0013]** Further characteristics and advantages of the invention will become better apparent from the description of some embodiments of the device according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is an exploded perspective view of a first embodiment of the device according to the invention; Figure 2 is a perspective view of the device of Figure 1 in the assembled condition;

Figure 3 is an exploded perspective view of a second embodiment of the device according to the invention; Figure 4 is a perspective view of the device of Figure 3 in the assembled condition;

55 Figure 5 is an exploded perspective view of a third embodiment of the device according to the invention; Figure 6 is a perspective view of the device of Figure

5 in the assembled condition;

Figure 7 is an exploded perspective view of a fourth embodiment of the device according to the invention; Figure 8 is a perspective view of the device of Figure 7 in the assembled condition;

Figure 9 is an exploded perspective view of a fifth embodiment of the device according to the invention; Figure 10 is a perspective view of the device of Figure 9 in the assembled condition;

Figure 11 is an exploded perspective view of a sixth embodiment of the device according to the invention; Figure 12 is a perspective view of the device of Figure 11 in the assembled condition;

Figure 13 is an exploded perspective view of a seventh embodiment of the device according to the invention;

Figure 14 is a perspective view of the device of Figure 13 in the assembled condition;

Figure 15 is an exploded perspective view of an eighth embodiment of the device according to the invention;

Figure 16 is a perspective view of the device of Figure 15 in the assembled condition;

Figure 17 is another perspective view of the device of Figures 15 and 16 in the assembled condition, but taken from a different angle with respect to Figure 16;

Figure 18 is an exploded perspective view of a ninth embodiment of the device according to the invention;

Figure 19 is a perspective view of the device of Figure 18 in the assembled condition;

Figure 20 is another perspective view of the device of Figures 18 and 19 in the assembled condition, but taken from a different angle with respect to Figure 19.

[0014] With reference to the figures, the device according to the invention, generally designated in its various embodiments by the reference numerals 1a, 1b, 1c, 1d, 1e, 1f, 1g, 1h, 1i, comprises a supporting structure 2a-2i, which is provided with engagement means 3a-3i, which can engage the hydraulic and sanitary fixture so as to support the supporting structure 2a-2i in a region of the fixture that is affected by the flow of the flushing water.

[0015] According to the invention, the supporting structure 2a-2i supports, so that it can rotate about a rotation axis 4a-4i, at least one rotating element 5a-5i, which interacts with the flow of the flushing water in order to mix detergent and/or sanitizing and/or deodorant products introduced in the flushing water and/or adjust the dispensing of detergent and/or sanitizing and/or deodorant products connected to the supporting structure 2a-2i and/or vary the orientation of the flow of flushing water conveyed onto detergent and/or sanitizing and/or deodorant products connected to the supporting structure 2a-2i.

[0016] The rotating element 5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h can be constituted by an impeller with radial vanes or of the screw type in which the rotation axis, considering

the device during use, i.e., with the supporting structure 2a, 2b, 2c, 2d, 2e, 2f, 2g, 2h supported by the engagement means 3a, 3b, 3c, 3d, 3e, 3f, 3g, 3h in a region of the fixture affected by the flow of the flushing water, is oriented substantially horizontally.

[0017] As an alternative, the rotating element 5i can be constituted by a helical impeller in which the rotation axis, considering the device during use, i.e., with the supporting structure 2i supported by the engagement means 3i in a region of the fixture affected by the flow of the flushing water, is oriented substantially vertically.

[0018] The detergent and/or sanitizing and/or deodorant products to be dispensed are supported preferably by the supporting structure 2a-2i so that they are external to the rotating element, e.g. they are placed upstream of or downstream of the rotating element with respect to the direction of the flushing water flow. The detergent and/or sanitizing and/or deodorant products can also be arranged within the cistern for storing flushing water in which the toilet bowl or the hydraulic and sanitary fixture in general is equipped. In this last case, the device according to the invention is constituted substantially by the supporting structure, by the engagement means and by the rotating element, which by interacting with the flow of the flushing water mixes the detergent and/or sanitizing and/or deodorant products that are already present in the flushing water and generates a larger volume of foam for an equal composition of the products.

[0019] With reference to Figures 1 and 2, the device 1a in the first embodiment comprises a supporting structure 2a, which is constituted substantially by an enclosure composed of two parts 7a, 8a, which are mutually assembled and define a compartment 9a inside them. Such compartment 9a is connected to the outside through openings 10a, which are designed to be directed toward the wall of the fixture along which the flushing water flows, and optionally openings 11a on its opposite side.

[0020] The rotating element 5a is constituted, in this first embodiment, by an impeller 6a with radial vanes which taper in the direction of their axial ends. The impeller 6a is supported, so that it can rotate about its own axis 4a, by the supporting structure 2a within the compartment 9a. The axis 4a of the impeller 6a, when the device is being used, is arranged substantially horizontally.

[0021] The detergent and/or sanitizing and/or deodorant products to be mixed with the flushing water are also arranged inside the compartment 9a. Such products are solid and are packaged in the form of at least one water-soluble tablet. Preferably, the detergent and/or sanitizing and/or deodorant products are packaged in the form of two water-soluble tablets 12a, 13a, which are positioned in the compartment 9a above the impeller 6a.

[0022] Conveniently, between the impeller 6a and the tablets 12a, 13a there is an interposed diaphragm 14a, which supports the tablets 12a, 13a. The diaphragm 14a is crossed by passages 15a, which allow the flushing water that makes contact with the tablets 12a, 13a and

the products of the dissolution of the tablets 12a, 13a to flow on the vanes of the underlying impeller 6a.

[0023] In practice, when using the device in this first embodiment, the flushing water enters the compartment 9a through the openings 10a, 11a located in the upper part of the supporting structure 2a, comes into contact with the tablets 12a, 13a, causing their gradual dissolution, and then descends onto the impeller 6a, causing its rotation about its own axis 4a before exiting from the openings 10a located on the lower part of the supporting structure 2a.

[0024] In this first embodiment, the impeller 6a performs predominantly the function of improving the mixing of the products of the dissolution of the tablets 12a, 13a with each other and with the flushing water, increasing the production of foam.

[0025] With reference to Figures 3 and 4, the device 1b in the second embodiment is provided substantially like the device described above with reference to the first embodiment shown in Figures 1 and 2, with the difference that the rotating element 5b is constituted, in this second embodiment, by an impeller 6b of the screw or screw-feeder type, the rotation axis 4b whereof is horizontal when the device is in use.

[0026] The other elements of the device in this second embodiment that correspond to the elements already described with reference to the first embodiment shown in Figures 1 and 2 have been designated by the same reference numerals followed by the letter b instead of the letter a.

[0027] In practice, in the use of the device in this second embodiment, the flushing water enters the compartment 9b through the openings 10b, 11b located in the upper part of the supporting structure 2b, comes into contact with the tablets 12b, 13b, causing their gradual dissolution, and then descends onto the impeller 6b, causing its rotation about its own axis 4b before flowing out through the openings 11b located in the lower part of the supporting structure 2b.

[0028] In this second embodiment also, the impeller 6b performs predominantly the function of improving the mixing of the products of the dissolution of the tablets 12b, 13b with each other and with the flushing water, increasing the production of foam. Moreover, the particular shape of the impeller 6b also directs laterally the flow of water mixed with the products of the dissolution of the tablets 12b, 13b in output from the device, thus extending the area of the action of the products on the walls of the bowl and achieving a more diffuse action which is not limited only to the region that lies below the device.

[0029] With reference to Figures 5 and 6, the device 1c in the third embodiment comprises a supporting structure 2c, which is constituted substantially by an enclosure composed of two parts 7c, 8c, which are mutually assembled and define internally a compartment 9c. Such compartment 9c is connected to the outside through openings 10c, which are designed to be directed toward the wall of the fixture along which the flushing water flows,

and optionally openings 11c on its opposite side.

[0030] The rotating element 5c is constituted, in this third embodiment, by an impeller 6c with radial vanes which taper in the direction of their axial ends. The impeller 6c is supported, so that it can rotate about its own axis 4c, by the supporting structure 2c within the compartment 9c. The axis 4c, when the device is in use, is arranged substantially horizontally.

[0031] The detergent and/or sanitizing and/or deodorant products to be mixed with the flushing water are also arranged within the compartment 9c. In this third embodiment, part of these products is in solid form, packaged in the form of at least one water-soluble tablet 12c, and part is in liquid or gel form and is contained within a tank 13c.

[0032] The tablet 12c and the tank 13c are arranged in the compartment 9c above the impeller 6c.

[0033] Conveniently, between the impeller 6c and the assembly constituted by the tablet 12c and the tank 13c, there is an interposed diaphragm 14c, which supports the tablet 12c and the tank 13c. The diaphragm 14c is crossed by passages 15c and by a hole 16c, which allow the flushing water that makes contact with the tablet 12c, the products of the dissolution of the tablet 12c, and the liquid or gel products dispensed by the tank 13c to flow on the vanes of the underlying impeller 6c.

[0034] More particularly, the tank 13c has at least one dispensing outlet at its lower end, which is not visible in the figures. The dispensing outlet of the tank 13c is arranged at a hole 16c, which is provided in the diaphragm 14c. Below the hole 16c, the supporting structure 2c supports a retention element, which is constituted for example by a plate 17c. The plate 17c is arranged at a preset distance from the hole 16c and is designed to retain preset quantities of the liquid or gel products that exit by gravity from the dispensing outlet of the tank 13c, preventing their excessive spread.

[0035] In this third embodiment, the impeller 6c is arranged below the plate 17c, but it might also be arranged between the diaphragm 14c, in which the hole 16c is provided, and the plate 17c, cooperating with the plate 17c in retaining the liquid or gel products dispensed by the tank 13c.

[0036] In practice, in the use of the device in this third embodiment, the flushing water enters the compartment 9c through the openings 10c, 11c located in the upper part of the supporting structure 2c, comes into contact with the tablet 12c, causing its gradual dissolution, and with the liquid or gel product deposited on the plate 17c. The flushing water, together with the products of the dissolution of the tablet 12c and the products dispensed by the tank 13c, then descends onto the impeller 6c, causing its rotation about its own axis 4c before it flows out from the openings 10c located on the lower part of the supporting structure 2c.

[0037] In this third embodiment, the impeller 6c performs predominantly the function of improving the mixing of the products of the dissolution of the tablet 12c and of

the products dispensed by the tank 13c with each other and with the flushing water, increasing the generation of foam.

[0038] It should be noted that according to a variation, not shown for the sake of simplicity, of this third embodiment, the tablet 12c might be replaced with a second tank, similar to the tank 13c, which contains other liquid products. In this case, at the dispensing outlet of the second tank there is a second hole, similar to the hole 16c, which passes through the diaphragm 14c, and below said second hole there is a second plate which is similar to the plate 17c.

[0039] With reference to Figures 7 and 8, the device 1d in the fourth embodiment is provided substantially like the device already described with reference to the first embodiment shown in Figures 1 and 2, with the difference that the impeller 6d is further connected to actuation means which can turn it about its own axis 4d in addition to the action of the flushing water on said impeller 6d.

[0040] More particularly, said actuation means preferably comprise an electric motor and an electric power source for supplying it, such as for example a battery, which are arranged inside a hermetically sealed container 18d supported by the supporting structure 2d. The electric motor is connected, by means of its output shaft, to the impeller 6d so as to cause its rotation about the axis 4d with respect to the supporting structure 2d. The electric motor can be controlled by an electronic circuit, which is also accommodated within the container 18d and drives the electric motor with a preset rotation rate when the impeller 6d is turned about its own axis 4d by the flow of the flushing water and interrupts its actuation after a period of time which can be preset.

[0041] The other elements of the device in this fourth embodiment that correspond to the elements already described with reference to the first embodiment shown in Figures 1 and 2 have been designated by the same reference numerals followed by the letter d instead of the letter a.

[0042] In practice, the operation of the device in this fourth embodiment is similar to the one already described with reference to the device in the first embodiment, with the difference that the rotation rate of the impeller 6d about its own axis 4d and the rotation time of the impeller 6d can be increased at will by means of the electric motor that drives the impeller 6d so as to further improve the effect of mixing the products of the dissolution of the tablets 12d, 13d with each other and with the flushing water and increase the generation of foam.

[0043] With reference to Figures 9 and 10, the device 1e in the fifth embodiment is provided in a manner which is similar to the device in the first embodiment shown in Figures 1 and 2, with the difference that in this fifth embodiment the impeller 6e is connected to means which are adapted to prolong its rotation activated by the flow of the flushing water.

[0044] Such means adapted to prolong the rotation of the impeller 6e comprise a flywheel 19e, which is sup-

ported, so that it can rotate about its own axis, by the supporting structure 2e and is connected to the impeller 6e cinematically, by means of gears 20e, 21 e also supported by the supporting structure 2e.

[0045] The other elements of the device in this fifth embodiment that correspond to the elements already described with reference to the first embodiment shown in Figures 1 and 2 have been designated by the same reference numerals followed by the letter e instead of the letter a.

[0046] In practice, in the use of the device in this fifth embodiment, the flushing water enters the compartment 9e through the openings 10e, 11e located in the upper part of the supporting structure 2e, comes into contact with the tablets 12e, 13e, causing their progressive dissolution, and then descends onto the impeller 6e, causing its rotation about its own axis 4e before flowing out from the openings 10e located on the lower part of the supporting structure 2e. The rotation of the impeller 6e about its own axis 4e is prolonged by the presence of the flywheel 19e.

[0047] In this fifth embodiment, the impeller 6e performs predominantly the function of improving the mixing of the products of the dissolution of the tablets 12e, 13e with each other and with the flushing water, increasing the generation of foam.

[0048] With reference to Figures 11 and 12, the device 1f in the sixth embodiment comprises a supporting structure 2f, which is constituted substantially by an enclosure composed of two parts 7f, 8f, which are mutually assembled and define internally a compartment 9f. Said compartment 9f is connected to the outside through openings 10f, which are designed to be directed toward the wall of the fixture along which the flushing water flows, and optionally openings 11f on its opposite side.

[0049] The rotating element 5f is constituted, in this sixth embodiment, by a screw-type impeller 6f. The impeller 6f is supported, so that it can rotate about its own axis 4f, by the supporting structure 2f within the compartment 9f. The axis 4f, when the device is in use, is arranged substantially horizontally.

[0050] The detergent and/or sanitizing and/or deodorant products to be mixed with the flushing water are arranged within the compartment 9f, downstream of the impeller 6f with respect to the direction of the flushing water. Said products are solid and packaged in the form of a water-soluble tablet 12f. As an alternative, two or more tablets can be arranged within the compartment 9f.

[0051] In this sixth embodiment, the impeller 6f is arranged above the tablet 12f and distributes the flow of flushing water that enters the compartment 9f onto the tablet 12f so as to achieve a more uniform and effective wear of the tablet 12f.

[0052] For this reason, the impeller 6f can be provided, as shown, with two mutually opposite cylindrical helical elements, which protrude from the center of the impeller toward the axial ends, so as to convey the flushing water also onto peripheral regions of the tablet 12f, which oth-

erwise would be reached only partially by the flushing water.

[0053] In practice, in the use of the device in this sixth embodiment, the flushing water enters the compartment 9f through the openings 10f, 11f located in the upper part of the supporting structure 2f. The flushing water makes contact with the impeller 6f and causes it to turn about its own axis 4f. The impeller 6f, by means of its rotation, changes the direction of the flow of the flushing water, distributing it uniformly on the tablet 12f, which is progressively dissolved by the passage of the flushing water. The flushing water with the products of the dissolution of the tablet 12f then exits through the openings 10f located in the lower part of the supporting structure 2f. In this case also, although the impeller 6f predominantly performs the function of modifying the path of the water stream that passes through the compartment 9f, by coming in any case into contact with the flushing water and with the products of the dissolution of the tablet 12f it mixes said products with the flushing water, increasing the generation of foam.

[0054] With reference to Figures 13 and 14, the device 1g in the seventh embodiment comprises a supporting structure 2g, which supports a tray-like container 20g and has, below said tray-like container 20g, a portion 7g which defines a compartment 9g, which is open laterally and in a downward region and in which the rotating element 5g, constituted by an impeller 6g with radial vanes, is arranged. When the device is in use, the rotation axis 4g of the impeller 6g is arranged substantially horizontally.

[0055] In this seventh embodiment, the detergent and/or sanitizing and/or deodorant products to be mixed with the flushing water are solid and are packaged in the form of a bar 12g, which is accommodated in the tray-like container 20g. As an alternative, two or more bars might be arranged in the tray-like container 20g.

[0056] The tray-like container 20g has, on its bottom, at least one opening 15g for the release of the water and of the detergent and/or sanitizing and/or deodorant products produced by the dissolution of the bar 12g, onto the vanes of the impeller 6g arranged below.

[0057] In this seventh embodiment, since the tray-like container 20g is open upwardly, the bar 12g is exposed to the flow of flushing water and the tray-like container 20g is designed to collect part of the flushing water and of the products of the dissolution of the bar 12g in order to release them gradually, even after the flow of the flushing water has ceased, onto the impeller 6g. This seventh embodiment is particularly adapted to achieve the dispensing of products which have a better performance if they can remain in the toilet bowl after the flow of flushing water has ceased, such as for example scale removers, whiteners or fragrances.

[0058] In this seventh embodiment also, the impeller 6g effectively performs the function of mixing the flushing water with the products of the dissolution of the bar 12g and of increasing the production of foam.

[0059] With reference to Figures 15 to 17, the device

1h in the eighth embodiment comprises a supporting structure 2h, which is constituted substantially by an enclosure 7h in which a compartment 9h is formed. Said compartment 9h is connected to the outside through at least one opening 10h, which is designed to be directed toward the wall of the fixture along which the flushing water flows, and optionally openings 11h on its opposite side.

[0060] The enclosure 7h has an upper portion 8h which forms a seat 21 h in which a tank 13h is arranged; the detergent and/or sanitizing and/or deodorant products in liquid or gel form to be mixed with the flushing water are contained in such tank.

[0061] The tank 13h has, at its lower side directed toward the bottom of the seat 21 h, at least one dispensing outlet 22h. Said dispensing outlet 22h is arranged at a hole 23h, which is provided in the bottom of the seat 21h that connects the dispensing outlet 22h to the compartment 9h.

[0062] In the compartment 9h, directly below the hole 23h, there is a drum-like element 24h.

[0063] On the lateral surface of the drum-like element 24h there is a recess 25h, which is designed to receive the liquid or gel products dispensed by the tank 13h.

[0064] The compartment 9h, in addition to the drum-like element 24h, accommodates the rotating element 5h, which when the device is in use is arranged so that its rotation axis 4h is horizontal.

[0065] In this eighth embodiment, the rotating element 5h is constituted by an impeller 6h with radial vanes, which is composed of two portions which are mutually rigidly coupled or independent and face the two end faces of the drum-like element 24h which is coaxial to the impeller 6h.

[0066] The drum-like element 24h can be rigidly coupled to the supporting structure 2h or can be able to rotate with respect to the supporting structure 2h monolithically with the impeller 6h.

[0067] In the first case, the recess 25h faces constantly the hole 23h and the recess 25h is connected to ducts, not shown, which are provided within said drum-like element 24h and lead outside on the two end faces of the drum-like element 24h which face the vanes of the impeller 6h. In this case, the recess 25h is designed to collect the liquid or gel dispensed by the tank 13h and dispense it proximate to the vanes of the impeller 6h, which is turned about the axis 4h by the flow of flushing water that passes through the compartment 9h.

[0068] In the second case, the recess 25h acts as a dosage element, since during its rotation about the axis 4h monolithically with the impeller 6h it faces cyclically the hole 23h, receiving a certain quantity of liquid or gel dispensed by the tank 13h. When, during the rotation of the drum-like element 24h, the recess 25h does not face the hole 23h, such hole 23h is blocked by the lateral surface of the drum-like element 24h, which in this manner interrupts the dispensing of the liquid or gel products contained in the tank 13h. During the rotation of the drum-

like element 24h monolithically with the impeller 6h, the products contained in the recess 25h mix with the flushing water.

[0069] In practice, in the use of the device in this eighth embodiment, the flushing water enters the compartment 9h through the openings 10h, 11 h, causing the rotation of the impeller 6h about the axis 4h and coming into contact with the liquid or gel products dispensed by the tank 13h. In this eighth embodiment, the impeller 6h performs the function of improving the mixing of the liquid or gel products dispensed by the tank 13h and of increasing the generation of foam.

[0070] If the drum-like element 24h is rigidly coupled to the impeller 6h, the rotation of the impeller 6h is utilized also to achieve a dosage of the liquid or gel dispensed by the tank 13h by means of the cyclic opening and closing of the hole 23h and therefore of the dispensing outlet 22h of the tank 13h.

[0071] It should be noted that according to a variation, not shown for the sake of simplicity, of this eighth embodiment, instead of a single tank 13h it is possible to arrange two tanks side by side in the seat 21h. In this case, the two tanks can be shaped so as to enter the hole 23h with their dispensing outlets, or two holes, one for each outlet of the tanks, can be provided on the bottom of the seat 21h, and the drum-like element is sized so as to serve both holes, or two drum-like elements, one for each hole, can be provided.

[0072] With reference to Figures 18 to 20, the device 1i in its ninth embodiment comprises a supporting structure 2i, which is constituted substantially by an enclosure 7i which defines internally a compartment 9i.

[0073] Such compartment 9i is open in a downward region and also has at least one lateral opening 10i on its side designed to be directed toward the wall of the fixture along which the flushing water flows, as well as openings 11 i provided on its opposite side.

[0074] The rotating element 5i is constituted, in this ninth embodiment, by a helical impeller 6i, which is supported, so that it can rotate about its own axis 4i, by the supporting structure 2i inside the compartment 9i. The axis 4i, when the device is in use, is arranged substantially vertically.

[0075] The enclosure 7i has, in an upward region, a portion 8i which forms a seat 21i, which is open upwardly and in which a tank 13i is arranged which contains the liquid or gel detergent and/or sanitizing and/or deodorant products to be mixed with the flushing water.

[0076] The tank 13i has, in a downward region, at least one dispensing outlet 22i arranged at a hole 23i, which is formed in the bottom of the seat 21i and connects the dispensing outlet 22i to the compartment 9i.

[0077] The impeller 6i, in this ninth embodiment, has a portion 26i which passes through the hole 23i and enters the tank 13i. Said portion 26i is shaped in a manner which is adapted to extract the liquid or gel products contained in the tank 13i due to the rotation of the impeller 6i about its own axis 4i.

[0078] The portion 26i is preferably shaped like a screw whose axis coincides with the rotation axis 4i of the impeller 6i.

[0079] Operation of the device according to the invention in this ninth embodiment is as follows.

[0080] The flushing water enters the compartment 9i through the openings 10i, 11i and acts on the vanes of the impeller 6i, causing the rotation of the impeller 6i about its own axis 4i. This rotation of the impeller 6i also causes the rotation of the screw-shaped portion 26i, achieving the dosed extraction of the liquid or gel product contained in the tank 13i. The liquid or gel extracted from the tank 13i mixes with the flushing water and comes into contact with the vanes of the rotating impeller 6i. The rotation of the impeller 6i about its own axis 4i improves the mixing of the liquid or gel product with the flushing water and increases the production of foam.

[0081] For the sake of completeness in description, it should be noted that the engagement means 3a-3i, in the various described embodiments, are constituted, in a per se known manner, by a hook-like appendage of the supporting structure 2a-2i, which can engage the rim of the toilet bowl or the hydraulic and sanitary fixture in general.

[0082] In practice it has been found that the device according to the invention fully achieves the intended aim, since it improves the mixing of the detergent and/or sanitizing and/or deodorant products with the flushing water and achieves, for an equal formulation of the detergent and/or sanitizing and/or deodorant products used, a higher production of foam and a longer permanence of the generated foam with respect to known types of devices.

[0083] Thanks to this fact, it is possible to reduce the percentage of surfactants in the composition of the detergent and/or sanitizing and/or deodorant products used.

[0084] In the examples of embodiments described above, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other examples of embodiments. Moreover, it is noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

[0085] The device thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept; all the details may further be replaced with other technically equivalent elements.

[0086] In practice, the materials used, as well as the dimensions, may be any according to requirements and to the state of the art.

[0087] The disclosures in European Patent Application No. 06425166.3 from which this application claims priority are incorporated herein by reference.

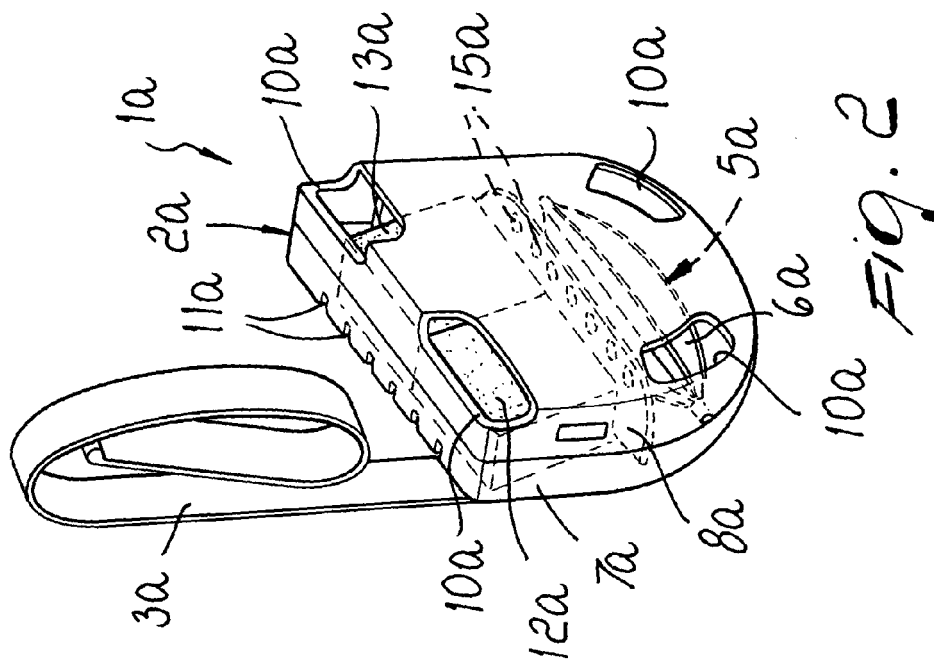
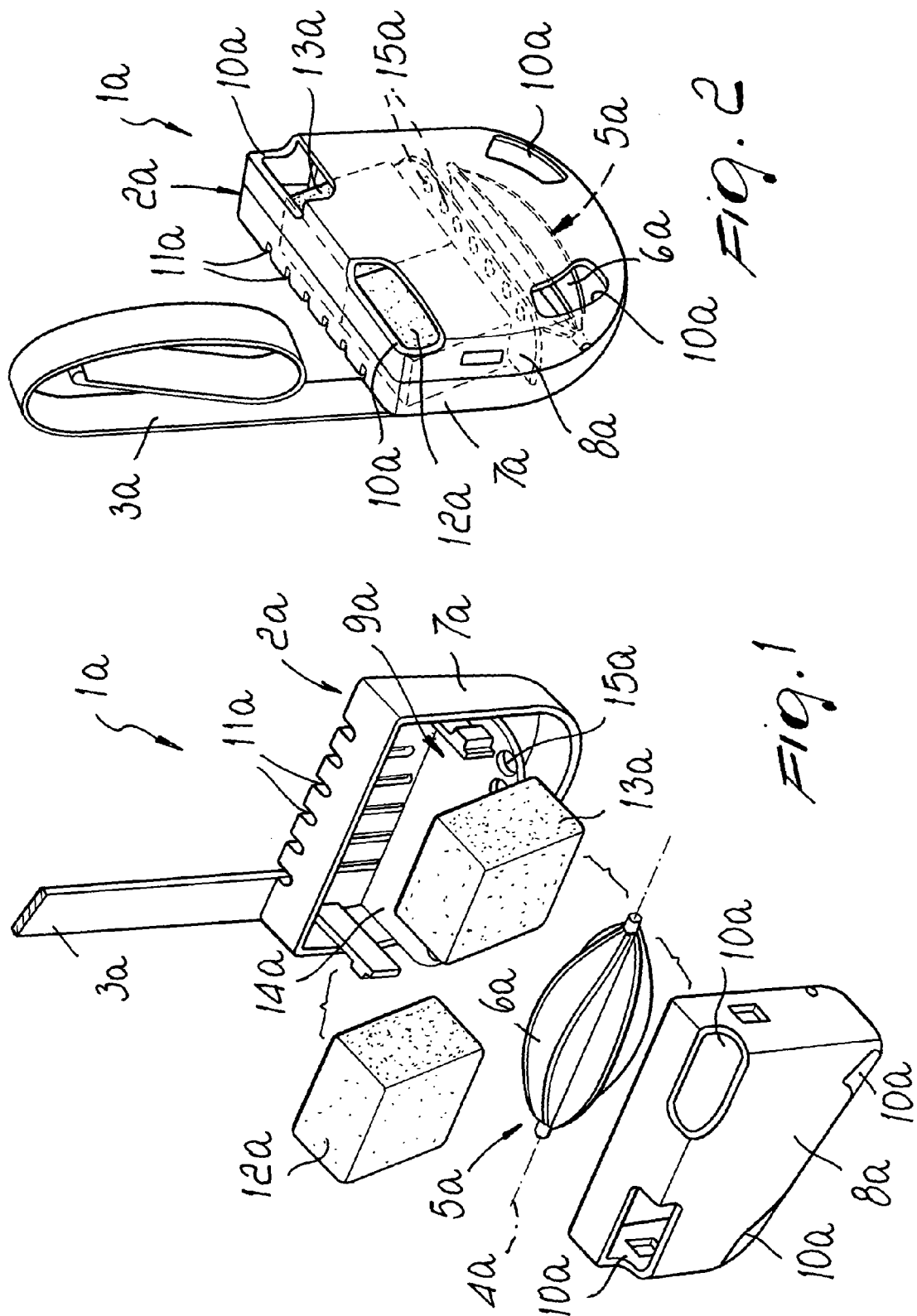
[0088] Where technical features mentioned in any claim are followed by reference signs, those reference

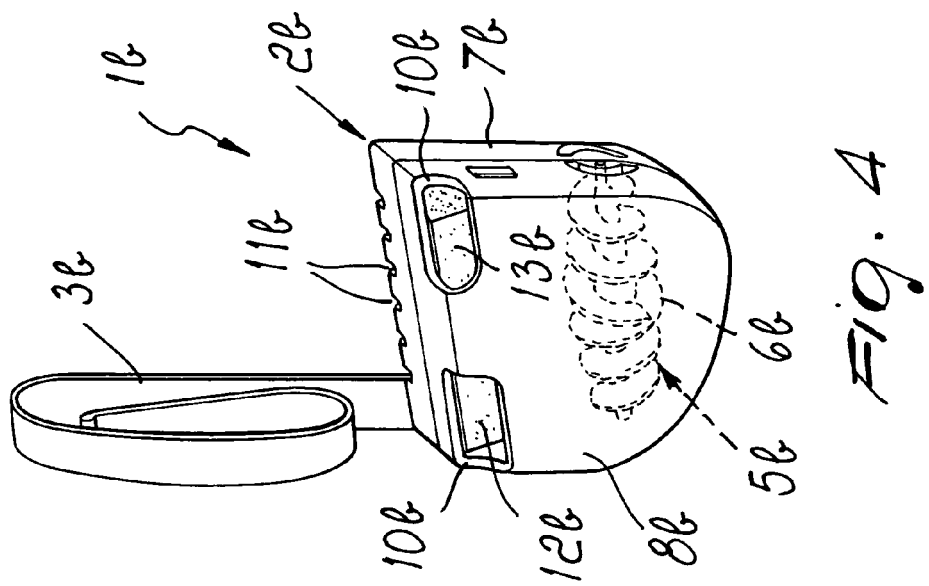
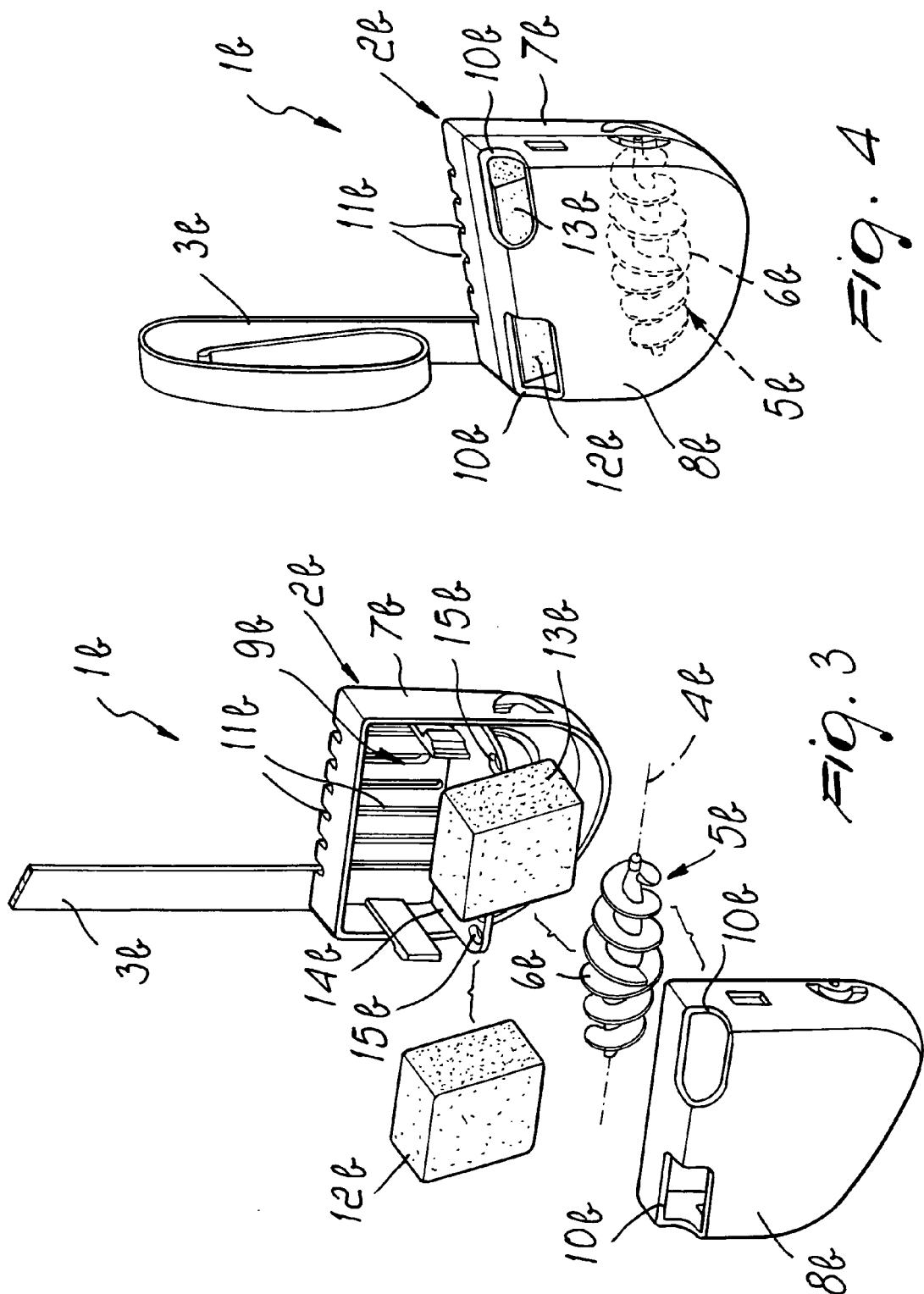
signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

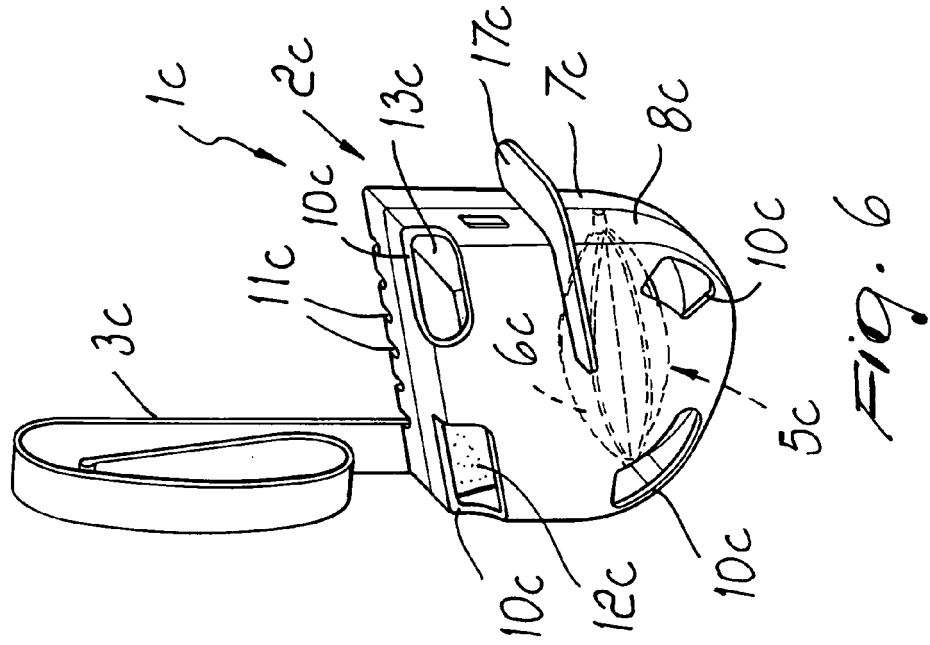
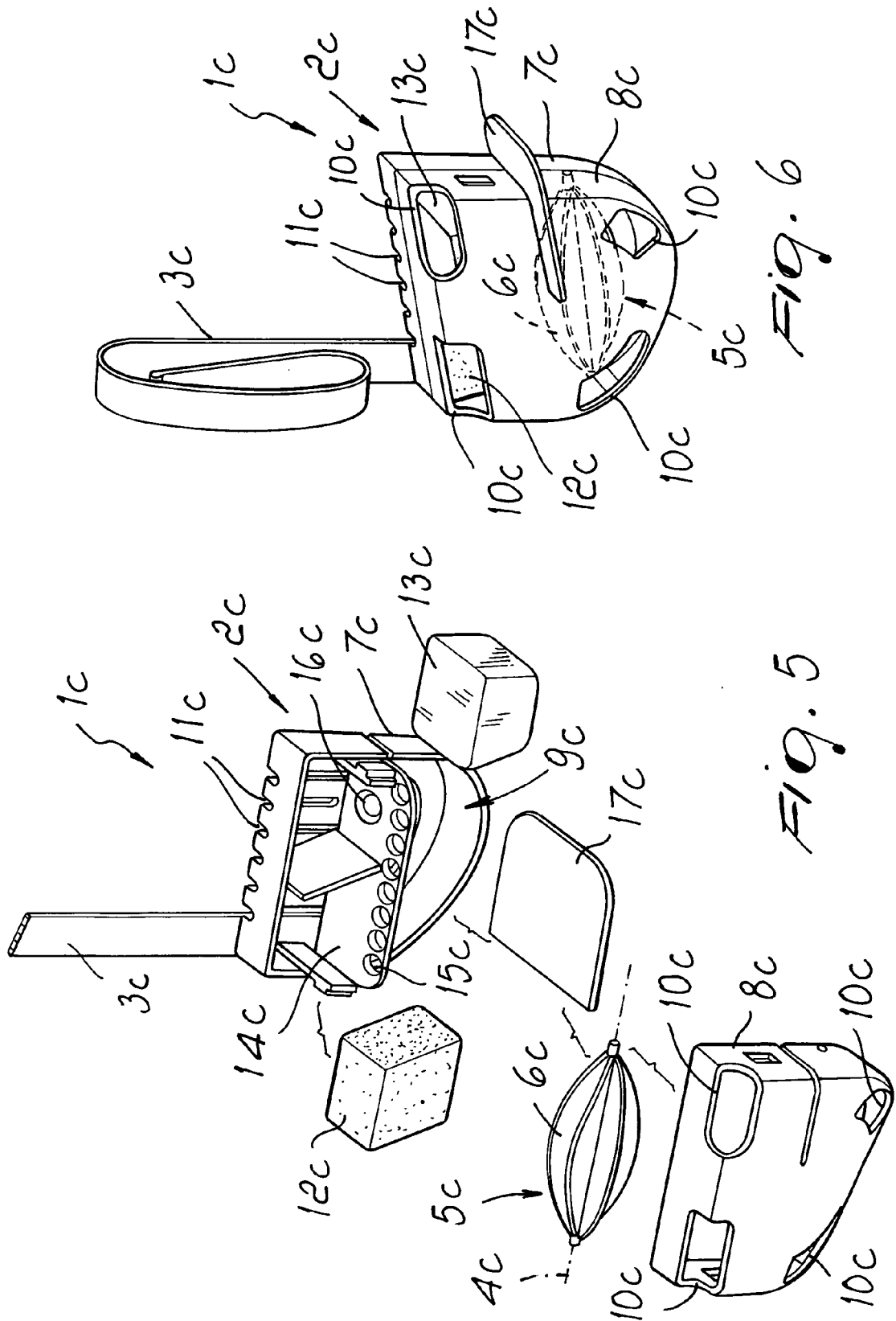
Claims

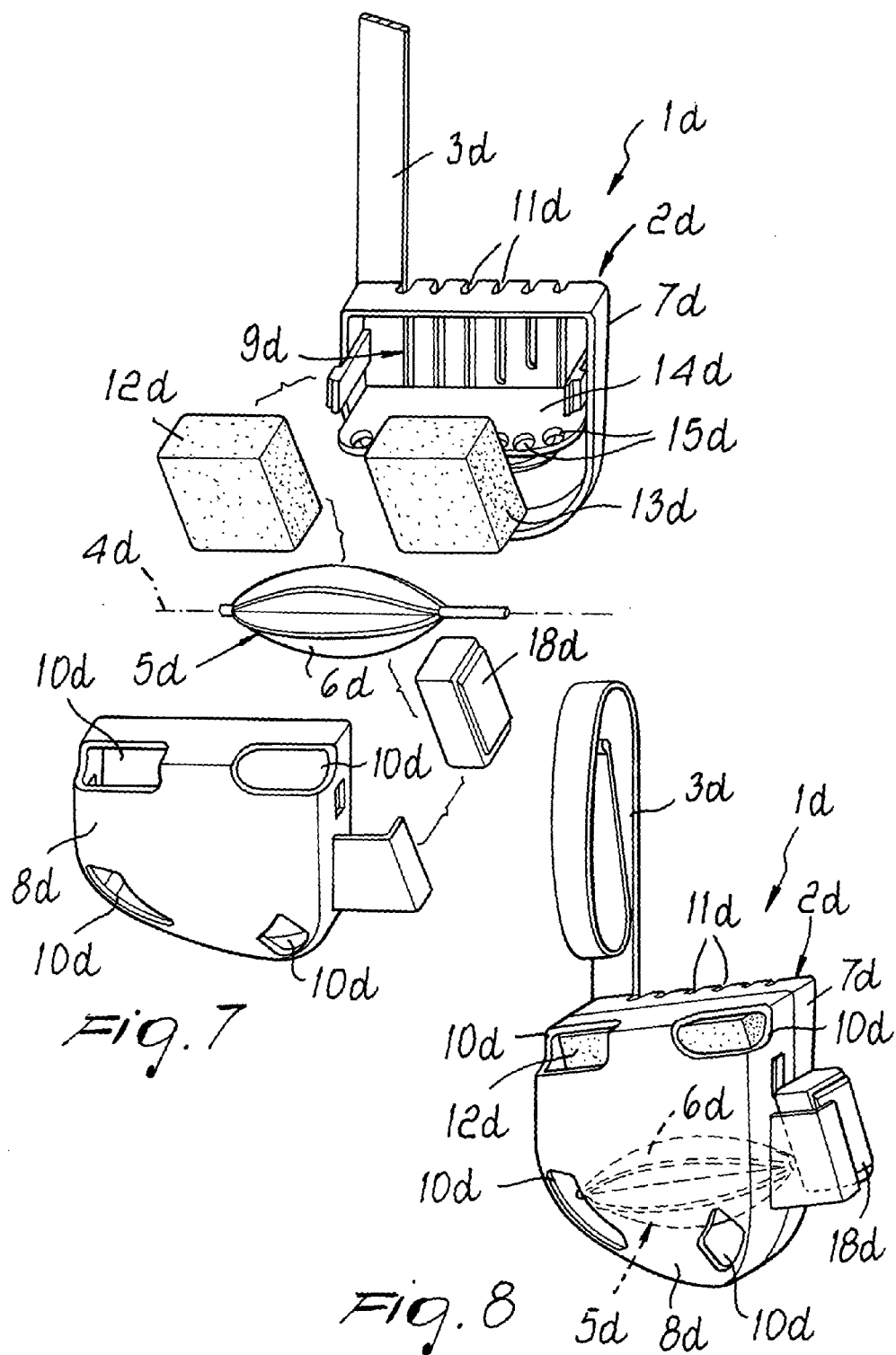
1. A device for dispensing into the flushing water and/or for mixing with the flushing water detergent and/or sanitizing and/or deodorant products, in toilet bowls or hydraulic and sanitary fixtures in general, which comprises a supporting structure provided with engagement means which can engage the hydraulic and sanitary fixture in order to support the supporting structure in a region of the fixture that is affected by the flushing water flow, **characterized in that** said supporting structure supports rotatably, about a rotation axis, at least one rotating element, which interacts with the flow of flushing water in order to mix detergent and/or sanitizing and/or deodorant products introduced in the flushing water and/or adjust the dispensing of detergent and/or sanitizing and/or deodorant products connected to said supporting structure and/or vary the orientation of the flow of flushing water conveyed onto detergent and/or sanitizing and/or deodorant products connected to said supporting structure, said detergent and/or sanitizing and/or deodorant products being external to said at least one rotating element.
2. The device according to claim 1, **characterized in that** said detergent and/or sanitizing and/or deodorant products are placed upstream of or downstream of said at least one rotating element with respect to the direction of the flushing water flow.
3. The device according to claim 1 or 2, **characterized in that** said rotating element comprises an impeller with radial vanes in which the axis of rotation is oriented substantially horizontally when said supporting structure is supported by said engagement means in a region of the fixture affected by the flow of the flushing water.
4. The device according to claim 3, **characterized in that** said rotating element has a shape which tapers in the direction of its axial ends.
5. The device according to one or more of the preceding claims, **characterized in that** said rotating element comprises a screw-like impeller in which the rotation axis is oriented substantially horizontally when said supporting structure is supported by said engagement means in a region of the fixture which is affected by the flow of the flushing water.
6. The device according to one or more of the preceding claims, **characterized in that** said rotating element comprises a helical impeller in which the rotation axis is oriented substantially vertically when said supporting structure is supported by said engagement means in a region of the fixture which is affected by the flow of the flushing water.
7. The device according to one or more of the preceding claims, **characterized in that** said supporting structure supports the detergent and/or sanitizing and/or deodorant products to be dispensed.
8. The device according to one or more of the preceding claims, **characterized in that** said detergent and/or sanitizing and/or deodorant products are solid and are packaged in the form of at least one tablet or bar supported by said supporting structure.
9. The device according to one or more of the preceding claims, **characterized in that** said detergent and/or sanitizing and/or deodorant products are solid and are packaged in the form of at least two tablets or bars supported by said supporting structure.
10. The device according to one or more of the preceding claims, **characterized in that** said detergent and/or sanitizing and/or deodorant products are liquid or in gel form and are arranged in at least one tank which is supported by said supporting structure.
11. The device according to one or more of the preceding claims, **characterized in that** said detergent and/or sanitizing and/or deodorant products are liquid or in gel form and are arranged in at least two tanks supported by said supporting structure.
12. The device according to one or more of the preceding claims, **characterized in that** said at least one tank has at least one dispensing outlet for the detergent and/or sanitizing and/or deodorant products in liquid or gel form which is directed downwardly; said supporting structure supporting, below said at least one tank, an element for retaining the detergent and/or sanitizing and/or deodorant products in liquid or gel form dispensed by said at least one tank.
13. The device according to one or more of the preceding claims, **characterized in that** said supporting structure comprises an enclosure which defines internally a compartment which accommodates said rotating element and has openings for the passage of the flow of flushing water; said at least one tablet or bar and/or said retention element and/or the dispensing outlet of said at least one tank being located within said compartment or connected to said compartment.

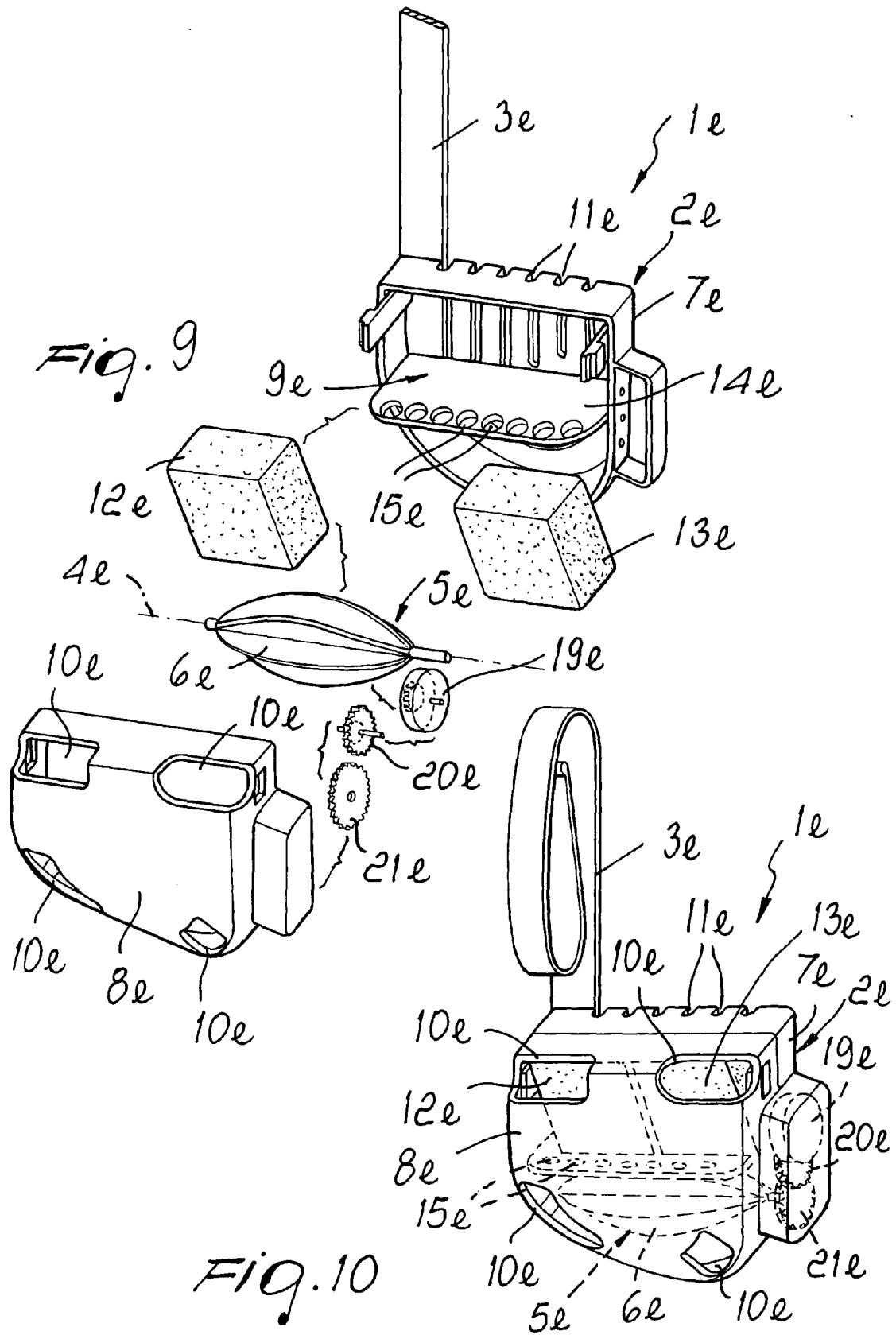
14. The device according to one or more of the preceding claims, **characterized in that** said rotating element is arranged above said at least one tablet or bar.
15. The device according to one or more of the preceding claims, **characterized in that** said rotating element is arranged below said at least one tablet or bar or the dispensing outlet of said at least one tank or said retention element.
16. The device according to one or more of the preceding claims, **characterized in that** said rotating element is arranged between the dispensing outlet of said at least one tank and said retention element.
17. The device according to one or more of the preceding claims, **characterized in that** a perforated diaphragm is arranged between said at least one tablet or bar and said rotating element.
18. The device according to one or more of the preceding claims, **characterized in that** said at least one tablet or bar is arranged in a tray-like container which is supported by said supporting structure above said rotating element; said tray-like container, when said supporting structure is supported by said engagement means in a region of the fixture that is affected by the flow of the flushing water, being exposed to the flow of the flushing water and having, on its bottom, at least one opening for the release of the water and of the detergent and/or sanitizing and/or deodorant products produced by the dissolution of said tablet or bar onto said rotating element.
19. The device according to one or more of the preceding claims, **characterized in that** said impeller is connected to actuation means.
20. The device according to one or more of the preceding claims, **characterized in that** said actuation means comprise an electric motor and an electric power source for supplying it, which are supported by said supporting structure; said electric motor being connected, with its output shaft, to said rotating element for its rotary actuation about its rotation axis.
21. The device according to one or more of the preceding claims, **characterized in that** said rotating element is connected to means which are adapted to prolong its rotation activated by the flow of the flushing water.
22. The device according to one or more of the preceding claims, **characterized in that** said means adapted to prolong the rotation of said rotating element comprise a flywheel, which is supported rotatably about its own axis by said supporting structure and is connected cinematically to said rotating element.
23. The device according to one or more of the preceding claims, **characterized in that** said rotating element has a portion which is inserted within said tank, said portion being shaped in a manner adapted to extract said detergent and/or sanitizing and/or deodorant products in liquid or gel form contained within said tank as an effect of the rotation of said rotating element about its own axis.
24. The device according to one or more of the preceding claims, **characterized in that** said portion of the rotating element that is inserted in said tank is shaped like the screw whose axis coincides with the rotation axis of the rotating element.
25. The device according to one or more of the preceding claims, **characterized in that** an element for collecting the detergent and/or sanitizing and/or deodorant products dispensed by said at least one tank is arranged below the dispensing outlet of said at least one tank, said collecting element being connected to the space occupied by said rotating element through calibrated passages for the dosage of the detergent and/or sanitizing and/or deodorant products.
26. The device according to one or more of the preceding claims, **characterized in that** a drum-like element is arranged below the dispensing outlet of said at least one tank and is supported so that it can rotate about its own axis by said supporting structure and closes said dispensing outlet by means of a portion of its lateral surface; a recess being formed in the lateral surface of said drum-like element and being arrangeable cyclically, by way of the rotation of said drum-like element about its own axis with respect to said tank, at the dispensing outlet of said tank in order to receive a preset amount of the detergent and/or sanitizing and/or deodorant products; said drum-like element being connected to said rotating element for a rotation of said drum-like element about its own axis with respect to the supporting structure due to the rotation of said rotating element about said rotation axis with respect to said supporting structure.
27. The device according to one or more of the preceding claims, **characterized in that** said drum-like element is connected monolithically and coaxially to said rotating element.

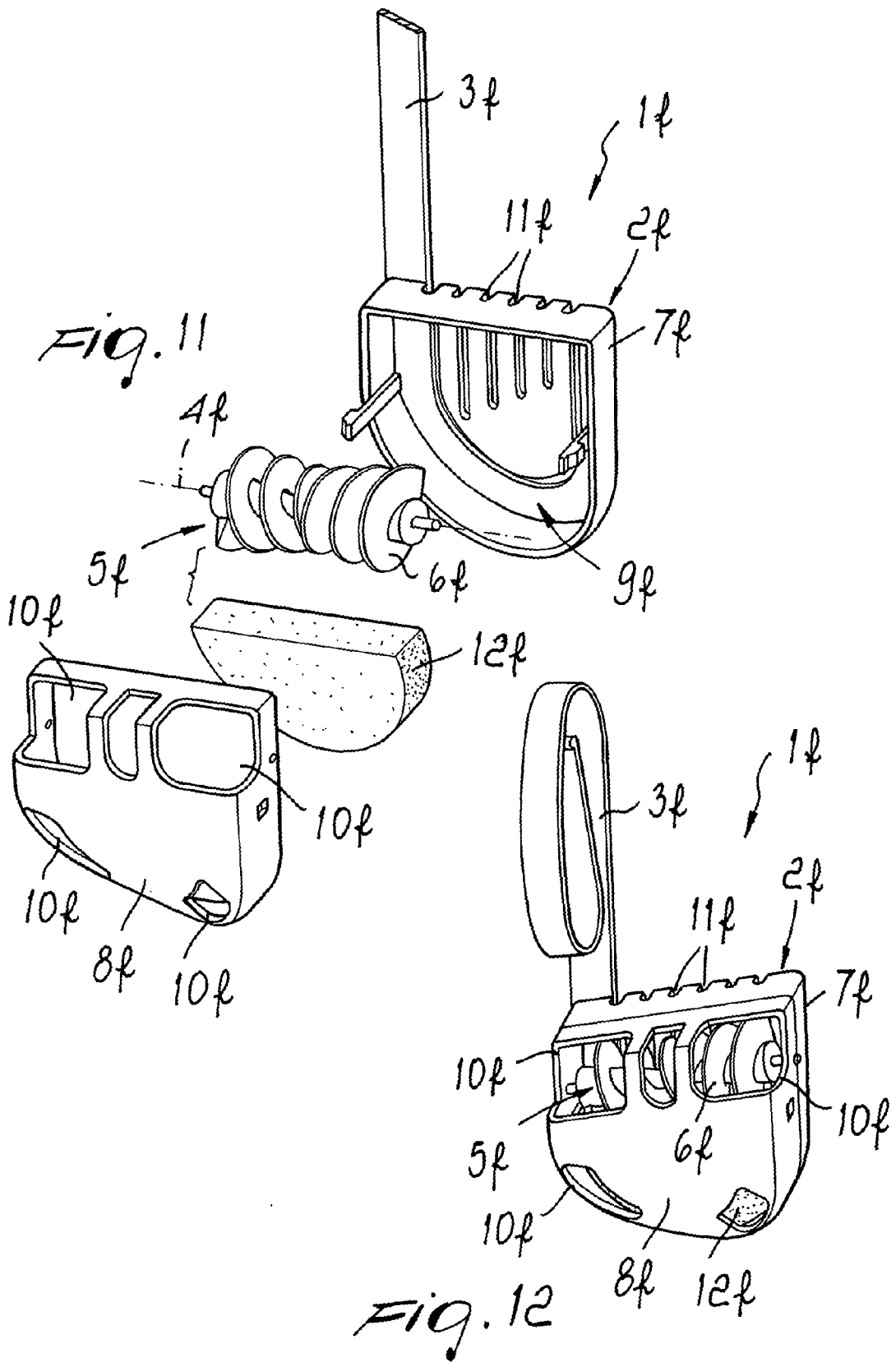


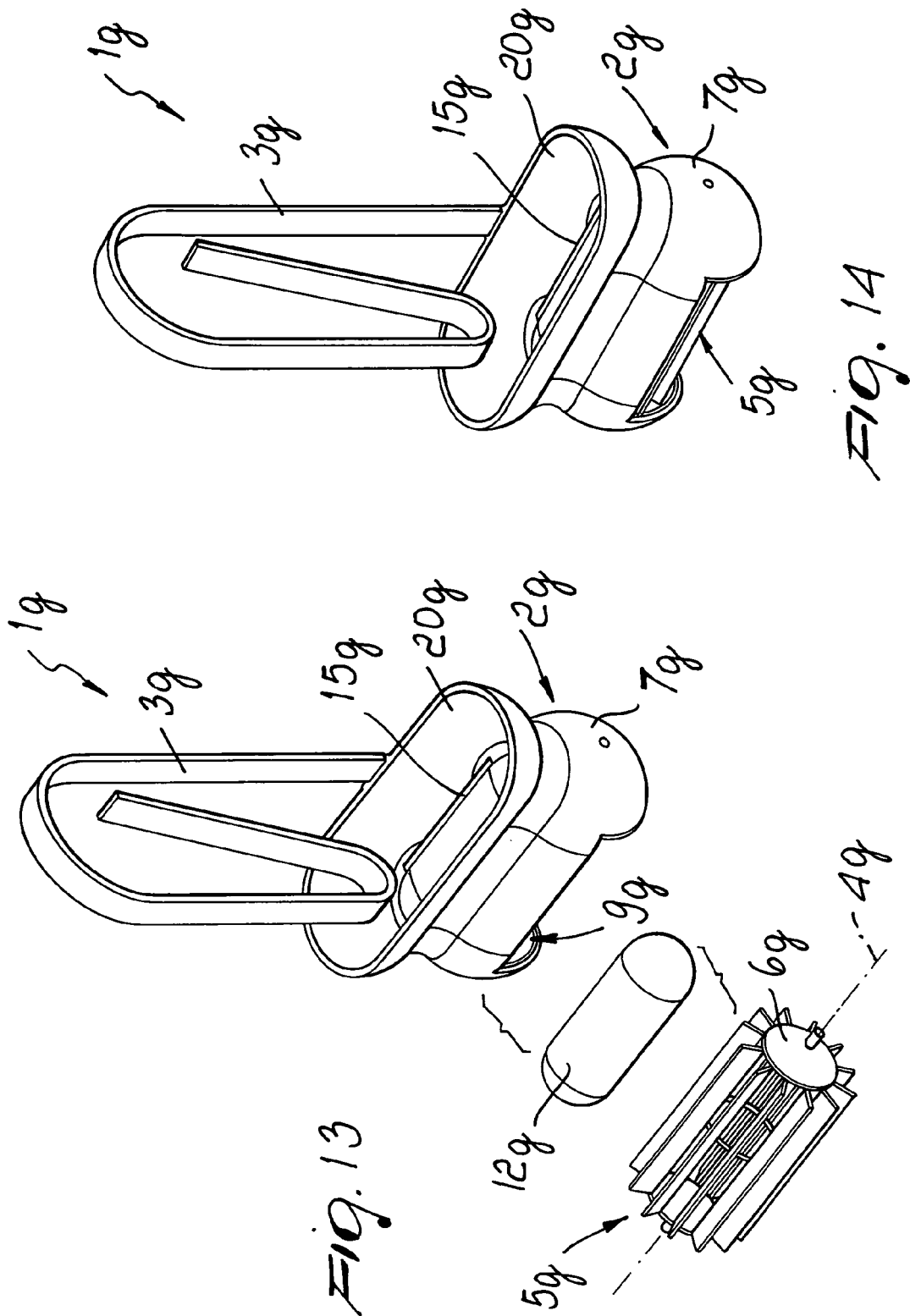












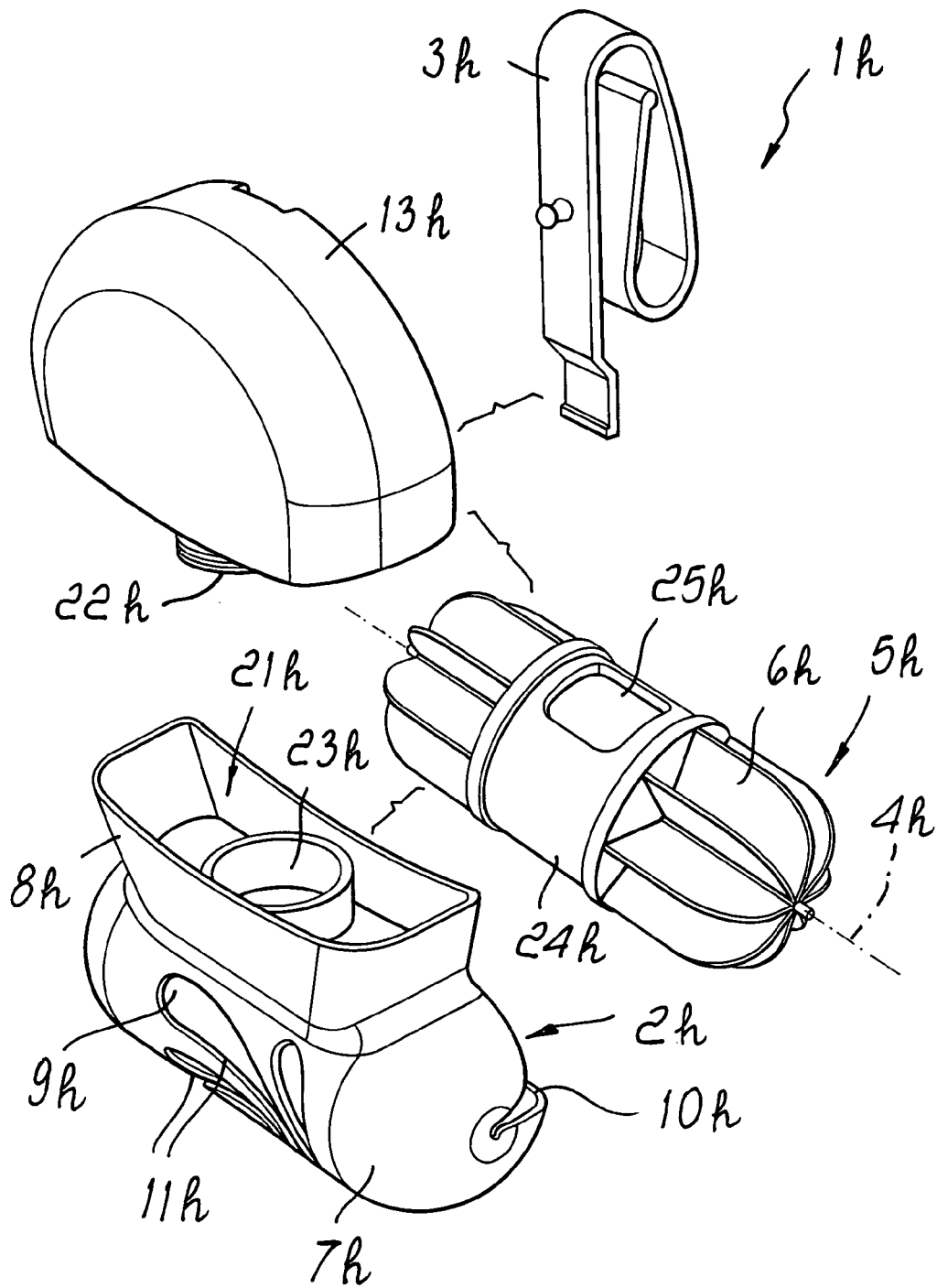


FIG. 15

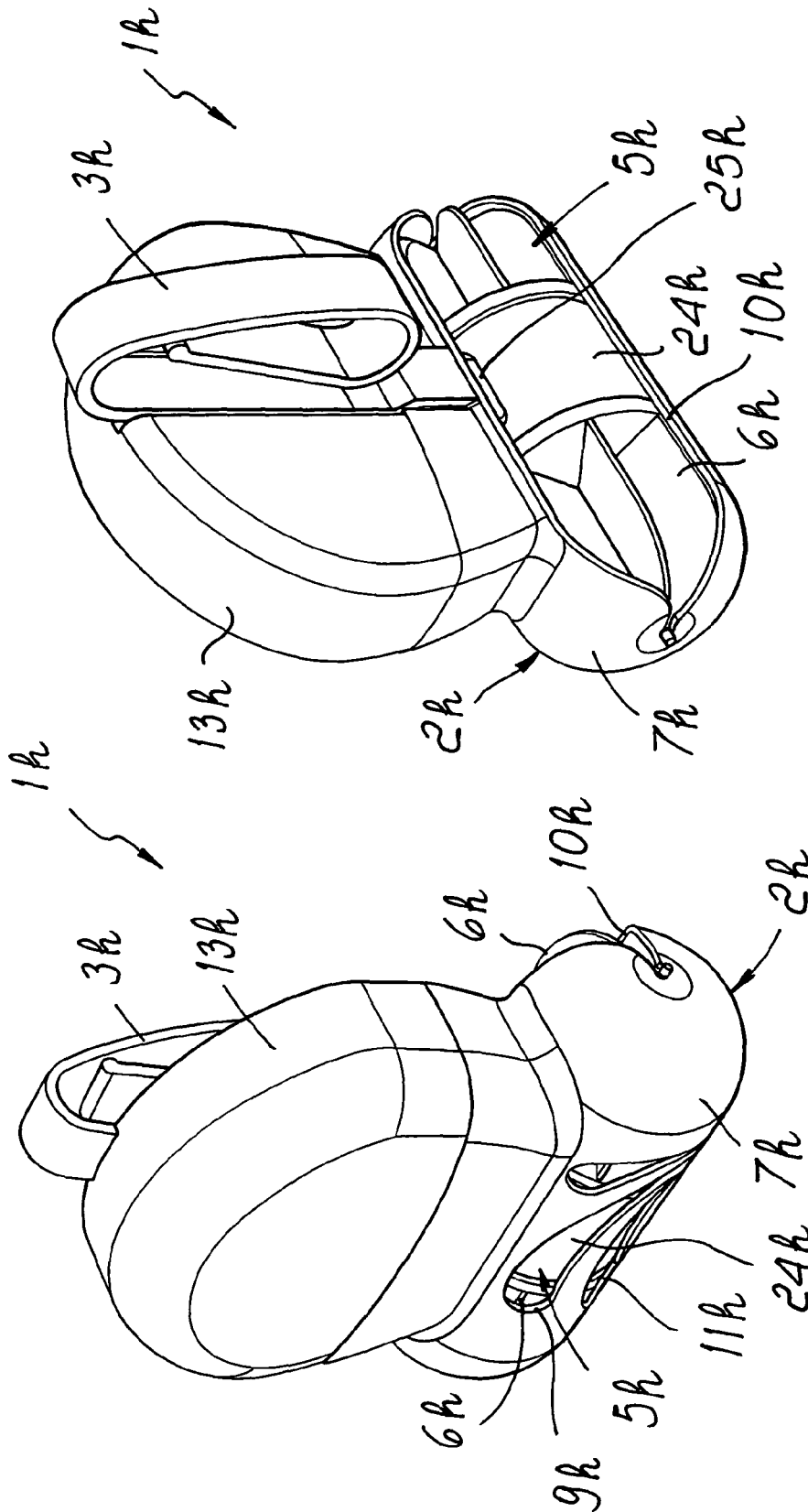
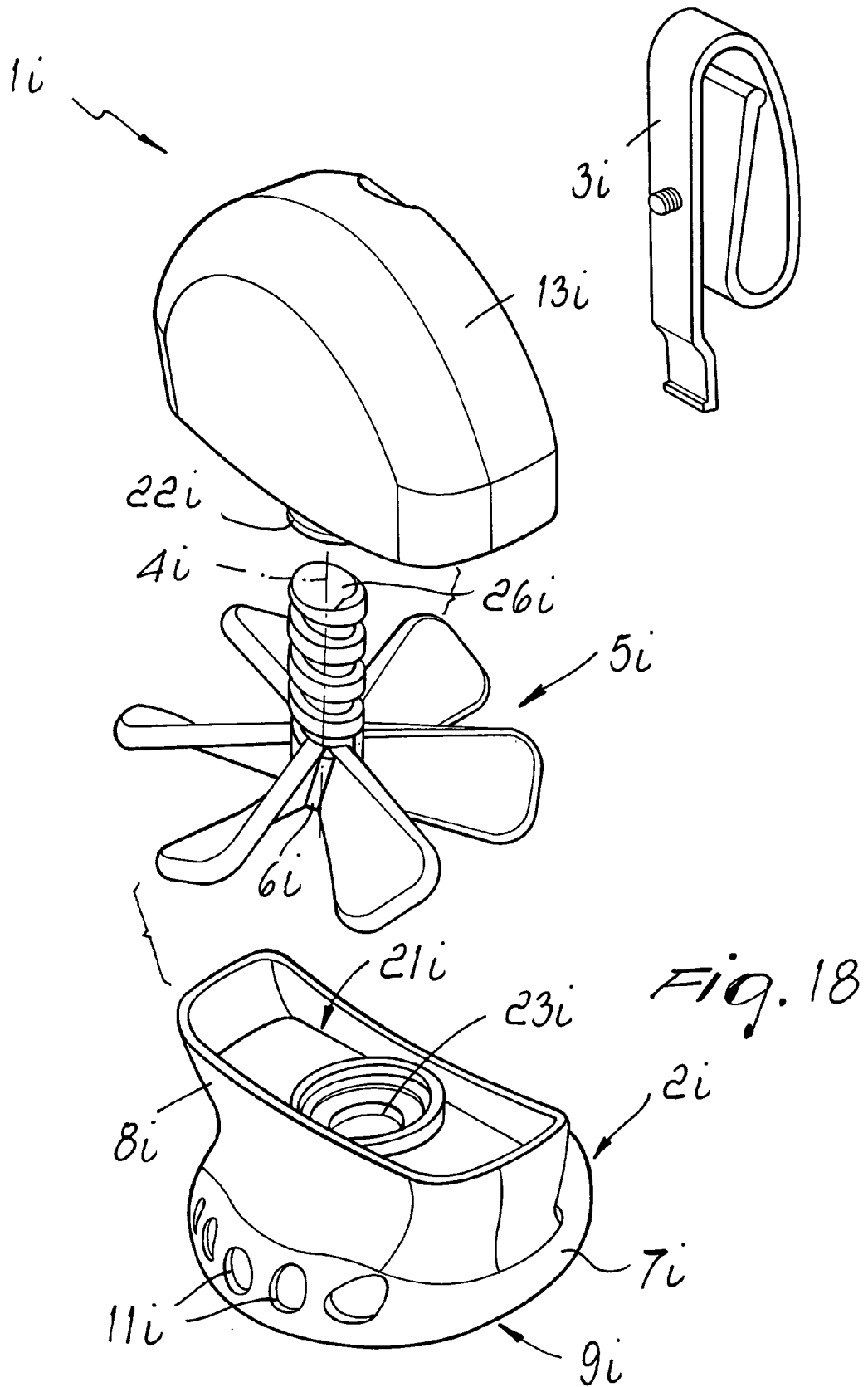
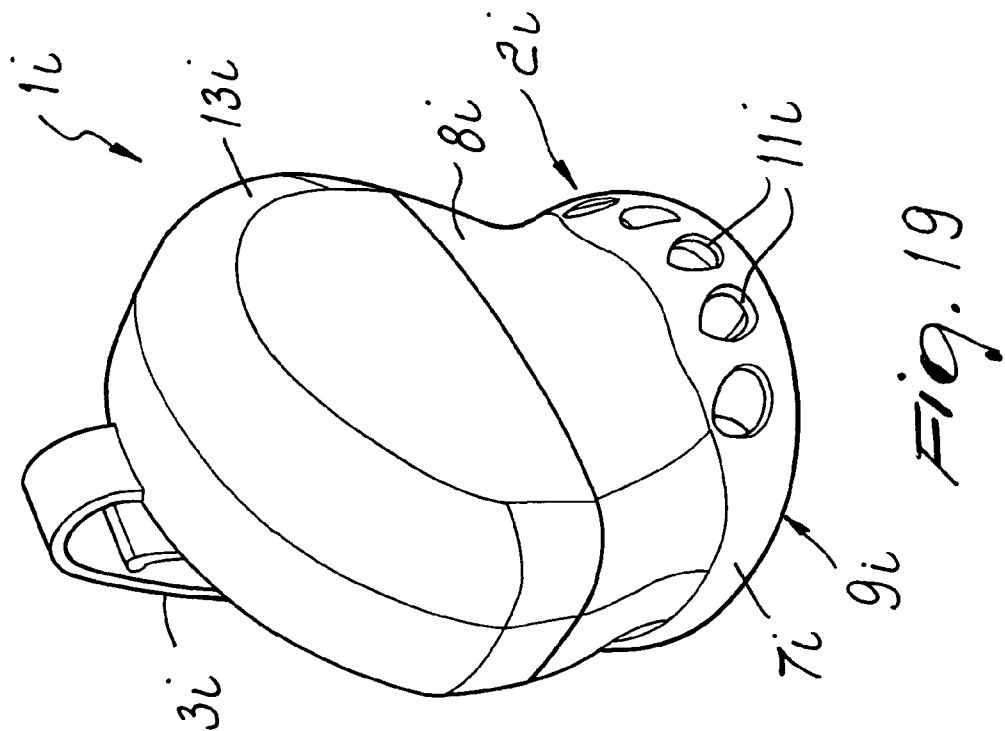
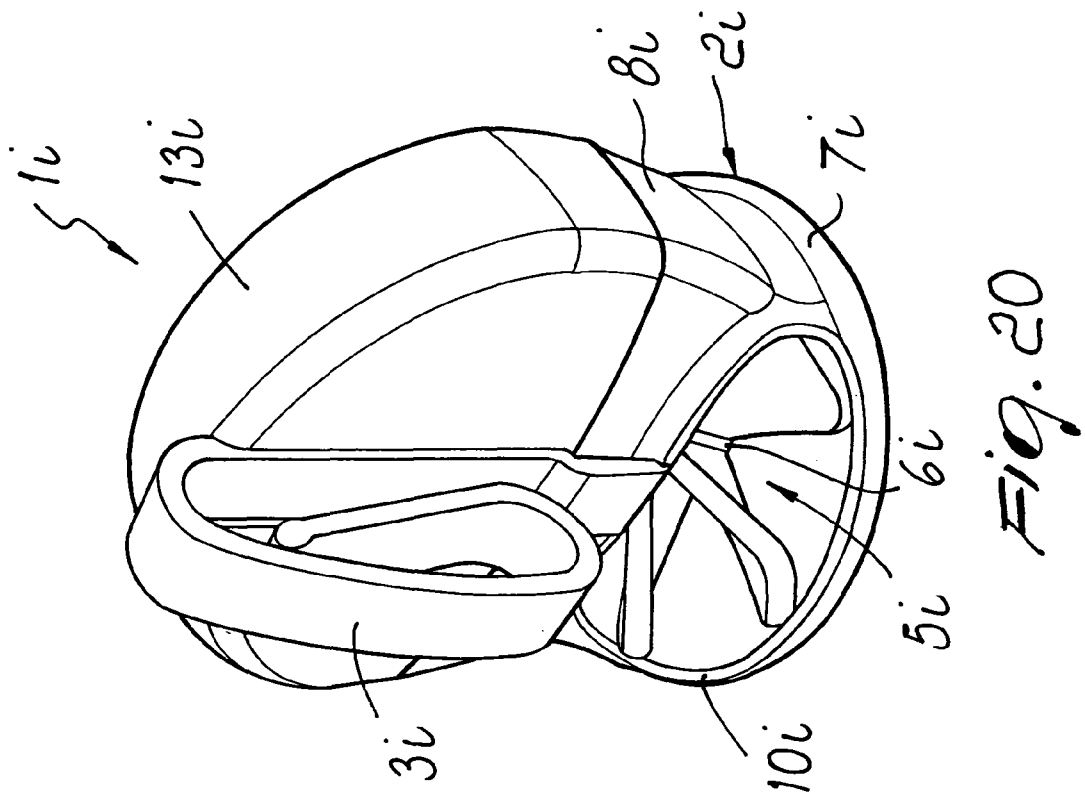


Fig. 17

Fig. 16







European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 07 00 4695

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
P,X	EP 1 674 626 A (DEOFLOR S P A [IT]) 28 June 2006 (2006-06-28) * figures 7,8,11 *	1	INV. E03D9/03
X	DE 199 20 897 A1 (OTTO JUERGEN [DE]) 14 December 2000 (2000-12-14) * column 8, line 20 - line 46; figure 4 *	1-3,7,10	
X	GB 2 349 157 A (UNILEVER PLC [GB]) 25 October 2000 (2000-10-25) * figures 1-3 * * abstract *	1	
X	WO 2004/005631 A (DEOFLOR S P A [IT]; GAZZANIGA GIANCARLO [IT]; PERAZZO LIVIA [IT]) 15 January 2004 (2004-01-15) * figures 3,4 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			E03D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 27 June 2007	Examiner Flygare, Esa
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ON EUROPEAN PATENT APPLICATION NO.**

EP 07 00 4695

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27-06-2007

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1674626	A	28-06-2006	NONE	
DE 19920897	A1	14-12-2000	NONE	
GB 2349157	A	25-10-2000	AU 3967300 A WO 0065162 A1	10-11-2000 02-11-2000
WO 2004005631	A	15-01-2004	AU 2002368083 A1	23-01-2004

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 06425166 A [0087]