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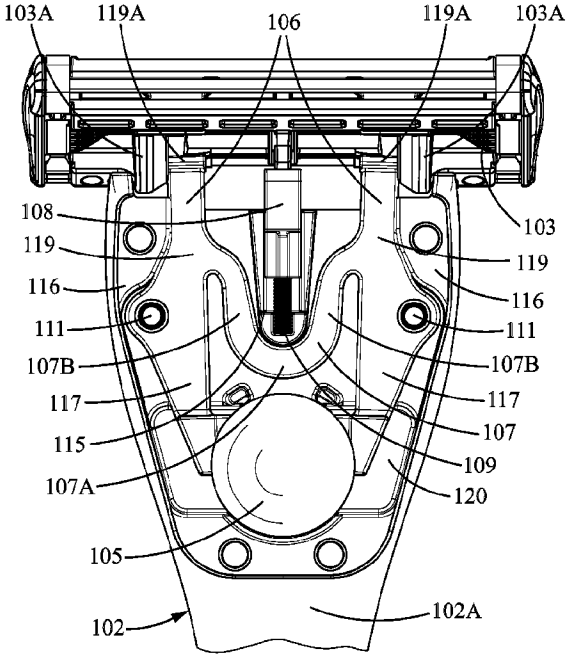
(54) Title: A SHAVER'S HANDLE WITH A LOCK AND RELEASE MECHANISM FOR ENGAGING AND DISENGAGING A RAZOR CARTRIDGE



(57) Abrégé/Abstract:
The invention relates to a handle for a shaving razor adapted to releasably support a razor cartridge, the handle including an actuation button actuatable to release the razor cartridge. The actuation button including a substantially spherical part positioned so that a finger of a user is able to come in contact with the actuation button when actuating the actuation button.

ABSTRACT

The invention relates to a handle for a shaving razor adapted to releasably support a razor cartridge, the handle including an actuation button actuatable to release the razor cartridge. The actuation button including a substantially spherical part positioned so that a finger of a user is able to come in contact with the actuation button when actuating the actuation button.

A shaver's handle with a lock and release mechanism for engaging and disengaging a razor cartridge

Background

1. Field

The invention relates to wet shaving razors includes razor handles with release mechanism for engaging and disengaging disposable razor cartridges and method of manufacturing such razors.

2. Description of the Related Art

Traditionally, shavers include a lock & release mechanism operated by an ejector button. The ejector button is mounted on the handle body and include a concave area designed for placing the finger of a user during actuation of a butto.

Summary

According to a general embodiment, there is provided a handle for a shaving razor adapted to releasably support a razor cartridge. The handle comprises a handle body; and an actuation button actuatable to release the razor cartridge. The actuation button has a substantially spherical shape and is positioned to allow a finger of a user to make contact therewith when actuating the actuation button.

Other possible aspect(s), object(s), embodiment(s), variant(s) and/or advantage(s) of the present invention, all being preferred and/or optional, are briefly summarized hereinbelow.

For instance, the handle for a shaving razor according to the present disclosure is adapted to releasably support a razor cartridge. The handle may include an actuation button, actuatable to release the razor cartridge. The actuation button may include a substantially spherical part (i.e. with spherical shape or little deviation from a spherical shape) positioned so that a finger of

the user comes in contact therewith when actuating the actuation button.

In particular, the actuation buttonoffers more freedom to a user when resting his/her finger on the button both during shaving and/or during actuation of the button.

Various embodiments of such a handle may incorporate one or more of the following features:

-the handle may include a handle body, an arm assembly having a pair of arms provided on the handle body and adapted to engage at least a razor cartridge for supporting the razor cartridge, the pair of arms may be movable between a rest position for engaging at least the razor cartridge and a release position for disengaging at least the razor cartridge. The actuation button may be movably mounted on the handle body, and the actuation button may cooperate by camming action with the arm assembly so that the actuation button moves the a pair of arms into the release position when the button is actuated;

-the handle body may be made of plastic;

-the substantially spherical part may have an average density different from a density of material of the handle body;

-the difference between said average density and said density of the material of the handle body may be at least 10%;

-the substantially spherical part may include at least two different materials with different densities;

-the substantially spherical part may have an average density higher than the density of material of the handle body (By this provision the actuation button may be multifunctional. The actuation button may be adapted to release a razor cartridge from the handle and may serve as an additional

weight to the handle without a need for additional weight to be disposed on or within the main body of the handle and/or without a need to use inserts fitted therein and/or without a need to increase the plastic volume of the handle or use of special material of higher density during the manufacture of the main gripping portion of the handle. Such actuation button may also improve the balance of the handle for a smooth and comfortable shave)

-the substantially spherical part of the actuation button may be made from metal (or the whole button or at least part of the button may be made made of metal);

-the arm assembly may be movably mounted on the handle body; the handle body and the arm assembly may be separate pieces;

-the actuation button may be mounted on the handle body so that the actuation button may slide substantially along a longitudinal direction of the handle;

-the handle may include an actuation button movably mounted on the handle body between a lifted position and a depressed position wherein the actuation button may be depressed inside the handle body; the actuation button may move the a pair of arms in the release position when the button may be pressed to the depressed position; the a pair of arms may bias the actuation button toward the lifted position when the actuation button is released;

-the a pair of arms may extend substantially in a common plane and the actuation button may be mounted on the handle body, so that the actuation button may move substantially perpendicular to the common plane;

-the handle may include at least one elastic portion through which an elastic return force may be applied to the a pair of

arms when the a pair of arms are moved from the rest position towards the release position; the handle may include a guard member and a pair of stop members adapted to come into abutment against the guard member when the a pair of arms are in the release position;

-the at least one elastic portion may be a U-shaped elastic member interconnecting the a pair of arms; the elastic member may be wound around the guard member and may include a return force generation portion and safeguard portions acting as stop members; the safeguard portions of the U-shaped elastic member may come into abutment against the guard member as the a pair of arms are in the release position, e.g. said safeguard portions of the U-shaped elastic member may prevent the return force generating portion of the U-shaped elastic member from reaching the point of the yield or the ultimate tensile stress exerted thereon.

-the a pair of arms have proximal parts closer to the actuation button and distal parts further away from the actuation button, the pair of arms being pivotable between the rest position and the release position around two pivot points; the proximal parts of the pair of arms may be moved apart during actuation of the actuation button, thereby rotating around the pivot points and resulting in the distal parts of the pair of arms coming closer together for releasing the razor cartridge from the handle;

-the arm assembly may further include a connecting portion, the pair of arms may be connected to the connecting portion by hinges and extending from the hinges to respective distal parts adapted to engage with the razor cartridge, the pair of

arms may be pivotable between the rest position and the release position around the hinges;

the arm assembly may be slideably mounted relative to the handle body along a longitudinal direction of the handle;

the connecting portion may include an inclined surface with which the actuation button cooperates by caming action when the actuation button may be actuated so as to slide the arm assembly in the longitudinal direction,

the pair of arms cooperate by caming action with the handle body so as to be moved to the release position when the arm assembly is slid upon actuation of the actuation button;

-the hinges may be elastically deformable to allow movement of the pair of arms between the rest position and the release postion;

-the connecting portion may include a cavity in which the actuation button may be received,the inclined surface may be formed in a rear portion of the cavity opposed to the distal ends of the pair of arms,

the actuation button may be movably mounted in the cavity between a lifted position and a depressed position wherein the actuation button may be depressed inside the cavity and presses by caming action on the inclined surface,

the actuation button may be guided related to the handle body to move substantially perpendicularly to the longitudinal direction when depressed;

-the actuation button may be a sphere and may be guided in a hole belonging to a cover which covers the arm assembly and which may be rigid with the handle body, the hole being dimensioned to avoid the actuation button from escaping the cavity;

- the stop members may protrude inwardly towards each other from the a pair of arms and may rest against the guard member as the a pair of arms move towards the release position, e.g. preventing the return force generating portions from reaching the point of yield or the ultimate tensile stress exerted thereon;
- the actuation button may be mounted on the handle body so that the actuation button may slide substantially along a longitudinal direction of the handle;
- the actuation button may include a button body and the substantially spherical part, the button body being mounted on the handle body so that the button body may slide substantially along the longitudinal direction of the handle, the substantially spherical part being movably mounted in the button body and being guided relative to the handle body substantially perpendicular to the longitudinal direction of the handle between a lifted position, where the substantially spherical part may be lifted outside the button body, and a depressed position where the substantially spherical part may be depressed inside the button body, the substantially spherical part being elacstically biased toward the lifted position and cooperating with the button body so as to prevent the button body from sliding when in lifted position and so as to enable the button body to slide when in depressed position;
- the button body has a cavity which may be open toward the handle body and a cover partially covering said cavity opposite to the handle body, the cover having a through hole through which the substantially spherical part may protrude outside the cavity when the substantially spherical part may be in the lifted position, the handle body may have a guide

extending in the cavity of the button body toward the cover, the substantially spherical part may bear against the guide toward the arm assembly and the cavity being dimensioned so that the substantially spherical part may enter entirely in the cavity in the depressed position and the substantially spherical part may be at least partially covered by the cover of the button body when the button body is slid toward the arm assembly;

- the handle may be adapted to pivotally support a removable razor cartridge, the guard member has return means for returning the razor cartridge to a rest position;
- the substantially spherical part may constitute any portion of a sphere, for instance a half-sphere;
- the subtsantially spherical part may be visible for a user;
- the subtsantially spherical part of the actuation may protrude outwardly from the handle body;
- the subtsantially spherical shape may provide multidirectional support for the finger of a user, not defining any designated area for a user to rest his finger on (By this provision, the substantially spherical part may serve as a finger rest area offering more freedom for manipulating the shaver both during the shaving and relasing the cartridge by actuating the release button. Moreover, the spherical part increases ergonomic nature of the actuation button);
- the actuation button or at least the substantially spherical part may be adapted to serve as a finger rest area for the finger of a user during shaving;
- the button may have a substantially spherical shape(the sphere may be easy to mold with less effort spent on defining complex features of the button, by this provision, the manufacturing

proces may be simplified with the reduced need for precision during the manufacture of small and delicate components, the symmetric properties of the substantially spherical shape with the directional independency put less demands on precision aspects of the machinery used during the assembly process, the probability of breaking during an accident, e.g. dropping of the shaver, or during a proper constant long-term use of the shaver may be decreased, a handle with minimum number of components and less complex features supports the long-term life of the handle and reduces the risk of accidentally breaking the handle or one of its key components).

Embodiments of the disclosure may include a shaving razor including the handle with any of the above described features and a cartridge mounted on the handle, the cartridge may be engaged by the pair of arms when the pair of arms are in the rest position and the cartridge may be disengaged from the pair of arms when the pair of arms are in the release postion, the cartridge may be released from the handle upon actuation of the actuation button.

The above and other objects and advantages of the disclosure will become apparent from the detailed description of various embodiments of the disclosure considered in conjunction with the accompanying drawings.

Brief Description of the Drawings

Figure 1 is an overall view of a first embodiment of the shaving razor.

Figure 2 is a front view of the distal part of the handle showing the lock & release mechanism according to the first embodiment.

Figure 3 shows an exploded view of the distal part of the handle according to the first embodiment.

Figure 4 displays an exploded view of the distal part of the

handle according to the first embodiment from another perspective.

Figure 5 is a front view of a second embodiment of the shaving razor.

Figure 6 shows an exploded view of the distal part of the handle according to the second embodiment.

Figure 7a illustrates a side section view of the distal part of the handle before actuation of the actuation button.

Figure 7b illustrates a side section view of the distal part of the handle after actuation of the actuation button.

Figure 8a is another view of the distal part of the handle and the lock & release mechanism before actuation of the actuation button.

Figure 8b is yet another view of the distal part of the handle after actuation of the actuation button.

Figure 8C shows a variant of the second embodiment, including an additional return spring.

Figure 9 depicts a third embodiment of the shaving razor.

Figure 10 shows a distal part of the third embodiment of the handle without an actuation button.

Figure 11 displays the main components of an actuation button of the third embodiment.

Figure 12 is a side section view of the third embodiment of the actuation button.

Figure 13 shows an exploded view of the third embodiment of the distal part of the shaving razor.

Figure 14 depicts another exploded view of the third embodiment of the distal part from another perspective view.

Figure 15 illustrates a fourth embodiment of the shaving razor.

Figure 16 shows a side section view of the distal part of the

shaving razor of the fourth embodiment with a substantially spherical part in the lifted position.

Figure 17 shows a side section view of the distal part of the shaving razor of the fourth embodiment with a substantially spherical part in the middle position.

Figure 18 shows a side section view of the distal part of the shaving razor of the fourth embodiment with a substantially spherical part in the depressed position.

Figure 19 is a front view of the distal part of the handle according to the fourth embodiment.

Figure 20 is a side view of the actuation button according to the fourth embodiment.

Figure 21 shows examples of a possible composition of the substantially spherical part of the actuation button.

Detailed Description

The following description of the main embodiments of the disclosure is made with refrence to the accompanying drawings, where the same reference numbers denote identical or similar elements.

In the description, the X-axis represent substantially the longitudinal direction of the handle, whereas the Y-axis is perpendicular to the X-axis; for instance the Y-axis may represent the pivot axis of the razor cartridge.

Description of the first embodiment

Figure 1 illustrates a shaving razor 101 according to the first embodiment of the invention, including a handle 102, a razor cartridge 103, a cover 104 and an actuation button 105. The handle 102 may be elongated, including an elongated handle body 102A. The handle body 102A may include a gripping portion. The handle body 102A may be further made of low-cost material, such as plastic

material. Alternatively, the handle body 102A may be manufactured from any other suitable material, such as metal. The handle body 102A according to the present disclosure may include as little components as possible. The handle body 102A may be made as one piece. The handle body 102, the cover 104 and/or the button 105 may include at least one finger rest area. The finger rest areas may be manufactured for instance from rubber or the like.

The shaving razor 101 may be adapted for use with disposable razor cartridges. The shaving razor 101 may be provided with an arm assembly including a pair of arms 106, as can be seen on Figure 2. The pair of arms 106 may be adapted to engage and disengage the razor cartridge 103. For example, the pair of arms 106 may be movable between a rest position, in which the cartridge 103 may be attached to the handle 102, and a release position, in which the pair of arms 106 may come closer together, thereby releasing the razor cartridge 103 from the handle 102.

The cartridge 103 may be provided with a pair of rims 103A. The pair of rims 103A may be adapted to engage with a pair of shell bearings 119A provided on the pair of arms 106. The pair of shell bearings 119A and the pair of rims 103A may be adapted to support pivotal movement of the cartridge 103 around the Y-axis. Alternatively, the pair of arms 106 may be compatible with an intermediate structure attached to the cartridge 103. The pair of arms 106 may then engage and disengage with the intermediate structure, or both the cartridge 103 and an intermediate structure.

When moving from the rest position towards the release position, an elastic return force may be applied to the pair of arms 106, so that the pair of arms 106 may be elastically biased towards the rest position. According to one embodiment, the elastic return force may be an elastic member 107 interconnecting the pair of arms 106. The elastic member 107 may push the pair of arms 106

away from each other, thus returning them both to the rest position. Alternatively, more than one elastic component may be incorporated in the handle 102, each elastic component may apply a return force to at least one of the pair of arms 106.

The actuation button 105 shown on Figures 1-4 of the accompanying drawings may be movably mounted on the handle body 102A. The actuation button 105 may be adapted to be movable between a lifted position and a depressed position. The actuation button 105 may cooperate by means of the camming action with the pair of arms 106, such that upon actuation of the actuation button 105 into the depressed position, the pair of arms 106 may be moved closer together into the release position, thus disengaging from the cartridge 103. When the actuation button 105 is released by a user, the pair of arms 106 may be elastically biased into the rest position, and simultaneously by means of the camming action, the pair of arms 106 may force the actuation button 105 back into the lifted position. A detailed description of the lock and release mechanism will be provided below.

The actuation button 105 may include a substantially spherical part. The substantially spherical part may constitute any portion of a sphere, for instance a half-sphere. The substantially spherical part may be visible for a user. Alternatively, the actuation button 105 itself may have a substantially spherical shape as shown on Figures 1-4. The substantially spherical actuation button 105 may be manufactured so that it adds weight to the distal part of the handle 102. With a substantially spherical actuation button 105, the manufacturing process of the actuation button 105, as well as the whole lock and release mechanism may be simplified, which may makes the shaver assembly less costly. The substantially spherical actuation button 105 may be symmetrical and easy to mold. The symmetric shape may also simplify the whole

manufacturing process, since there is no directional dependency, when placing the sphere in the handle body 102A during an assembly of the handle 102. The substantially spherical shape of the actuation button 105 may also be comfortable for a user when using the button 105 as a finger rest area.

According to an embodiment, the pair of arms 106 may extend substantially in a common plane XY. The actuation button 105 may be mounted in the handle body 102A, so that the actuation button 105 may move in a direction substantially perpendicular to the plane XY. The actuation button 105 may be restricted in motion within the plane XY by being fixed inside the hole 127 of the cover 104. Thus the actuation button 105 may be restricted in movement to the sides of the handle 102 and along the longitudinal direction of the handle 102. The restriction in movement of the actuation button 105 along the longitudinal direction of the handle 102 inside the handle 102 may be ensured by blocking protrusions 113. Additionally, the actuation button 105 may be restricted from rotational movement. The restriction in rotational movement may be achieved for example by covering the surface of the actuation button 105 with a suitable material, such as rubber or other elastomeric materials, increasing the friction between the actuation button 105 and the rim of the hole 127. The rubber or other elastomeric material may also serve as suitable finger rest area. The actuation button 105 may thus also serve as a support area for resting finger of a user during shaving. Therefore, the actuation button 105 may provide support for the finger of a user, which may be close to the blades, thus the motion of the blades on the skin of a user may be led more conveniently during shaving.

In some embodiments, the actuation button 105 may be provided with an outer layer adapted to prevent a finger of the user from slipping when the finger is rested against the actuation button

105. Alternatively, the actuation button 105 may be manufactured from a material which may inherently restrict slippery motion when in contact with the skin of a user. Examples of such material preventing slippery motion may be elastomeric materials, such as rubber or similar.

The material of the actuation button 105 may have a density different from the density of the material of the handle body 102A. Thereby the balance of the handle 102 may be improved. The difference between the density of the actuation button 105 and the density of the handle body 102A may be at least 10% of the density of the handle body 102A.

The material of the actuation button 105 may be chosen among materials with density higher than the density of a material used for manufacture of the handle body 102A. According to one embodiment, the actuation button 105 may be made of metal. The weight of the actuation button 105 may help to improve the feel of the shaver 101 during shaving and to enhance shaving performance. Such a weight in the distal portion of the handle 102 may assist with the process of shaving feeling more natural and convenient, especially when the handle body 102A is molded from light low-cost material, such as plastic material. The additional weight placed in the actuation button 105 may be close to the blades. Therefore the balance of the handle 102 during use may be improved.

The additional weight of the actuation button 105 may be lower than the elastic return force exerted by the elastic portion, for example the elastic member 107, of the a pair of arms 106. This is so as to avoid unexpected spontaneous release of the cartridge 103 merely by the weight of the actuation button 105 without a user actually pushing the actuation button 105. This provision may also ensure that the actuation button 105 may be moved back to the

lifted position, when the a pair of arms 106 are elastically biased to the rest position.

Figure 2 shows the lock and release mechanism of the handle 102 according to the first embodiment. The lock and release mechanism may include a pair of arms 106, the actuation button 105 and an elastic member 107. The elastic member 107 may include a return force generating portion 107A. The elastic member 107 may further include safeguard portions 107B. In one embodiment the elastic member 107 may be a U-shaped elastic member wound around a guard member 115 as depicted in Figures 2-4. The safeguard portions 107B may act as stop members. The safeguard portions 107B and the guard member 115 may prevent the return force generating portion 107A of the elastic member 107 from reaching the point of yield or the ultimate tensile stress exerted thereon, the former being the point of maximum stress, that the material may withstand before undergoing permanent plastic deformation, and the latter being the point at which the material breaks. When the actuation button 105 is pressed into the depressed position, the pair of arms 106 may come closer together, thereby releasing the razor cartridge 103 from the handle 102. At the same time, the safeguard portions 107B may be pushed towards each other, so that they rest against the guard member 115. This prevents the pair of arms 106 from moving further together, thus stopping in the release position and reducing the risk of the return force generation portion 107A stretching too much and reaching the point of yield or the ultimate tensile stress exerted thereon. By such provision the functionality and durability of the elastic member 107 may be improved. The probability of accidently breaking the elastic member 107 by straining it too much and causing excessive deformation may be reduced. The elastic member may thus be less vulnerable to an improper or excessive use, and the reliability of the whole shaver

may therefore also be improved. With the protective means, such as the guard member 115 and the safe guard portions 107B, the lifetime of the shaver may be increased; moreover the costs a user may spend on shaving are lowered.

Figures 2-4 show the pair of arms 106 including distal parts 119 and proximal parts 117. The distal parts 119 of the pair of arms 106 may be adapted to engage or disengage the razor cartridge 103. For example, as shown on Figures 2-4, the distal part 119 of the pair of arms may be provided with the pair of shell bearings 119A. The pair of shell bearings are adapted to fit into the pair of rims 103A provided on the cartridge 103. The pair of shell bearings 119A and the rim 103A may be adapted to allow pivotal movement of the cartridge 103 around the pivot axis Y. Any alternative means for attaching the pivoting razor cartridge 103 may be used, such as pins and corresponding holes, or the like.

The pair of arms 106 may be pivotally mounted on the handle body 102A with respect to the pivot points. The pivot points may be a pair of pins 111 protruding from the handle body 102A. For example, each one of the pair of pins 111 may be fitted into each respective one of a pair of openings 118 provided on the pair of arms 106, as illustrated in Figures 3-4. The openings 118 may be provided substantially in the middle of the length of the pair of arms 106. The pair of arms 106 may be constructed symmetrically with respect to the X-axis. Any alternative solutions enabling relative rotational movement between the handle body 102A and the pair of arms may also be possible. For example, the pair of pins 111 may be provided on the pair of arms 106 and the corresponding pair of openings may be disposed in the handle body 102A.

In order to provide for a smooth movement of the proximal parts 117 of the pair of arms 106, there may be a depressed area 120 in the handle body 102A surrounding the proximal parts 117.

When returned back to the rest position, the distal parts 119 of the pair of arms 106 may be supported by two rest projections 116 protruding from each side of the handle 102. In the rest position, the distal parts 119 may lean against the rest projections 116.

When the actuation button 105 is in the depressed position, the acuation button 105 may be depressed inside the handle body 102A. To this end, a cavity 114, hollowed in the handle body 102A exists, as illustrated in Figure 3. The actuation button 105 may be seated conveniently in the cavity 114 when actuated into the depressed position. As the actuation button 105 is pressed from the lifted position towards the depressed position inside the handle 102, the actuation button 105 may be lodged into the cavity 114.

The proximal parts 117 of the a pair of arms 106 may each include an inclined surface 117A. For example, the inclined surfaces 117A may be planar and may face each other. When the pair of arms 106 are in the rest position and the actuation button 105 is in a lifted position, two side portions of the actuation button 105, which rest against the inclined surfaces 117A. In the lifted position, the actuation button 105 may be seated between the cover 104 and the inclined surfaces 117A. During actuation of the actuation button 105, the proximal parts 117 may be moved apart by pressing the actuation button 105 between the proximal parts 117. As the proximal parts 117 are moved apart, they rotate around the pair of pins 111. Simultaneously, the distal parts 119 move closer together, thereby releasing the cartridge 103 from the handle 102. The sides of the actuation button 105 adjacent to the inclined surfaces 117A may be adapted to slide along the inclined surfaces 117A, as the actuation button 105 is actuated. For example, a substantially spherical shape of the actuation button 105 may be compatible with the inclined surfaces 117A, as displayed on Figures 3-4. Alternatively, it may also be possible for the actuation

button 105 to include a triangular shape portion which contacts the inclined surfaces 117A.

According to another embodiment, the pair of arms 106 may be adapted so that the distal parts 119 move apart, when the cartridge 103 is being released. Correspondingly, the proximal parts 117 of the pair of arms may move closer during the release of the cartridge 103. The actuation button 105 may be adapted to force the proximal parts 117 together, when the actuation button is actuated. The proximal parts 117 may be provided with inclined surfaces 117A having faces that may be oriented away from each other. The actuation button 105 may alternatively comprise a recessed portion, for example of triangular shape, so that when the actuation button 105 is actuated, the recessed portion contacts and slides along the inclined surfaces 117A, thereby forcing the inclined surfaces 117A to move closer to each other.

As depicted in Figure 3, a set of openings 112 may be provided on the handle 102. The set openings 112 may engage with a set of corresponding protrusions 124 disposed on the cover 104. The cover 104 may be press-fitted in a set of openings 112, in order to be secured to the handle body 102A. Additionally, the cover 104 may be provided with a pair of pockets 122. The pair of pockets 122 cover the pair of pins 111, around which the pair of arms 106 may rotate. Furthermore, a pair of posts 125 may be present on the inner side of the cover 104. Each of the pair of posts 125 may be fitted between the guard member 115 and one of the pair of arms 106 on the distal-most part of the handle body 102A. There may also be a hole in the cover 127 abutting the actuation button 105 so that the actuation button 105 may be restricted in side-to-side motion. In a case where the actuation button 105 may be substantially spherical in shape, the hole 127 may be circular in shape. The hole 127 may have a diameter smaller than the diameter of the actuation button

105. According to one embodiment, the actuation button 105 may be retained inside the handle body 102A. Furthermore, the actuation button 105 may partially protrude outside through the hole 127 in the cover 104.

The cartridge 103 may be allowed to pivot around the axis Y. The handle 102 may be provided with a return means adapted to return the cartridge 103 to a neutral position when the cartridge 103 is rotated. The cartridge 103 may be held on the handle 102 by the pair of shell bearings 119A. The pair of shell bearings 119A may be adapted to engage with the pair of rims 103A provided on the cartridge 103. The pair of rims 103A and the pair of shell bearings 119A may enable the cartridge 103 to rotate around the axis Y during shaving. Other pivoting means, which allow the cartridge 103 to pivot around the Y-axis, may also be possible, for example, the pair of pins 111 may be provided on the pair of arms 106 and the corresponding holes may be disposed on the cartridge 103.

According to one embodiment, the guard member 115 may cooperate with stop members 107B in order to prevent the return force generation portion 107A of the elastic member 107 from reaching the point of yield or the ultimate tensile stress exerted thereon. Furthermore, the guard member 115 may enclose a return means for returning the pivoting cartridge 103 to a neutral position. Therefore the guard member 115 may serve as a multifunctional element, the number of components included in the lock and release mechanism of the handle 102 may be reduced, and the manufacturing process of the handle 102 may be simplified. The guard member 115 may be molded as a part of the handle body 102A. The guard member 115 may be molded in the distal-most part of the handle 102, neighboring the cartridge 103. The guard member 115 may lie on the X-axis of the handle 102.

The guard member 115 may accommodate any means for returning the cartridge 103 to a neutral position known in the art. According to the present disclosure, the return means may be a combination of a pusher 108 and a spring 109. The spring 109 may generate the required elastic force for returning the cartridge to a neutral position. The pusher 108 may cooperate with a corresponding cam surface 110 of the cartridge 103. The pusher 108 may be located inside the guard 115. The pusher 108 may be covered with the cover 104, so that the pusher 108 may be restricted in movement in all the directions other than being restricted along the X-axis. The pusher 108 may be adapted to reciprocate inside the guard 115. To this end, the pusher 108 may be provided with at least one protrusion 108A. For example, the pusher 108 may include two protrusion 108A provided on the opposite sides of the pusher 108. One such protrusion 108A may fit inside a groove 115A provided on the inside of the guard 115. The cover 104 may also be provided with a groove 126, in which the other protrusion 108A may be located during movement of the pusher 108.

Description of the second embodiment

Illustrated in Figure 5 is a shaving razor 201 according to the second embodiment. The shaving razor 201 may include a handle 202, a razor cartridge 203, a cover 204 and an actuation button 205. The handle 202 may have an elongated handle body 202A including an elongated gripping portion. The handle body 202A may be made of low-cost material, such as plastic material. Alternatively, the handle body 202A may be manufactured from any other suitable material, such as metal. The handle body 202A may be formed from as minimal components as possible. For example, the handle body 202A may be made as one piece. The handle body 202A, the cover 204 and/or the actuation button 205 may include at least

one finger rest area. The finger rest areas may be manufactured, for instance, from rubber or the like.

The shaving razor 201 may be adapted for use with disposable razor cartridges. The shaving razor may be provided with an arm assembly including a pair of arms 206 and a connecting portion 214 as seen in Figure 6. The pair of arms 206 may be adapted to engage and disengage the razor cartridge 203. For example, the pair of arms 206 may be movable between a rest position, in which the cartridge 203 may be attached to the handle 202, and a release position, in which the pair of arms 206 may come closer together, thereby releasing the razor cartridge 203 from the handle 202.

The cartridge 203 may be provided with a pair of rims 203A. The pair of rims 203A may be adapted to engage with a pair of shell bearings 206A provided on the pair of arms 206. The pair of shell bearings 206A and the pair of rims 203A may be adapted to support pivotal movement of the cartridge 203 around the Y-axis. Alternatively, the pair of arms 206 may be compatible with an intermediate structure attached to the cartridge 203. The pair of arms 206 may then engage and disengage with the intermediate structure, or both the cartridge 203 and an intermediate structure.

When moving from the rest position towards the release position, an elastic return force may be applied to the pair of arms 206, so that the pair of arms 206 may be elastically biased towards the rest position. According to one embodiment the elastic return force may be generated by elastic connections between the pair of arms 206 and a connecting portion 214. For example, the pair of arms 206 and the connecting portion 214 may be connected via the elastic connections. The pair of arms 206, the elastic connections and the connecting portion 214 may be manufactured as a single piece. According to another embodiment, the pair of arms 206 may be made from elastic material. The pair of arms 206 may be

directly connected to the connecting portion 214, without the presence of elastic connections. In this case, the elastic return force may be generated by the pair of arms 206 themselves. The pair of arms 206 may include hinges 207 generating the return force. For example, hinges 207 may be located at points where the pair of arms 206 protrude from the connecting portion 214, as depicted in Figure 6. Preferably, the connecting portion 214 and the pair of arms 206 may extend in the XY plane. The pair of arms 206 may be movable between the rest position, in which the pair of arms 206 engage the cartridge 203, and the release position, in which the pair of arms 206 may disengage the cartridge 203. The hinges 207 may be adapted to generate an elastic return force. When the pair of arms 206 are in the release position, the hinges 207 may push both arms 206 away from each other, thus returning the pair of arms 206 back to the rest position.

The actuation button 205 as shown in Figures 5-6 may be movably mounted on the handle body 202A. The actuation button 205 may be adapted to be movable between a lifted position and a depressed position. The actuation button 205 may cooperate by means of the camming action with the pair of arms 206, such that upon actuation of the actuation button 205 into the depressed position, the pair of arms 206 may be moved closer together into the release position. The cartridge 203 may thus be disengaged. When the actuation button 205 is released by the user, the pair of arms 206 may be elastically biased into the rest position. Simultaneously, by means of the camming action, the pair of arms 206 may force the actuation button 205 back into the lifted position. A more detailed description of the release mechanism is provided below.

The actuation button 205 may include a substantially spherical part. The substantially spherical part may constitute any portion

of a sphere, for instance, a half-sphere. The substantially spherical part may be visible for a user. Alternatively, the actuation button 205 itself may have a substantially spherical shape as shown in Figure 6. In some embodiments, the actuation button 205 may be manufactured so that the actuation button 205 adds weight to the distal part of the handle 202. With a substantially spherical actuation button 205 the manufacturing process of the actuation button 205, as well as the whole lock and release mechanism, may be simplified, which contributes to the shaver assembly being less costly. A substantially spherical actuation button 205 may be symmetrical and easy to mold. The symmetric shape may also simplify the whole manufacturing process, since there is no directional dependency when placing the sphere in the handle body 202A during an assembly of the handle 202. The substantially spherical actuation button 205 may also be comfortable for a user when using the actuation button 205 as a finger rest area.

According to one embodiment, the pair of arms 206 may extend substantially in a common plane XY. The actuation button 205 may be mounted in the handle body 202A, so that it may move in a direction substantially perpendicular to the plane XY. The actuation button 205 may be restricted in motion within the plane XY by being fixed inside the hole 227 of the cover 204. Thus the actuation button 205 may be restricted in movement to the sides of the handle 202 and along the longitudinal direction of the handle 202. Additionally, the actuation button 205 may be restricted from rotational movement. The restriction in rotational movement may be achieved for example by covering the surface of the actuation button 205 with a suitable material, such as rubber or other elastomeric materials, increasing the friction between the actuation button 205 and the rim of the hole 227.

The rubber or other elastomeric material may also serve as suitable finger rest area. The actuation button 205 may also serve as a support area for resting a finger of the user during shaving. Therefore the actuation button 205 may provide support for the finger of the user, which may be close to the blades, thus the motion of the blades on the skin of the user may be led more conveniently during shaving.

In some embodiments, the actuation button 205 may be provided with an outer layer adapted to prevent slipping of a finger of the user when rested against the actuation button 205. Alternatively, the actuation button 205 may be manufactured from a material which inherently restricts slippery motion when in contact with the skin of the user. Examples of such material preventing slippery motion may include elastomeric materials, such as rubber or similar.

The material of the actuation button 205 may have different density from the density of the material of the handle body 202A. Thereby the balance of the handle 202 may be improved. For example, the difference between the density of the actuation button 205 and the density of the handle body 202A may be at least 10% of the density of the handle body 202A.

The material of the actuation button 205 may be chosen among materials having a density higher than the density of a material used for manufacture of the handle body 202A. For example, the actuation button 205 may be made of metal. The weight of the actuation button 205 may help to improve the feel during shaving and to enhance shaving performance. Such a weight in the distal portion of the handle 202 may assist in the process of shaving being more natural and convenient, especially when the handle body 202A is molded from light low-cost material, such as plastic material. The additional weight placed in the actuation button 205

may be close to the blades. Therefore the perception of the blades on the skin of the user during the shaving stroke may be enhanced.

The additional weight of the actuation button 205 may be lower than the elastic return force exerted by the elastic portion, for example, the hinges 207 of the pair of arms 206. This may be to help prevent unexpected spontaneous release of the cartridge 203 merely by the weight of the actuation button 205 without a user actually pushing the actuation button 205. This provision may also ensure that the actuation button 205 may be moved back to the lifted position, when the pair of arms 206 are elastically biased to the rest position.

According to another aspect of the second embodiment, a connecting portion 214 may be movably mounted on the handle body 202A. The connecting portion 214 may be adapted for a sliding motion along the X-axis of the handle 202. The connecting portion 214 may be adapted to slide in a direction away from the cartridge 203.

The connecting portion 214 may further include a cavity 214A shaped so that the actuation button 205 fits into the cavity 214A when the actuation button 205 is in the depressed position. The actuation button 205 may be seated conveniently in the cavity 214A when actuated into the depressed position. As the actuation button 205 is pressed from the lifted position towards the depressed position inside the handle 202, may be lodged in the cavity 214A.

According to another a pair of arms 206 may protrude outwardly from the connecting portion 214. For example, the pair of arms 206 may protrude in a direction towards the cartridge 203. The pair of arms 206 may extend symmetrically to the X-axis. In the rest position, the pair of arms 206 may extend such that any portion of the pair of arms 206 located closer to the cartridge 203 may be at the same or greater distance from the X-axis than the portion

located further from the cartridge 203. Thus the pair of arms 206 may diverge from the X-axis. Preferably, the pair of arms 206 and the connecting portion 214 may lie in the XY plane.

The cartridge 203 may be allowed to pivot around an axis Y. The handle 202 may be provided with return means adapted to return the cartridge 203 to a neutral position when the cartridge 203 is rotated. The cartridge 203 may be held on the handle 202 by the pair of shell bearings 206A. The pair of shell bearings 206A may be adapted to engage with the pair of rims 203A provided on the cartridge 203. The pair of rims 203A and the pair of shell bearings 206A may enable the cartridge 203 to rotate around the axis Y during shaving. Other pivoting means, which allow the cartridge 203 to pivot around the Y-axis, may also be possible. For example pins may be provided on the pair of arms 206 and the corresponding holes disposed on the cartridge 203.

A depressed area 220 may be provided in the handle body 202A surrounding the connecting portion 214. The depressed area 220 may provide for a smooth sliding movement of the connecting portion 214 along the X-axis. The pair of arms 206 may be directly connected to the connecting portion 214, so that the connecting portion 214 and the pair of arms 206 slide together. The pair of arms 206 and the connecting portion 214 may be adapted to slide along the X-axis in a direction away from the cartridge 203. When returned back to the rest position, each of the pair of arms 206 may be supported by a respective rest projection 216 protruding from each side of the handle 202. In the rest position the pair of arms 206 may lean against the rest projections 216.

According to another aspect, at least one inclined surface 217 may be provided on the connecting portion 214. For example, the at least one inclined surface 217 may be located near the edge of the connecting portion 214. The at least one inclined surface 217 may

be planar. The at least one inclined surface may protrude outside from the connecting portion 214 in a direction perpendicular to the XY plane. Preferably, the at least one inclined surface 217 may protrudes from the connecting portion 214, so that the inclined surface 217 may be in contact with the actuation button 205. For example, there may be at least one portion on the actuation button 205, which may contact the at least one inclined surface 217 of the connecting portion 214. In the lifted position, the actuation button 205 may be seated between the cover 204 and the at least one inclined surface 217. The at least one portion of the actuation button 205, which contacts the at least one inclined surface 217 of the connecting portion 214 may be adapted to slide along the at least one inclined surface 217 during the actuation of the actuation button 205. For example, a substantially spherical shape of the actuation button 205 may be compatible with the at least one inclined surface 217 as shown in Figure 6. Alternatively, the actuation button 205 may include a triangular shape which may contact the at least one inclined surface 217.

Additionally, the handle 202 may be provided with push features 229. For example, the push features 229 may project from the rest projections 216 towards the center part of the handle 202, in a direction parallel to the Y-axis. When the pair of arms 206 are in the rest position, the pair of arms 206 may lean against the push features 229. The push features 229 may contact the pair of arms 206 substantially in the middle of the length of the pair of arms 206. The push features 229 may contact that side of the pair of arms 206, which is furthest from the X-axis.

When the actuation button 205 is pressed by the user towards the depressed position, the actuation button 205 may slide along the at least one inclined surface 217 of the connecting portion 214. As the actuation button 205 slides along the at least one

inclined surface 217, the connecting portion 214 may be forced by the actuation button 205 to slide along the X-axis. For example, the connecting portion 214 may be pushed along the X-axis in a direction away from the cartridge 203 during the actuation of the actuation button 205. The connecting portion 214 may slide within inside of the depressed area 220.

The connecting portion 214 may be attached to the pair of arms 206 by a pair of elastic connections. When the actuation button 205 is pressed into the depressed position, the connecting portion 214 and the pair of arms 206 may slide together along the X-axis. The connecting portion 214 and the pair of arms 206 may slide in a direction away from the cartridge 203.

The push features 229 may be adapted to move the pair of arms 206 closer together, when the pair of arms 206 and the connecting portion 214 slide together along the X-axis. The push features 229 may force the pair of arms 206 from the rest position to the release position, thereby disengaging the pair of arms 206 from the cartridge 203. For example, in the rest position the pair of arms 206 may extend such that any portion of the pair of arms 206 located closer to the cartridge 203 may be at the same or greater distance from the X-axis, than the portion located further from the cartridge 203. The push features 229 may be located substantially in the middle of the length of the pair of arms 206. Therefore in the rest position, any portion of the pair of arms 206 closer to the cartridge 203 than the push features 229, may also be more distant from the X-axis, when compared to the push features 229. As the pair of arms 206 and the connecting portion 214 may slide together in a direction away from the cartridge 203, the corresponding portions of the pair of arms 206 may be forced closer together by the push features 229. Thus, the push features 229 may

force the pair of arms 206 into the release position, and the cartridge 203 may be released.

According to another aspect of the second embodiment, by means of the camming action of the actuation button 205 to the pair of arms 206, the motion of the actuation button 205 from the lifted position into the depressed position may be connected with the movement of the pair of arms 206 from the rest position into the release position. Upon pressing the actuation button 205, the pair of arms 206 may move close to each other, towards the release position, thereby releasing the cartridge 203 from the handle 202. The pair of arms 206 may be elastically biased towards the rest position by an elastic force generated by the hinges 207. When the actuation button 205 is in the depressed position, the elastic force generated by the hinges 207 may lift the actuation button 205 back to the lifted position, when the actuation button 206 is released by a user.

Additionally, as shown in the variant of Figure 8c, the handle 202 may include a spring 242 positioned near the proximal side of the connecting portion 214. More particularly, the spring 242 may be located between the proximal side of the connecting portion 214 and a corresponding adjacent wall of the depressed area 220. The spring 242 may be partially embedded into the proximal wall of the depressed area 220 neighboring the proximal side of the connecting portion 214. As the connecting portion 214 is slid away from the cartridge 203 during actuation of the actuation button 205, the connection portion may press the spring 242 against the proximal wall of the depressed area 220, thereby increasing the elastic tension within the spring 242. Therefore, the spring 242 may further support the return force generated by the hinges 207, when the actuation button 205 is about to be raised into the lifted position.

In an alternative embodiment, the pair of arms 206 may be closer together in the rest position than in the release position. For example, when the actuation button 205 is actuated, the pair of arms 206 may be forced apart into the release position, thus the cartridge 203 may be released.

Additionally, a guard member 215 may be provided on the handle body 202A. The guard member 215 may be molded as a part of the handle body 202A. The guard member 215 may be molded in the distal-most part of the handle 202, neighboring the cartridge 203. The guard 215 may lie on the X-axis of the handle 202.

The guard member 215 may enclose a return means for returning the pivoting cartridge 203 to a neutral position. The guard member 215 may accommodate any means for returning the cartridge 203 to a neutral position known in the art. The return means may be a combination of a pusher 208 and a spring 209. The spring 209 may generate the required elastic force for returning the cartridge 203 to a neutral position. The pusher 208 may cooperate with a corresponding cam surface 210 of the cartridge 203. The pusher 208 may be located inside the guard member 215. The pusher 208 may be covered with the cover 204, so that the pusher 208 may be restricted in movement in all the directions other than that along the X-axis. The pusher 208 may be adapted to reciprocate inside the guard member 215. To this end, the pusher 208 may be provided with at least one protrusion 208A. For example, the pusher 208 may include two protrusions 208A provided on the opposite sides of the pusher 208. One such protrusion 208A may fit inside a groove 215A provided on the inside of the guard member 215. The cover 204 may also be provided with a groove, in which the other protrusion 208A may be located during movement of the pusher 208.

The pair of arms 206 may be provided with stop members 228. For example, the stop members 228 may ensure that the pair of arms

206 do not come too close to each other when the pair of arms 206 are moved into the release position. The stop members 228 may lean against a guard member 215, as the pair of arms 206 are closing towards each other towards the release position. The hinges 207 may thus be prevented from a sudden overload, which could lead to breaking of the hinges 207. The guard member 215 and the stop members 228 may prevent the hinges 207 from reaching the point of yield or the ultimate tensile stress exerted thereon, the former being the point of maximum stress that the material may withstand before undergoing permanent plastic deformation, and the latter being the point at which the material may break. By providing the pair of arms 206 with the stop members 228, the pair of arms 206 may be stopped in the release position, thereby reducing the risk of the hinges 207 stretching too much and reaching the point of yield or the ultimate tensile stress exerted thereon. As such, the functionality and durability of the hinges 207 may be improved. The probability of accidently breaking the hinges 207 from straining it too much and causing excessive deformation may be reduced. The hinges 207 may thus be less vulnerable to an improper or excessive use, and the reliability of the whole shaver may therefore also be improved. With the protective means, such as the guard member 215 and the stop members 228, the lifetime of the shaver might may increase; moreover the costs a user may spend spent on shaving may be lowered.

Therefore, the guard member 215 may serve as a multifunctional element. Consequently, the number of components included in the lock and release mechanism of the handle 202 may be reduced, and the manufacturing process of the handle 202 may be simplified.

Moreover, the stop features 228 may be adapted so that the pair of arms 206 may not be allowed to move into the release position unless the cartridge 203 is pulled out. To this end safety

features 228A may be disposed on the sides of the distal part of the guard member 215. The safety features 228A may protrude outwardly from the guard member 215 toward the sides of the handle 202. The stop features 228 may be fastened by the safety features 228A, so that the stop features 228 may be prevented from movement toward the cartridge 203. Therefore, the cartridge 203 may be more effectively prevented from an accidental release, and the safety of the user may be increased.

Acording to another embodiment, the pair of arms 206, the connecting portion 214 and the stop members 228 may be made of plastic material. The pair of arms 206 may be directly connected to the connecting portion 214, without the presence of elastic connections. In this case, the elastic return force may be generated by the pair of arms 206 themselves. The pair of arms 206 may include the hinges 207 which generate the return force.

As depicted in Figures 8a-8b, a set of openings 212 may be provided on the handle 202. The openings 212 may engage with a set of corresponding protrusions 224 disposed on the cover 204. The cover 204 may be press-fitted in a set of openings 212, in order to be secured to the handle body 202A. There may also be a hole 227 in the cover 204 abutting the actuation button 205 so that the actuation button 205 may be restricted in side-to-side motion. The actuation button 205 may have a substantially spherical shape, and the hole 227 may have a circular shape. The hole 227 may have a diameter smaller than the diameter of the actuation button 205. The actuation button 205 may be retained inside the handle body 202A. Furthermore, the actuatuation button 205 may partially protrude from the hole 227 in the cover 204.

Description of the third embodiment

Figure 9 details a shaver 301 according to yet another embodiment. The shaver 301 may include a handle 302, a cartridge

303, and an actuation button 305. The actuation button 305 may further include a substantially spherical part 305A fixed in the actuation button 305.

The handle 302 may include an elongated handle body 302A. The elongated handle body 302A may include an elongated gripping portion. The handle body 302A may be further made of low-cost material, such as plastic material. Alternatively, the handle body 302A may be manufactured from any other suitable material, such as from metal. The handle body 302A may include as few components as possible. The handle body 302A may be made as one piece. The handle body 302A and/or the actuation button 305 may include at least one finger rest area. The finger rest areas may be manufactured for instance from rubber or the like.

The distal part of the handle 302, as illustrated, for example in Figure 10, may include a lock and release mechanism. The lock and release mechanism may be adapted to releasably engage and disengage the razor cartridge 303. The handle 302 may be provided with an arm assembly including a pair of arms 306. The cartridge 303 may be pivotally mounted on the pair of arms 306. The pair of arms 306 may be movable between the rest position, when the cartridge 303 may be engaged on the handle 302, and the release position when the cartridge 303 may be disengaged from the handle 302. The pair of arms 306 may be provided with the pair of shell bearings 306A by means of which the cartridge 303 may be mounted on the handle 302. In the rest position the pair of shell bearings 306A may be engaged with the pair of rims 303A provided on the cartridge 303. The pair of rims 303A and the pair of shell bearings 306A enable a rotational movement of the cartridge 303 around the pivot axis Y. Any alternative means for attaching the pivoting razor cartridge 303 may be used, such as pins and corresponding holes, or the like.

Alternatively, the pair of arms 306 may be compatible with an intermediate structure attached to the cartridge 303. The pair of arms 306 may then be engaged and disengaged with the intermediate structure, or both the cartridge 303 and an intermediate structure.

The pair of arms 306 may be adapted to cooperate with the actuation button 305. Upon actuation of the actuation button 305 the pair of arms 306 may be moved closer together into the release position by way of camming action between the actuation button 305 and the pair of arms 306. The actuation button 305 may include a substantially spherical part 305A. The substantially spherical part 305A may constitute any portion of a sphere, for instance, a half-sphere. The substantially spherical part 305A may be visible for a user. The substantially spherical part 305A may be positioned so that the finger of a user may come in contact therewith when actuating the actuation button 305. The manufacturing process of the substantially spherical part 305A may be simpler, quicker and with less production costs than the manufacturing process of other more complex parts. The substantially spherical shape may also be comfortable for a user when using the substantially spherical part 305A as a finger rest area.

The material of the substantially spherical part 305A may have a different density from the density of the material of the handle body 302A. Thereby the balance of the handle 302 may be improved. For example, the difference between the density of the substantially spherical part 305A and the density of the handle body 302A may be at least 10% of the density of the handle body 302A.

The substantially spherical part 305A may be manufactured so that the substantially spherical part 305A may add weight to the distal part of the handle 302. More particularly, the substantially spherical part 305A may be manufacutured from material with density

higher than the density of the material used for manufacturing handle body 302A. For example, the substantially spherical part 305A may be made of metal. The actuation button 305 may thus serve multiple functions. The actuation button 305 may release the razor cartridge 303. The actuation button 305 may also provide additional weight to the distal part of the handle 302.

The additional weight of the substantially spherical part 305A of the actuation button 305 may help to improve the feel during shaving and to enhance shaving performance. The additional weight in the distal portion of the handle 302 may also assist with the process of shaving being more natural and convenient, especially when the handle body 302A is molded from light low-cost material, such as plastic material. The additional weight placed in the actuation button 305 may be close to the blades. Therefore the perception of the blades on the skin of a user during the shaving stroke may be enhanced.

The actuation button 305 and/or the substantially spherical part 305A of the actuation button 305 may serve as a support area for resting the finger of a user. Therefore, the actuation button 305 and/or the substantially spherical part 305A of the actuation button 305 may be coated with rubber or other elastomeric material to prevent slipping of a finger of the user when the finger may be rested against the actuation button 305. Alternatively, the actuation button 305 may be manufactured from a material which inherently restricts slippery motion when in contact with skin of a user. Examples of such material preventing slippery motion may be elastomeric materials, such as rubber or similar.

When the cartridge 303 is released from the handle 302, the pair of arms 306 may be flexed to be brought closer together. The cartridge 303 may thus be disengaged from the pair of shell bearings 306A and removed or replaced. For this reason, each one of

the pair of arms 306 may include a receptacle 330. The receptacles 330 may be provided on the front surface of each respective pair of arms 306. The receptacles 330 may be of non-linear shape. For example, the receptacles 330 may be of a substantially beam-like shape. The receptacles 330 may be adapted to receive a pair of pins 337 provided on the actuation button 305. The pair of arms 306 may be positioned symmetrically with respect to the X-axis on the handle 302.

A platform 331 may be positioned between the pair of arms 306. The platform 331 may serve multiple purposes. The platform 331 may provide a support for a pusher 308. Further, the platform 331 may lock the actuation button 305 in position and may also help to prevent disengagement of the actuation button 305. The platform 331 may take the overall shape of a prism. The walls of the platform 331 adjacent to the pair of arms 306 may be parallel to the longitudinal axis of the shaver 301.

The platform 331 may include a front wall. The front wall may be oriented towards the actuation button 305. The front wall of the platform 331 may include a track 331A. The track 331A may be adapted to receive one of a pair of guiding protrusions 308A provided on the pusher 308. The track 331A may then help to guide the pusher 308 to reciprocate linearly, reducing risk of the pusher 308 being displaced or misguided in a wrong direction. Therefore, the risk of damage of the pusher 308 may be lowered, and the function of the cartridge 303 returning to its rest position may be enhanced.

The pair of arms 306 and the platform 331 may be separated from each other by non-linear slots 332. The non-linear slots 332 may be provided between the platform 331 and each respective arm 306. Each of the non-linear slots 332 may include a portion defining a linear part 333. The linear part 333 may be adapted to

cooperate with the actuation button 305, namely with locators 338 provided on the portion of the actuation button 305 that may mate with distal part of the handle body 302A.

A slot 334 may be formed below the platform 331. The slot 334 may be substantially rectangular in shape and may be elongated in one direction. The elongated direction of the slot 334 may be parallel to the longitudinal axis of the shaver 301. The walls of the slot 334, parallel to the longitudinal axis of the shaver 301, are parallel to each other, and also to the side walls of the platform 331. The side walls of the slot 334 may be provided substantially in one line with the side walls of the platform 331. The side walls may form two longitudinal edges forming a pair of opposed tracks. The pair of opposed tracks may be adapted to receive flexible hooks 339 of the actuation button 305.

A proximal wall of the slot 334 may include a stop projection 335. The stop projection 335 may protrude into the slot 334. The front wall of the stop projection 335 may be aligned with the front wall of the platform 331. In this way, the stop projection 334 does not interfere with the possible movements of the pusher 308. The stop projection 335 may prevent flexible hooks 339 of the actuation button 305 from being brought either closer together, or, alternatively, further apart. The stop projection 335 may thus help to prevent disengagement of the actuation button 305, and disassembly of the handle 302, when the handle 302 is dropped or exposed to shock.

The front portion of the distal part of the handle body 302A may be adapted to receive the actuation button 305. As shown in Figure 11, the actuation button 305 may be formed as a body with a protruding part 340. The protruding part 340 may protrude from a far side of the actuation button 305 with respect to the distal front portion of the handle body 302A, and away from the handle

body 302A. The protruding part 340 may be adapted to accommodate the substantially spherical part 305A. The substantially spherical part 305A may be adapted to contact the finger of a user, when the actuation button 305 is being actuated. To this end, the protruding part may be provided with a finger rest portion 340A. The finger rest portion 340A may prevent slipping motion between the actuation button 305 and the finger of a user as the actuation button 305 is actuated by the user, therefore enabling a smooth control of the release mechanism. The finger rest portion 340A may be preferably made from suitable elastomeric material, such as rubber, silicone or the like. Similarly, the outer surface of the substantially spherical part 305A may also be provided with a finger rest portion. For example, the substantially spherical part 305A may be coated with suitable elastomeric material such as rubber.

When the cartridge 303 is to be removed, the actuation button 305 may be pushed forward toward the cartridge 303 substantially along the longitudinal direction of the handle 302. The back portion of the actuation button 305, as shown in Figure 14, may include a pair of lockers 338. The pair of lockers 338 may protrude outward from the side of the actuation button 305 which engages with the handle body 302A. The pair of lockers 338 may be positioned on a side of the actuation button 305 closer to the cartridge 303, i.e. on the distal-most part of the actuation button 305. The pair of lockers 338 may be positioned symmetrically with respect to the longitudinal axis of the shaver 301. The pair lockers 338 may be offset so as to enable the platform 331 to be positioned between the pair of lockers 338. This prevents the pair of lockers 338 from being accidentally brought closer together, and thus damaged or disengaged from the handle body 302A.

The platform 331 and the pair of lockers 338 define an opening through which the pair of protrusions 308A of the pusher 308 may

protrude. The pusher 308 may be configured to reciprocate in the opening. One of the pair of protrusions 308A provided on the pusher 308 may engage with the track 331A of the platform 331. A similar track to the one present on the platform 331 may be provided also on the side of the actuation button 305 which engages the handle body 302A. As a result, the pusher 308 may provide guidance so that the function of the pusher 308 may be secured.

The pusher 308 may cooperate with a spring 309. The cooperation of these two components may provide a return means for returning the pivoting cartridge 303 to a neutral position when the cartridge 303 is in use and rotated. The spring 309 may also provide a pushing force for pushing the cartridge 303 away from the pair of shell bearings 306A after the cartridge 303 is disengaged from the handle 302.

Each one of the pair of lockers 338 may be provided in the form of an outwardly oriented hook. When the actuation button 305 is in the rest position, the pair of lockers 338 engage the linear part 333 of the non-linear slot 332.

An inner portion of the actuation button 305, which is in contact with the handle body 302A, may include the pair of pins 337. The pair of pins 337 may be positioned so as to engage the receptacles 330, provided in the pair of arms 306. The receptacles 330 may be in a form of grooves, which may be non-rectilinear and may be oriented slantwise, outwardly forwardly.

The pair of pins 337 may provide a means for moving the pair of arms 306 closer together when the cartridge 303 is to be disengaged. When the actuation button 305 is actuated by the user, the actuation button 305 may slide along the longitudinal direction of the handle 302 towards the cartridge 303. The pair of pins 337 may move forward in the receptacles 330, thus forcing the pair of arms 306 to flex and move closer together. Each one of the pair of

shell bearings 306A may thus disengage from the corresponding rim 303A of the cartridge 303. At the same time, the cartridge 303 may be urged away from the pair of shell bearings 306A by the pusher 308. Therefore the cartridge 303 may be removed from the handle 302 and may be replaced with a new one.

The inner portion of the actuation button 305 may further include flexible hooks 339. The flexible hooks 339 may be provided near the proximal end of the actuation button 305, i.e. on the end more distant from the cartridge 303. The flexible hooks 339 may protrude outwardly from the side of the actuation button 305 which engages with the handle body 302A. When the lock and release mechanism is assembled, they extend through the slot 334 provided next to the platform 331. The flexible hooks 339 take an overall shape of a hook The hook may include a bent portion that may be positioned on the distant portion of the flexible hooks 339. The hooks forming the inner part of the flexible hooks 339 may be outwardly oriented, i.e. bent outward. Thus, the flexible hooks may be oriented in opposing directions. The flexible hooks may engage the side walls of the slot 334. The hooks may then be held by the end of the side walls of the slot 334. The flexible hooks 339 are may be snap-fitted with the tracks 331A. These features prevent easy disengagement of the actuation button 305.

Description of the fourth embodiment

The shaver 401 of the fourth embodiment may include a handle 402, a cartridge 403, and an actuation button 405.

The handle 402 includes a handle body 402A, which may serve as a gripping area. The handle body 402A may be further made of low-cost material, such as plastic material. Alternatively, the handle body 402A may be manufactured from any other suitable material, such as metal. The handle body 402A may include as little components as possible. As such, the handle body 402A may be made

as one piece. The handle body 402A and/or the button body 405B and/or the substantially spherical part 405A may include at least one finger rest area. The finger rest areas may be manufactured, for instance, from rubber or the like. The handle body 402A may be elongated, and may include an elongated gripping portion.

The actuation button 405 may furhter include a button body 405B and a substantially spherical part 405A. The substantially spherical part 405A may be located substantially in the middle of the button body 405B. The button body 405B and the substantially spherical part 405A may be manufactured as two separate pieces. The button body 405B may be mounted on the handle body 402A so that the button body 405B slides substantially along the longitudinal direction of the handle 402. The button body 405B may be slidably mounted on the handle body 402 along the X-axis between a first position and a second position. In the first position, the button body 405B may be at the furthest point from the cartridge 403. In the second position, the button body 405B may be at closest point to the cartridge 403.

The substantially spherical part 405A may be movable within the button body 405B. For example, the substantially spherical part 405A may be mounted on the handle body 402, so that the substantially spherical part 405A may move in a direction substantially perpendicular to the plane XY. The substantially spherical part 405A may be movable between a lifted position, when the substantially spherical part 405A partially protrudes outside the button body 405B, and a depressed position when the substantially spherical part 405A the substantially spherical part 405A fully depressed in the inside of the button body 405B.

The material of the substantially spherical part 405A may have a different density from the density of the material of the handle body 402A. Thereby the balance of the handle 402 may be improved.

Preferably, the difference between the density of the substantially spherical part 405A and the density of the handle body 402A may be at least 10% of the density of the handle body 402A.

The substantially spherical part 405A of the actuation button 405 may be manufactured so that the substantially spherical part 405A may add weight to the distal part of the handle 402. Therefore, the substantially spherical part 405A may be made of material with density higher than the density of material used for manufacturing the handle body 402. As such, the additional weight of the substantially spherical part 405A may help to improve the feel of the shaver 401 during shaving and to enhance shaving performance. The additional weight in the distal portion of the handle 402 may make the process of shaving more natural and convenient, especially when the handle body 402A is molded from light low-cost material, such as plastic material. The additional weight placed in the button body 405B may be close to the blades. Therefore the perception of the blades on the skin of a user during the shaving stroke may be enhanced. The substantially spherical part 405A could be made from metal. Alternatively, the substantially spherical part 405A may be made from metallic alloy.

The substantially spherical part 405A may prevent the button body 405B from sliding along the longitudinal direction of the handle 402, when the substantially spherical part 405A is in the lifted position. Thus, the substantially spherical part may lock the button body 405B in the first position. The substantially spherical part 405A may cooperate with the button body 405B so as to enable the botton body 405B to slide toward the second position, when the substantially spherical part 405A is in the depressed position.

The button body 405B being locked in the first position, while the substantially spherical part 405A is in the lifted position,

may enable the button body 405B to be used as a finger rest area even more comfortably during shaving. The user may be allowed to place his/her finger in close proximity to the blades, so that he/she may be able to lead the shaving blades more effectively. The cartridge 403 may be disengaged from the handle 402 by pressing the substantially spherical part 405A in a direction substantially perpendicular to the XY plane to unlock the button body 405B. The user may be able to apply almost any force desirable when resting his/her finger on the actuation button 405 in a direction of X-axis, when pushing the shaver 401 towards his/her skin. Therefore, by locking the button body 405B in a first position, the safety of the user may be even further increased. The actuation button 405 may provide support for the finger of the user, which may be close to the blades, thus the motion of the blades on the skin of a user may be led more conveniently during shaving.

The substantially spherical part 405A may thus serve multiple functions. The substantially spherical part 405A may operate as a locking mechanism with respect to the sliding of the button body 405B. The substantially spherical part 405A may also provide additional weight to the distal part of the handle 402.

The substantially spherical part 405A may be a sphere. The spherical shape may provide directional independence and may allow for arbitrary placement in the handle body 402A during the manufacturing process. The manufacturing process of the substantially spherical part 405A may thus be simpler, quicker and with less production costs than the manufactuting process of other more complex parts. The spherical shape may also be comfortable for a user when using the substantially spherical part 405A as a finger rest area.

The button body 405B and/or the substantially spherical part 405A in the lifted position may serve as a support area for resting

a finger of the user, for example during shaving. Therefore, the button body 405B and/or the substantially spherical part 405A may be coated with rubber or other elastomeric material to prevent slipping of a finger of the user when the finger is rested against the button body 405B and/or the substantially spherical part 405A. Alternatively, the button body 405B and/or the substantially spherical part 405A may be manufactured from a material which inherently restricts slippery motion when in contact with the skin of a user. Examples of such material preventing slippery motion are may be elastomeric materials, such as rubber or similar.

The button body 405B may be provided with an extended portion 444. The extended portion 444 may enlarge the area, which may serve for resting a finger of the user. The extended portion 44 may allow for additional comfort when the user places a finger on the surface of the button body 405B The extended portion 444 may be covered with a suitable elastomeric material, such as rubber or the like.

The distal part of the handle 402 according to the fourth embodiment is illustrated in Figures 16-19. The lock and release mechanism may be adapted to releasably engage and disengage a razor cartridge 403. The handle 402 may be provided with an arm assembly comprising a pair of arms 406. The pair of arms 406 may be positioned symmetrically with respect to the X-axis on the handle body 402A. The cartridge 403 may be pivotally mounted on the pair of arms 406. The pair of arms 406 may be flexible. The pair of arms 406 may be manufactured from any suitable elastic material, such as plastic. The pair of arms 406 may be molded integrally with the handle body 402A.

The pair of arms 406 may be movable between the rest position, when the cartridge 403 is engaged on the handle 402, and the release position when the cartridge 403 is disengaged from the

handle 402. Upon moving from the rest position toward the release position during the release of the cartridge 403, the pair of arms 406 may move closer to each other. In an alternative embodiment, the pair of arms 406 may instead move further apart during the disengagement of the cartridge 403.

When the pair of arms 406 are moved closer together towards the release position, the pair of arms 406 may generate an elastic return force, which forces the pair of arms 406 back into the rest position. The pair of arms 406 may thus be elastically biased toward the rest position, when the actuation button 405 is actuated. After the actuation button 405 is released by the user, the actuation button 405 may be pushed back into the first position by the biasing force generated by the pair of arms 406.

As shown in Figure 19, the pair of arms 406 may be provided with a pair of shell bearings 406A by means of which the cartridge 403 may be mounted on the handle 402. For example, in the rest position the pair of shell bearings 406A may be engaged with the corresponding pair of rims (not shown) provided on the cartridge 403. The pair of rims and the pair of shell bearings 406A may enable a pivotal movement of the cartridge 403 around the pivot axis Y. Any alternative means for attaching the pivoting razor cartridge 403 may be used, such as pins and corresponding holes, or the like.

Alternatively, the pair of arms 406 may be compatible with an intermediate structure attached to the cartridge 403. The pair of arms 406 may then be engaged and disengaged with the intermediate structure, or both the cartridge 403 and an intermediate structure.

In an embodiment, the pair of arms 406 may be adapted to cooperate with the actuation button 405. Upon actuation of the actuation button 405 the pair of arms 406 may be moved closer together by way of camming action between the actuation button 405

and the pair of arms 406. As the button body 405B is slid forward along the X-axis from the first position to the second position toward the cartridge 403, the pair of arms 406 may move closer together from the rest position towards the release position.

Each one of the pair of arm 406 may include a receptacle 430. The receptacles 430 may be provided on the front surface of each respective arm 406. The receptacles 430 may be of non-linear shape. For example, the receptacles 430 may be of a substantially bean-like shape. The receptacles 430 may lean away from one another from proximal to the distal part of the handle 402 with respect to the longitudinal direction given by the X-axis. The receptacles 430 may be in the form of grooves, which may be non-rectilinear and may be oriented slantwise, outwardly and forwardly. The receptacles 430 may be adapted to receive a pair of pins 437 provided on the button body 405B. The receptacles 430 may be configured such that when the button body 405B moves forward into the second position, the pair of arms 406 may tend to move closer to each other, whereas when the actuation button 405 returns back in the first position, the pair of arms 406 deviates back apart.

The lower portion of the button body 405B may include the pair of pins 437. When the cartridge 403 is to be released from the handle 402, the pair of arms 406 may be flexed to be brought closer together. The pair of pins 437 provide means for moving the pair of arms 406 closer together when the cartridge 403 is disengaged. The pair of pins 437 may be positioned so as to engage the receptacles 430, provided in the pair of arms 406. The cartridge 403 may thus be disengaged from the shell pair of bearings 406A and removed or replaced. The pair of pins 437 may engage the receptacles 430 to drive the pair of arms 406. The pair of pins 437 may drive the receptacles 430 to flex the pair of arms 406 when the button body 405B is pushed from the first into the second position. When the

actuation button 405 is actuated by the user, the button body 405B may slide along the X-axis towards the cartridge 403. The pair of pins 437 may move forward in the receptacles 430, thus forcing the pair of arms 406 to flex and move closer together. Each one of the pair of shell bearings 406A may thus disengage from the cartridge 403. Therefore the cartridge 403 may be removed from the handle 402 and may be replaced with a new one.

Between the pair of arms 406, an elastic tongue 445 may be positioned. The elastic tongue 445 may return the cartridge 403 to a neutral position, when the cartridge 403 pivots around the Y-axis. The elastic tongue 445 may be located on or parallel to the X-axis. Alternatively, the elastic tongue 445 may be replaced by any other return force generating means, such as plunger or the like.

The button body 405B may have a cavity 414, which may open toward the handle body 402A. The substantialy spherical part 405A may be located substantially inside the cavity 414. The cavity 414 may be dimensioned so that the substantially spherical part 405A may enter entirely in the cavity 414, as the substantially spherical part 405A is in the depressed position. The button body 405B may further include a cover 404 partially covering the cavity 414 opposite to the handle body 402A. In the lifted position the substantially spherical part 405A may partially protrude upwardly outside the button body 405B through a through hole 427. The through hole 427 may be disposed in the cover 404 of the button body 405B. The through hole 427 may be adapted to prevent the substantially spherical part 405A from escaping the cavity 414 of the button body 405B. When located in the through hole 427, the substantially spherical part 405A may be restricted from side-to-side movement. For example, the through hole 427 may have

substantially circular cross section with diameter smaller than the diameter of the substantially spherical part 405A.

The handle body 402A may include a guide 443 extending rigidly in the cavity 414 of the button body 405B toward the cover 404. The guide 443 may take the form of a wall or a post integral with the handle body 402A. The substantially spherical part 405A may bear against the guide 443 toward the pair of arms 406. The substantially spherical part 405A may bear against the guide 443 all the way from the lifted position to the depressed position, so that the substantially spherical part 405A may be guided toward the inside of the button body 405B. Thus, the substantially spherical part 405A may be guided relative to the handle body 402A substantially perpendicular to the longitudinal direction of the handle 402 between the lifted postion and the depressed position.

The handle body 402A may further include a recessed portion 450, hollowed substantially under the cavity 414 of the button body 405B. The recessed portion 450 may be preferably designed to allow at least partial entering of the substantially spherical component 405A, as the substantially spherical part 405A is pressed in the depressed position. For example, the recessed portion 450 may be concave, so that the substantially spherical part 405A may fit in the recessed portion 450. Moreover, there may be a spring 442 disposed within the recessed portion 450. The spring 442 may be positioned between the substantially spherical part 405A and the handle body 402A. The spring 442 may facilitate application of biasing force, which may push the substantially spherical part 405A back from the depressed position to the lifted position. If no pressure is applied to the substantially spherical part 405A by a user, the force provided by the return spring 442 may keep the substantially spherical part 405A in the lifted position.

Alternatively, the spring 442 may be replaced with a leaf spring or other means providing the return force.

Figure 16 shows the distal part of the handle 402 with the substantially spheriacal part 405A in the lifted position. With the substantially spherical part 405A in the lifte position, the button body 405B may be in the first position and the pair of arms 406 may be in the rest position. In the lifted postion, the substantially spherical part 405A may bear against the guide 443 toward the pair of arms 406. Furthemore, in the lifted position the substantially spherical part may be fixed inside the through hole 427 of the cover 404 with respect to the longitudinal direction of the handle. Therefore, in the lifted position the substantially spherical part 405A may prevent the button body 405A from sliding. The button body 405B may thus be locked by the substantially spherical part 405A in the first position. Upon pressing the substantially spherical part 405A, the user may initiate movement of the substantially spherical part 405A toward the depressed position.

Figure 17 shows the distal part of the handle 402 with the substantially spherical part 405A in a middle position, which corresponds to the substantially spherical part 405A to be substantially halfway between the lifted position and the depressed position. With the substantially spherical part 405A in the middle position, the inclined surface 417 of the button body 405B may be enabled to slide along the substantially spherical part 405A. Consequently, the button body 405B may be freed to slide to the second position. The user may thus push the button body 405B forward along the X-axis toward the second position. By the camming action the button body 405B may start cooperating with the pair arms 406, so that the pair of arms 406 may start to be flexed closer together toward the release position. As the button body 405B is slid forward into the second position and the substantially

spherical part 405A slides along the inclined surface 417, the substantially spherical part 405A may be pressed by the inclined surface 417 of the button body 405B into the depressed position. With the substantially spherical part 405A bearing against the guide 443, the substantially spherical part 405A may not be able to move forward in a direction toward the pair of arms 406, as the substantially spherical part 405A slides along the inclined surface 417.

Figure 18 shows the distal part of the handle 402 with the substantially spherical part 405A in the depressed position. With the substantially spherical part 405A in the depressed position, the button body 405B may be in the second position and the pair of arms 406 may be in the released position, so that the cartridge 403 may be removed/replaced. In the depressed position, the substantially spherical part 405A may be pressed inside the cavity 414 of the button body 405B. Also the substantially spherical part 405A may still bear against the guide 443. For these reasons, the button body 405B cannot slide any further toward the arm assembly. In the depressed position, the substantaially spherical part 405A may enter the recessed portion 450. With the substantially spherical part 405A in the depressed position, the spring 442 may be fully pressed inside the recessed portion between the substantially spherical part 405A and the handle body 402A.

Once the user stops pushing the button body 405B forward, the button body 405B may be forced all the way back into the first position by means of the return force generated by the pair of elastic arms 406. Additionally, by means of the camming action between spring 442, the substantially spherical part 405A and the button body 405B, the return force generated by the spring 442 may contribute to pushing the button body 405B back to the first position. As the substantially spherical part 405A returns to the

lifted position, the substantially spherical part 405A may be guided along the guide and slides back along the inclined surface 417. Therefore, the substantially spherical part 405A may force the button body 405B back to the first position.

Figure 21 details the actuation button 105 of the first embodiment where the actuation button 105 may include two different materials. Nevertheless, while two different material may be detailed, the number of materials included in the actuation button 105 may be more than two. In the following paragraphs, although reference may be made to the actuation button 105 of the first embodiment only, the same or similar structures of the actuation button or the substantially spherical part may also be employed in the other embodiments of the invention. The material of the actuation button 105 may have an average density higher or lower then the density of the material of the handle body 102A. Preferably, the difference between the average density of the actuation button 105 and the density of the material of the handle body 102A may be at least 10% of the density of the material of the handle body 102A.

In some embodiments, the actuation button 105 may include a plurality of different materials with different densities. Some of these materials may have densities higher than the material of the handle body 102A, and some of these materials may have densities lower than the material of the handle body 102A. Using a combination of multiple materials of the actuation button 105 may increase the weight of the handle 102 and may provide a gripping and/or rest area for finger of a user. The weight increasing materials with the density higher than the material of the handle body 102A may be a higher density plastic, metal or other materials. The low density materials with the density lower than

the material of the handle body 102A may be a light plastic material, rubber or other suitable materials.

The combination of materials may be selected so that an average density of the plurality of materials may be different from the density of the material of the handle body 102A. The difference between the average density and the density of the material of the handle body 102A may be at least 10% of the density of the handle body 102A.

Figure 21a displays a spherical actuation button 105 including a material B of density higher than the material of the handle body 102A in the inside of the actuation button 105, and a material A of density lower than the density of the material used to manufacture the handle body 102A on the outside of the actuation button 105. Nevertheless, the reversed arrangement of the materials would also be possible.

Figure 21b illustrates a material D in the inside of the actuation button 105 and partially protruding to the outside of the actuation button 105. Alternatively, as depicted on Figure 21c the actuation button 105 may include a single material E and a hollow portion F in the inside. The hollow portion F may thus have density equal to zero or very close to zero. Figure 21d shows another example where a material G provided in the center of the spherical actuation button 105 protrudes in various directions towards the outside of the actuaction button 105 through a material H. The material H may be a weight increasing material with respect to the handle 102 and the material G may be a material suitable for increasing gripping characteristics of the handle, such as rubber. Other variations of the materials with different densities than those illustrated on Figures 21a-21d are also possible. Any of the material A, B, C, D, E, G, and H may be selected among materials

with the density either lower or higher than the density of the material of the handle body 102A.

Further, the disclosure may include embodiments according to the following clauses:

Clause 1. A handle (402) for a shaving razor (401) comprising:

a handle body (402A);

an arm assembly having a pair of arms (406) provided on the handle body (402A) and adapted to engage at least a razor cartridge (403) for supporting it, said pair of arms (406) being movable between a rest position for engaging at least the razor cartridge (403) and a release position for disengaging at least the razor cartridge (403);

an actuation button (405) comprising a button body (405B) movably mounted on the handle body (402A) so that it slides substantially along the longitudinal direction of the handle (402), and a substantially spherical part (405A);

wherein said body (405B) of the actuation button (405) cooperates by camming action with the arm assembly so that said actuation button (405) moves said pair of arms (406) into the release position when said button (405) is actuated;

wherein the substantially spherical part (405A) is movably mounted in the button body (405B) substantially perpendicular to the longitudinal direction of the handle (402) between a lifted position when the substantially spherical part (405A) is lifted outside the button body (405B) and a depressed position when the substantially spherical part (405A) is fully depressed inside the button body (405B), said substantially spherical part (405A) being elastically biased toward the lifted position and cooperating with the button body (405B) so as to prevent said button body (405B) from sliding when said substantially spherical part (405A) is in the lifted position and so as to enable said button body (405B) to

slide when in depressed position said substantially spherical part (405A) is in the depressed position.

Clause 2. The handle (402) according to clause 1, wherein the substantially spherical part (405A) has an density different from a density of the material of the handle body (402A).

Clause 3. The handle (402) according to clause 2, wherein a difference between said average density and said density of the material of the handle body (402A) is at least 10%.

Clause 4. The handle (402) according to clause 2 or 3, wherein the substantially spherical part comprises at least two different materials with different densities.

Clause 5. The handle (402) according to any of the preceding clauses, wherein the substantially spherical part (405A) has an average density higher than the density of the material of the handle body (402A).

Clause 6. The handle (402) according to any of the preceding clauses, wherein at least a portion of the substantially spherical part (405A) is made from metal.

Clause 7. The handle (402) according to any of the preceding clauses, wherein the handle further comprises a spring (442); said spring (442) providing a return force for pushing the substantially spherical part (405A) back to the lifted position, when the substantially spherical part (405A) has been pressed towards the fully depressed position.

Clause 8. The handle (402) according to any of the preceding clauses, wherein the button body (405B) comprises an extended part (444) for resting user's finger during shaving.

Clause 9. A handle (102, 202, 302, 402) for a shaving razor (101, 201, 301, 401) comprising:

a handle body;

an arm assembly having pair of arms (106, 206, 306, 406) provided on the handle body and adapted to engage at least a razor cartridge (103, 203, 303, 403) for supporting it, said pair of arms (106, 206, 306, 406) being movable between a rest position for engaging at least the razor cartridge (103, 203, 303, 403) and a release position for disengaging at least the razor cartridge (103, 203, 303, 403);

an actuation button (105, 205, 305, 405) which is movably mounted on the handle body, said actuation button (105, 205, 305, 405) cooperating by cam action with the arm assembly so that said actuation button (105, 205, 305, 405) moves said pair of arms (106, 206, 306, 406) into the release position when said button (105, 205, 305, 405) is actuated;

characterized in that the actuation button (105, 205, 305, 405) comprises a weight component having an average density different from a density of material of the handle body (102A, 202A, 302A, 402A).

Clause 10. The handle (102, 202, 302, 402) according to clause 9, wherein a difference between said average density and the density of the material of the handle body (102A, 202A, 302A, 402A) is at least 10%.

Clause 11. The handle (102, 202, 302, 402) according to clause 9 or 10, wherein the weight component comprises at least two different materials with different densities.

Clause 12. The handle (102, 202, 302, 402) according to any of clauses 9-11, wherein the weight component has an average density higher than the density of material of the handle body (102A, 202A, 302A, 402A).

Clause 13. The handle according to clauses 9-12, wherein at least a portion of the weight component is made from metal.

Clause 14. The handle according to any of clauses 9-13, wherein the actuation button (105, 205) itself serves as the weight component.

Clause 15. The handle according to clause 9, wherein the actuation button (105, 205) is movably mounted on the handle body between a lifted position and a depressed position wherein said actuation button (105, 205) is depressed inside the handle (102, 202); said actuation button (105, 205) moving said pair of arms (106, 206) in the release position when said actuation button (105, 205) is pressed to the depressed position; said pair of arms (106, 206) being elastically biased toward the rest position; said pair of arms (106, 206) biasing the actuation button (105, 205) toward the lifted position when the actuation button (105, 205) is released.

CLAIMS

1. A handle for a shaving razor adapted to releasably support a razor cartridge, said handle comprising:

a handle body; and

an actuation button actuatable to release the razor cartridge, the actuation button having a substantially spherical shape and being positioned to allow a finger of a user to make contact therewith when actuating the actuation button.

2. The handle according to claim 1, wherein the actuation button has an average density different from a density of a material of the handle body.

3. The handle according to claim 2, wherein the density of the actuation button is higher than the density of the handle body.

4. The handle according to any one of claims 1 to 3, further comprising

an arm assembly including a pair of arms provided on the handle body and being adapted to engage the razor cartridge;

the pair of arms being movable between a rest position for engaging the razor cartridge and a release position for disengaging the razor cartridge.

5. The handle according to claim 4, wherein the actuation button is movably mounted on the handle body, the actuation button cooperating by a camming action with the pair of arms to move the pair of arms into the release position.

6. The handle according to claim 5, wherein the pair of arms extend in a plane common with the actuation button, the actuation button being movable substantially perpendicular to said plane.

7. The handle according to claim 5 or claim 6, wherein the arm assembly and the handle body are separate pieces.

8. The handle according to claim 6, further comprising at least one elastic portion through which an elastic return force is applied to the pair of arms when the pair of arms are moved from the rest position towards the

release position; a guard member and a pair of stop members adapted to abut the guard member when the pair of arms are in the release position.

9. The handle according to claim 8, wherein the at least one elastic portion is a U-shaped elastic member interconnecting the pair of arms, the U-shaped elastic member being wound around the guard member and including a return force generating portion and safeguard portions acting as stop members,

the safeguard portions of the U-shaped elastic member being adapted to abut the guard member when the pair of arms are in the release position.

10. The handle according to claim 9, wherein the razor cartridge is adapted to pivotally support the razor cartridge, and the guard member includes a return means for returning the razor cartridge to the rest position.

11. The handle according to any one of claims 5 to 10, wherein the actuation button is movably mounted on the handle body between a lifted position and a depressed position; the actuation button, in the depressed position, being depressed inside the handle; the actuation button moving the two arms to the release position when the button is pressed to the depressed position; the two arms being elastically biased toward the rest position; the actuation button being biased, by the two arms, toward the lifted position when the actuation button is released.

12. The handle according to claim 11, wherein the two arms include proximal parts disposed closer to the actuation button and distal parts disposed further away from the actuation button, the two arms being pivotable between the rest position and the release position around two pivot points; the proximal parts of the two arms being moved apart during actuation of the actuation button, and rotated around the pivot points; and the distal part of the two arms being moved closer together for releasing the razor cartridge from the handle.

13. The handle according to any one of claims 4 to 12, wherein the arm assembly further includes a connecting portion;

the two arms being connected to the connecting portion by hinges and extending from the hinges to respective distal parts and are adapted to engage with the razor cartridge;

the two arms being pivotable between the rest position and the release position around said hinges; the two arms being slidably mounted relative to the handle body along a longitudinal direction of the handle;

the connecting portion including an inclined surface, the actuation button cooperates with the inclined surface by camming action when the actuation button is actuated to slide the two arms in the longitudinal direction; and

the two arms cooperate by camming action with the handle body to move to the release position when the two arms are actuated by the actuation button.

14. The handle according to claim 13, wherein the hinges are elastically deformable to allow movement of the two arms between the rest position and the release position.

15. The handle according to claim 13 or claim 14, wherein the connecting portion includes a cavity configured to receive the actuation button; the inclined surface being formed in a rear portion of the cavity at a distal end opposed to the two arms; the actuation button being movably mounted in the cavity between a lifted position and a depressed position wherein the actuation button is depressed inside the cavity and is pressed by camming action on the inclined surface; and the actuation button being guided, by camming action, to move substantially perpendicularly to the longitudinal direction of the handle when depressed.

16. The handle according to claim 15, wherein the actuation button is guided in a hole disposed in a cover; the cover being connected to the handle body and being configured to cover the two arms; and the hole being dimensioned to lodge the actuation button in the cavity.

17. The handle according to any one of claims 4 to 16, wherein the actuation button includes a button body and a substantially spherical part;

the button body being mounted on the handle body to slide substantially along the longitudinal direction of the handle;

the substantially spherical part being movably mounted in the button body and being guided relative to the handle body substantially perpendicular to the longitudinal direction of the handle between a lifted position, wherein the substantially spherical part is lifted outside the button body, and a depressed position wherein the substantially spherical part is depressed inside the button body;

the substantially spherical part being elastically biased toward the lifted position to cooperate with the button body to prevent the button body from sliding when in the lifted position and to enable the button body to slide when in depressed position.

18. The handle according to claim 17, wherein the button body includes a cavity open toward the handle body and a cover partially covering the cavity;

the cover including a through hole;

the substantially spherical part configured to protrude outside the cavity when the substantially spherical part is in the lifted position;

the handle body including a guide extending in the cavity of the button body toward the cover;

the substantially spherical part being configured to bear against the guide toward the two arms; and

the cavity being dimensioned to entirely receive the substantially spherical part when in the depressed position; and

the substantially spherical part being at least partially covered by the cover of the button body when the button body is slid toward the two arms.

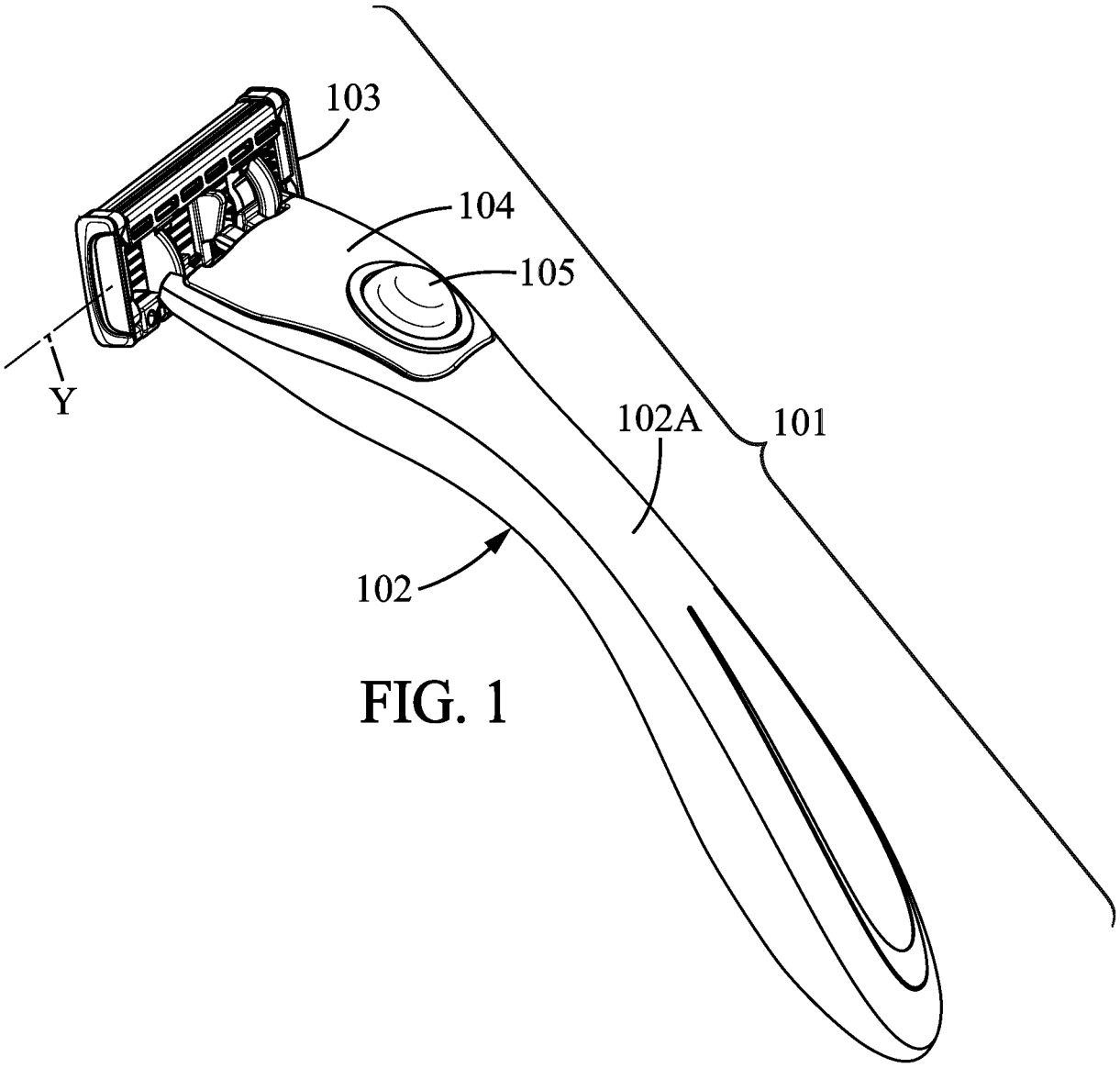
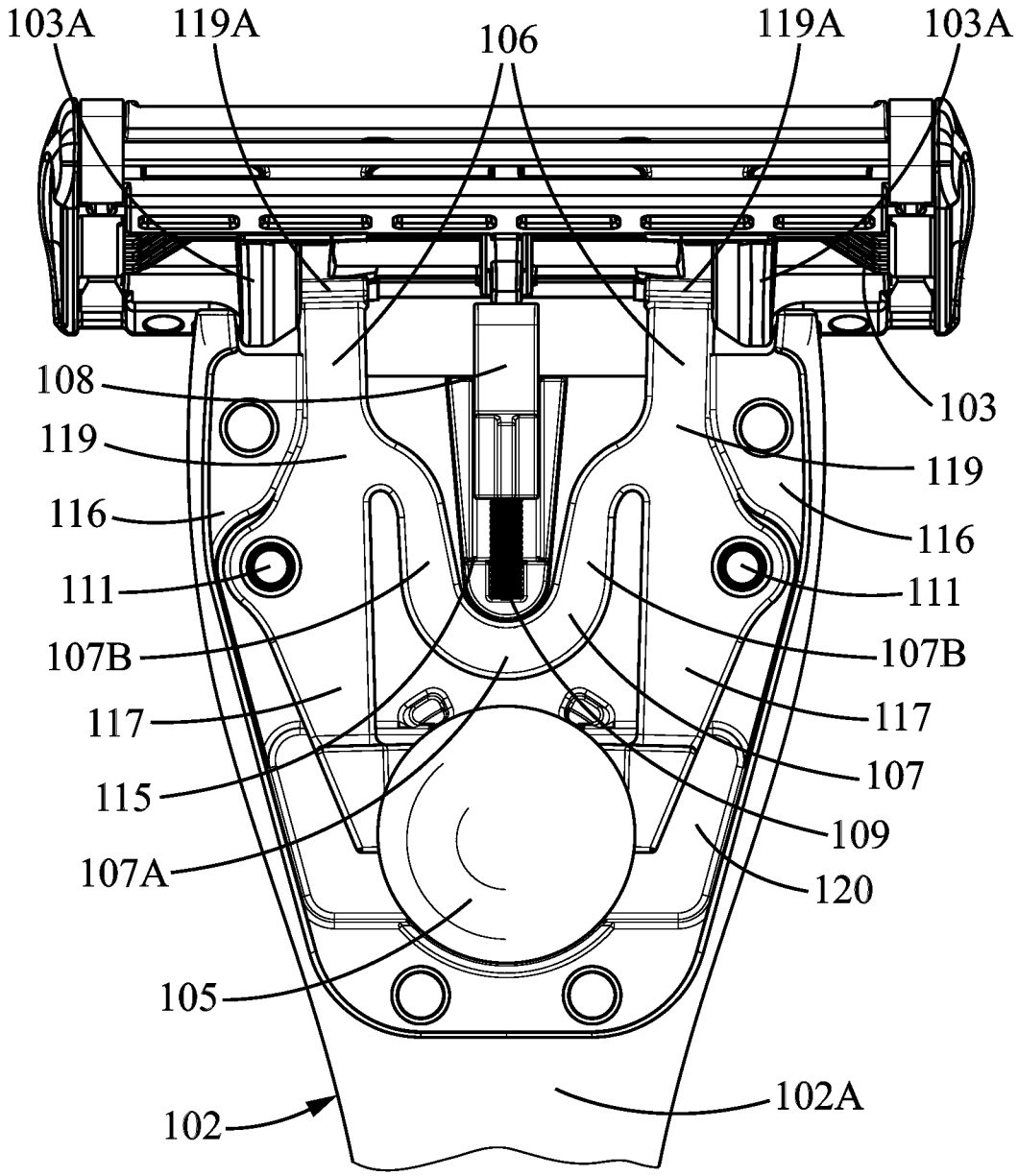


FIG. 1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119A
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103
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116
116
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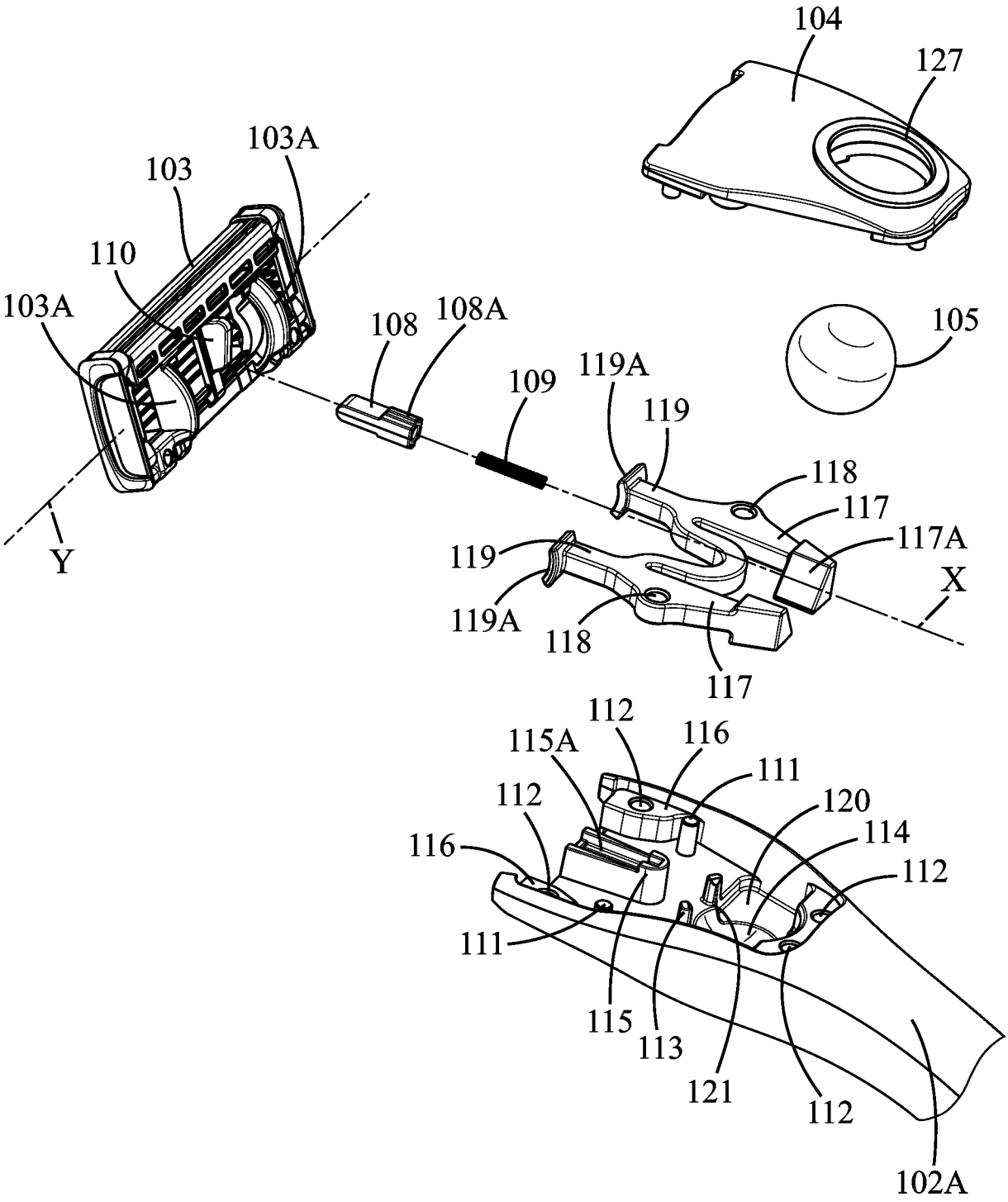
117
107
115
109
107A
120
105
102A
102

FIG. 2

FIG. 3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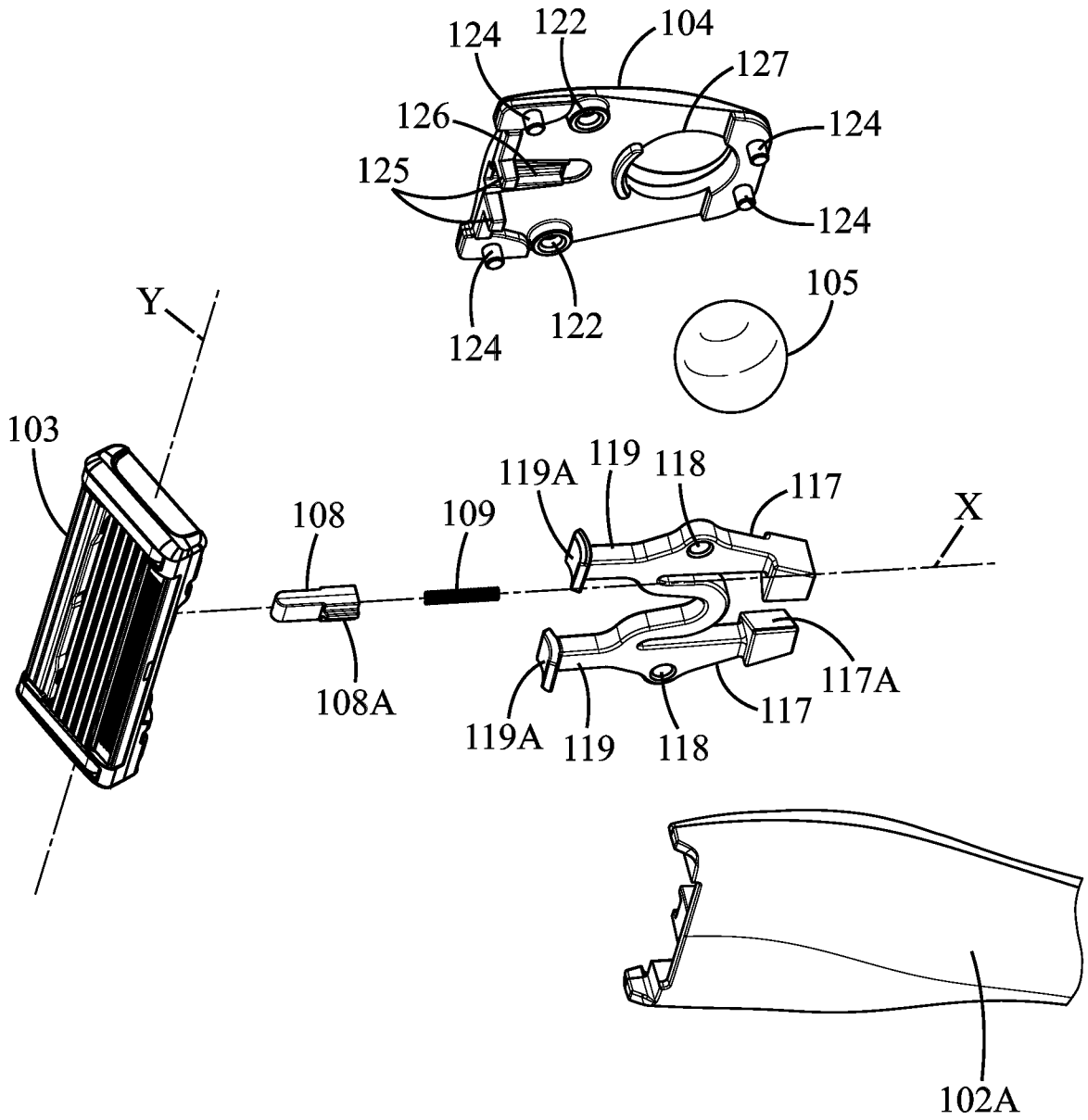
111
115
113
121
112
102A

FIG. 4


124
122
104
127
126
124
125
124
124
122
105
Y
103
119A
119
118
117
X
108
109
108A
117A
119A
119
118
117
102A

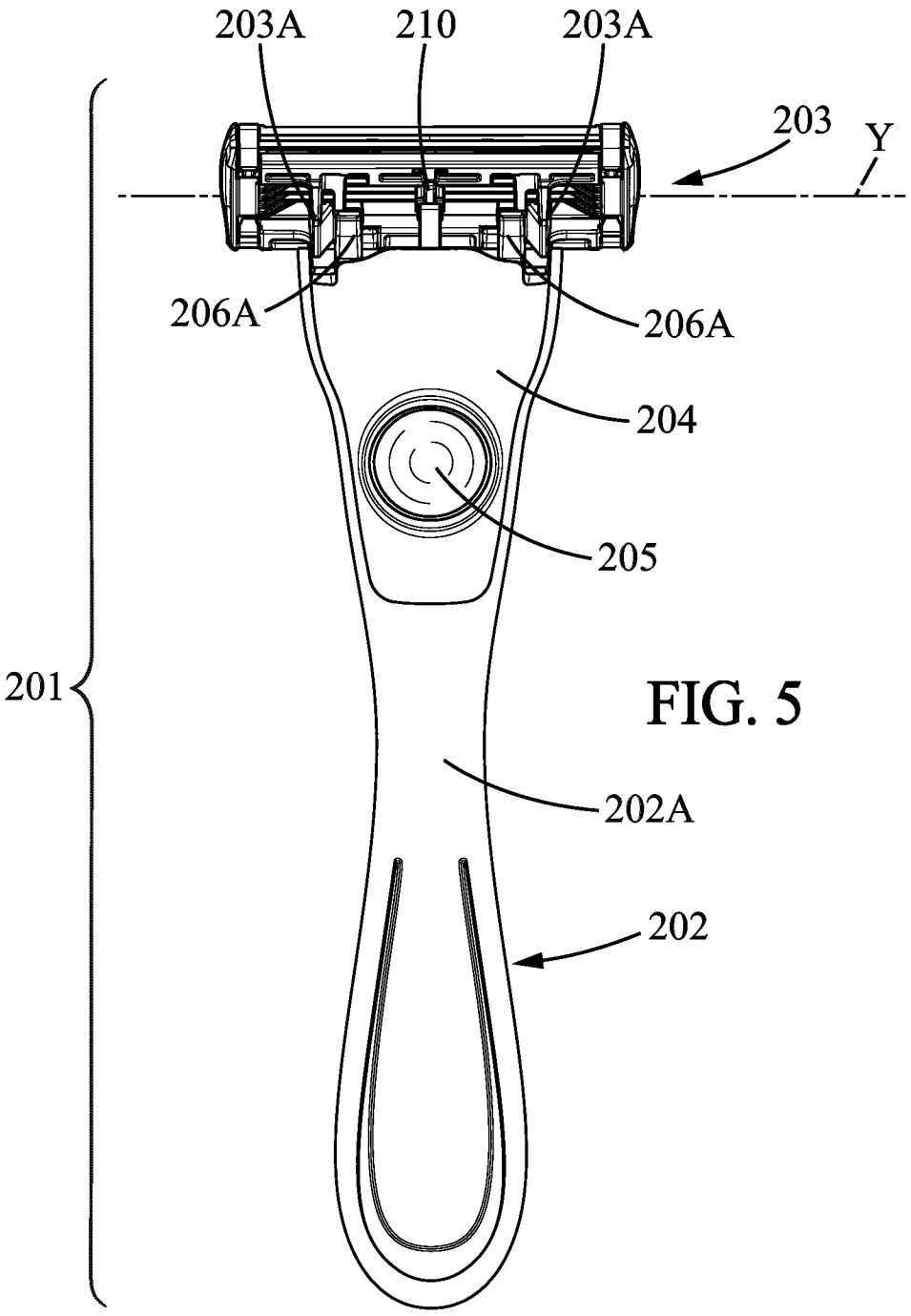


FIG. 5

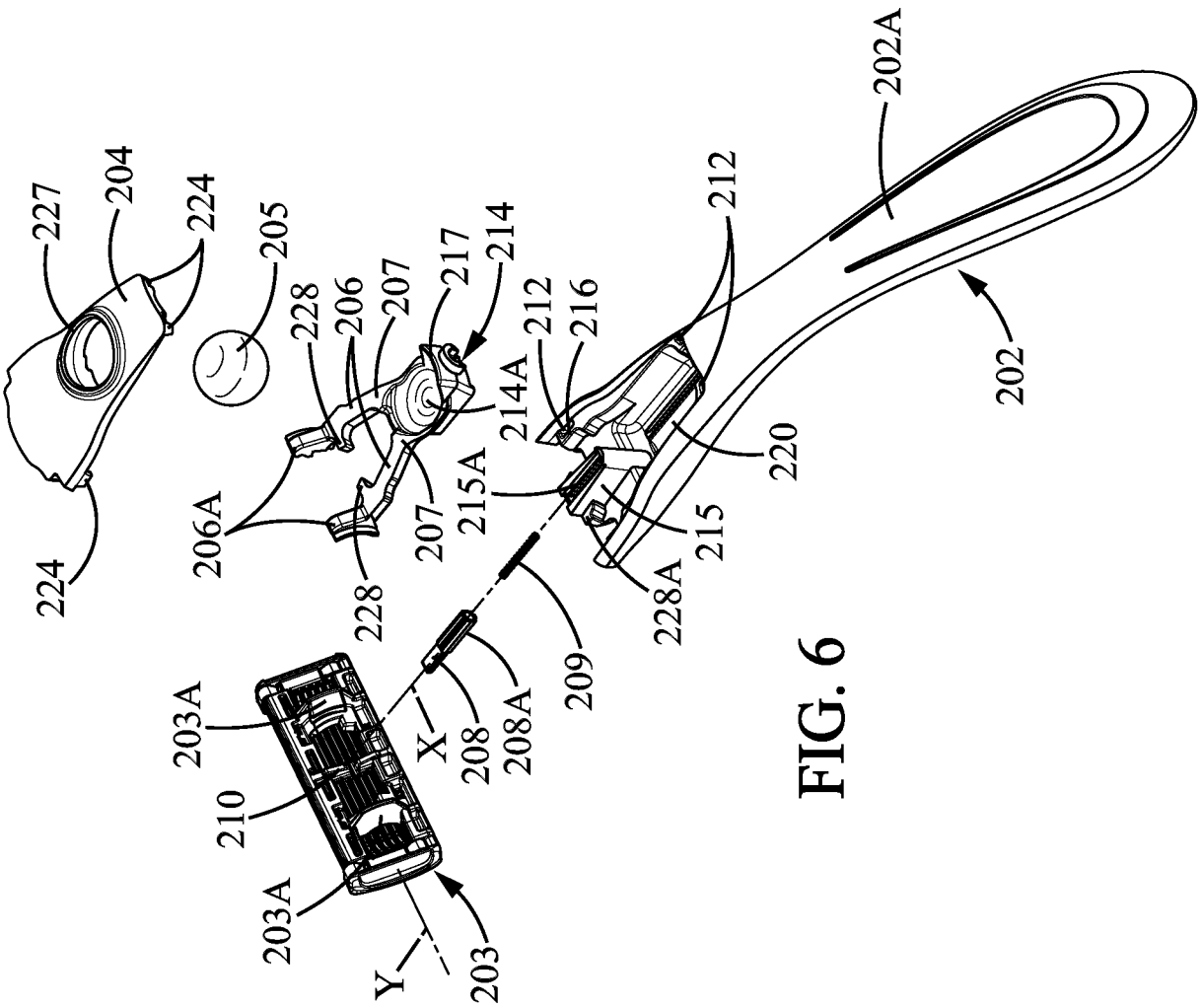

202A
227
204
224
205
228
206
207
217
214
212
216
214A
212
202
206A
207
215A
220
224
228
215
228A
209
203A
X
208
208A
210
203A
Y
203

FIG. 6

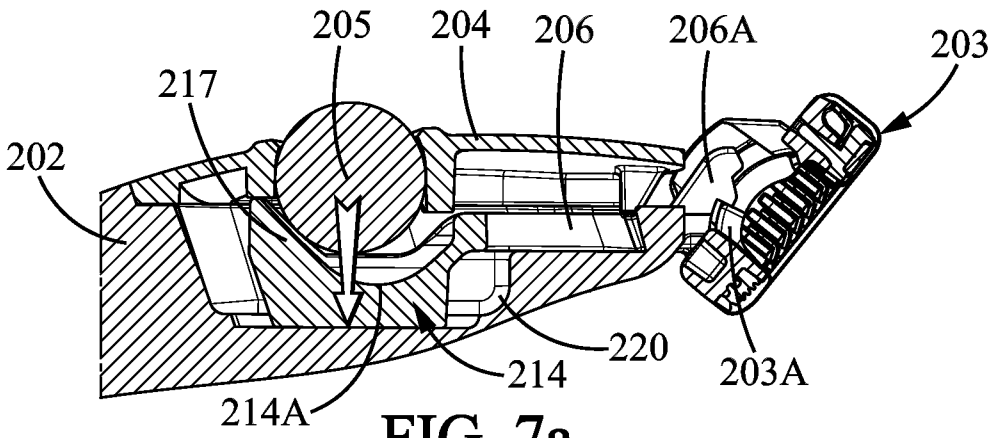


FIG. 7a

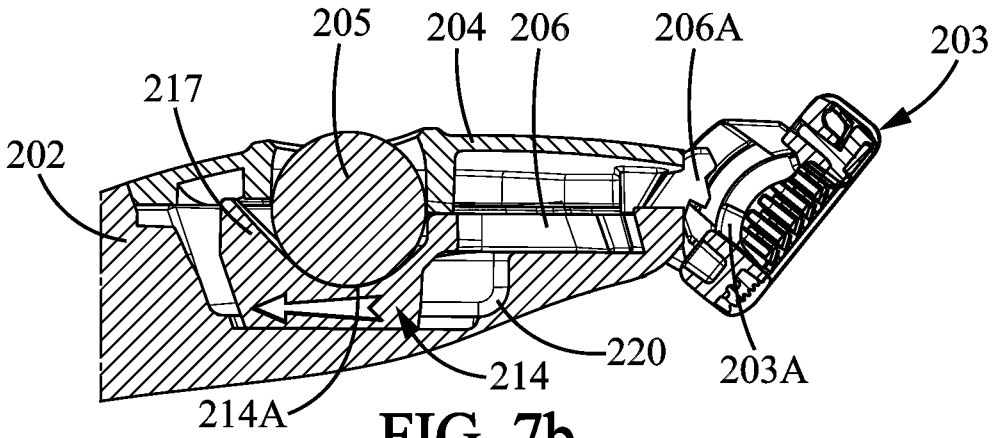


FIG. 7b

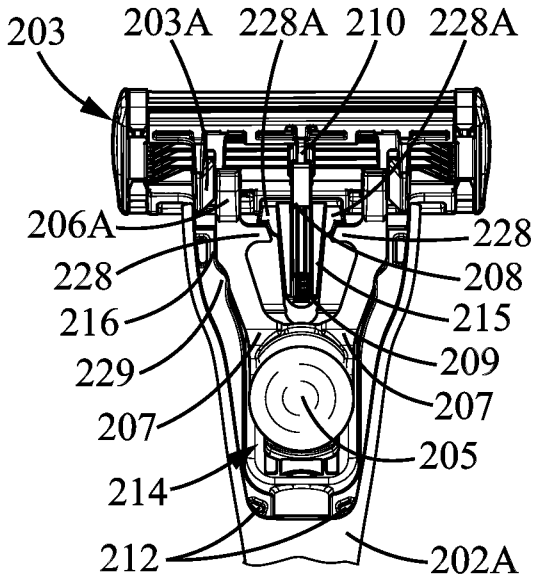


FIG. 8a

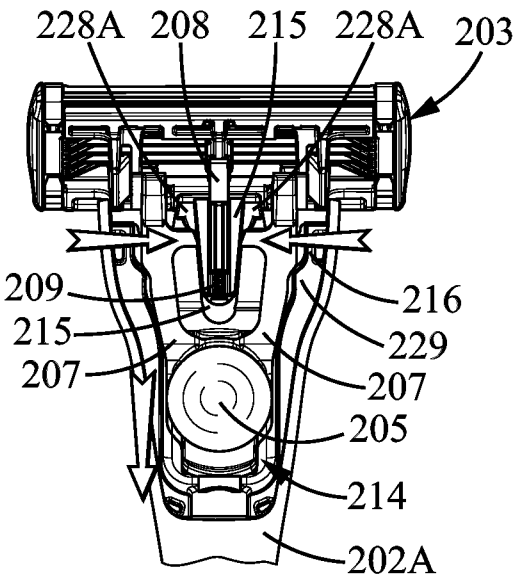


FIG. 8b

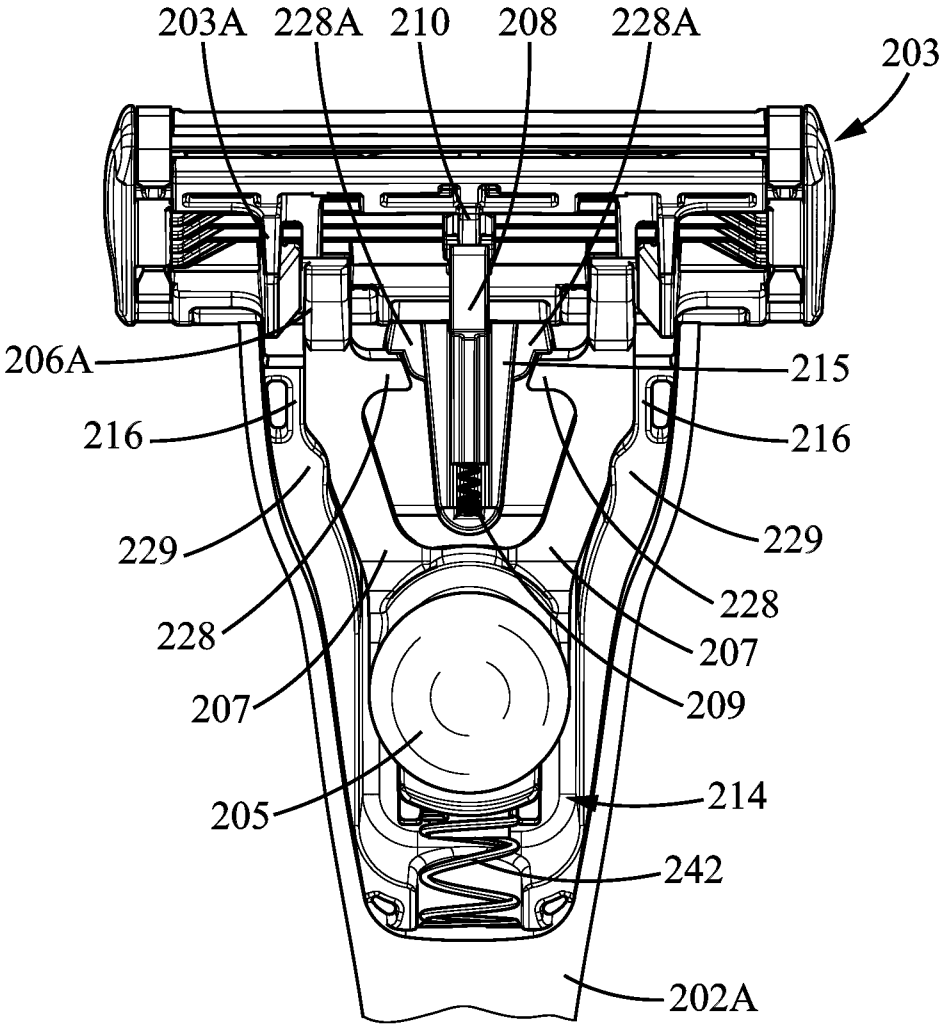
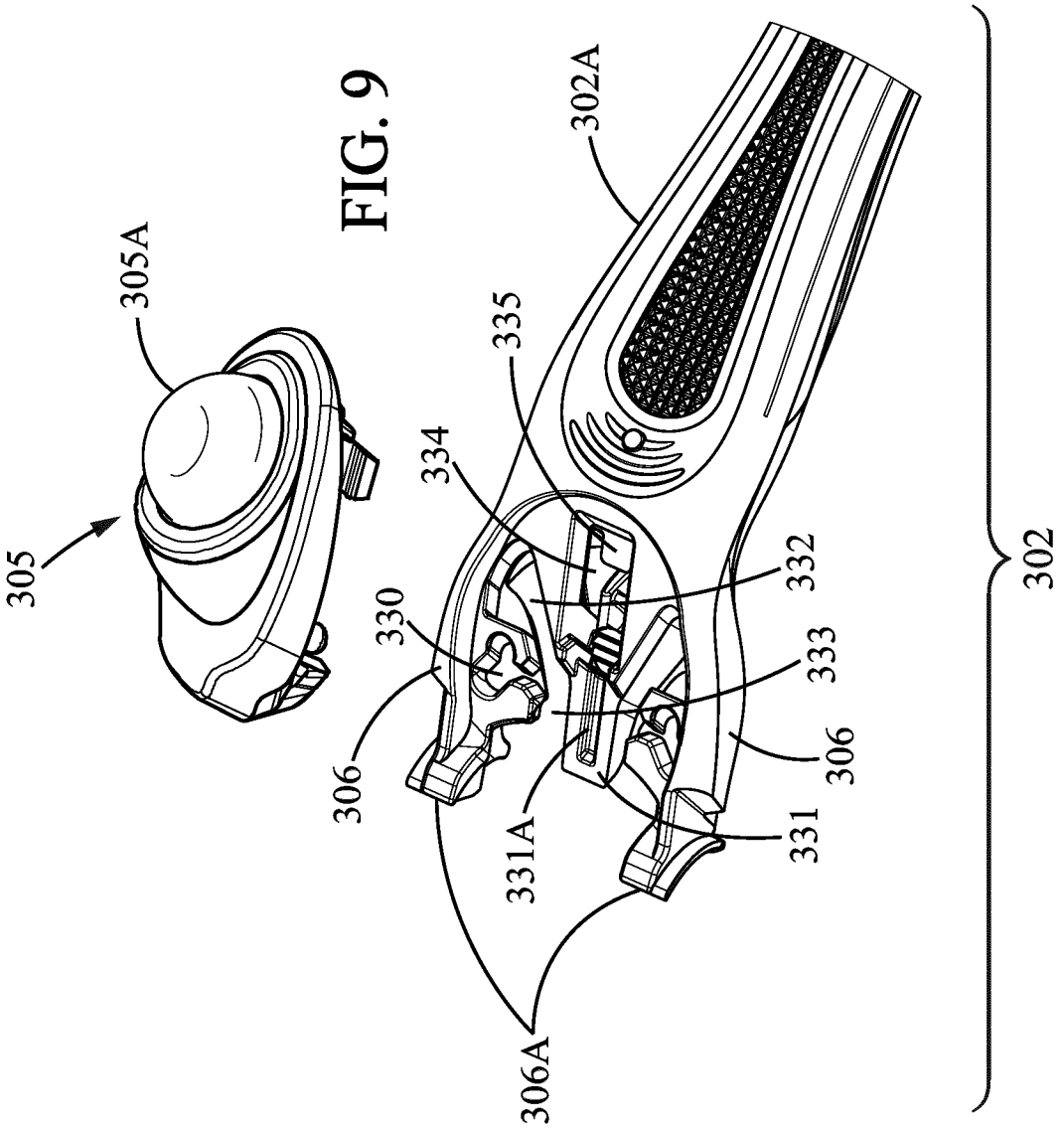

203A
228A
210
208
228A
203
206A
215
216
216
229
229
228
228
207
207
209
205
214
242
202A

FIG. 8c

FIG. 9



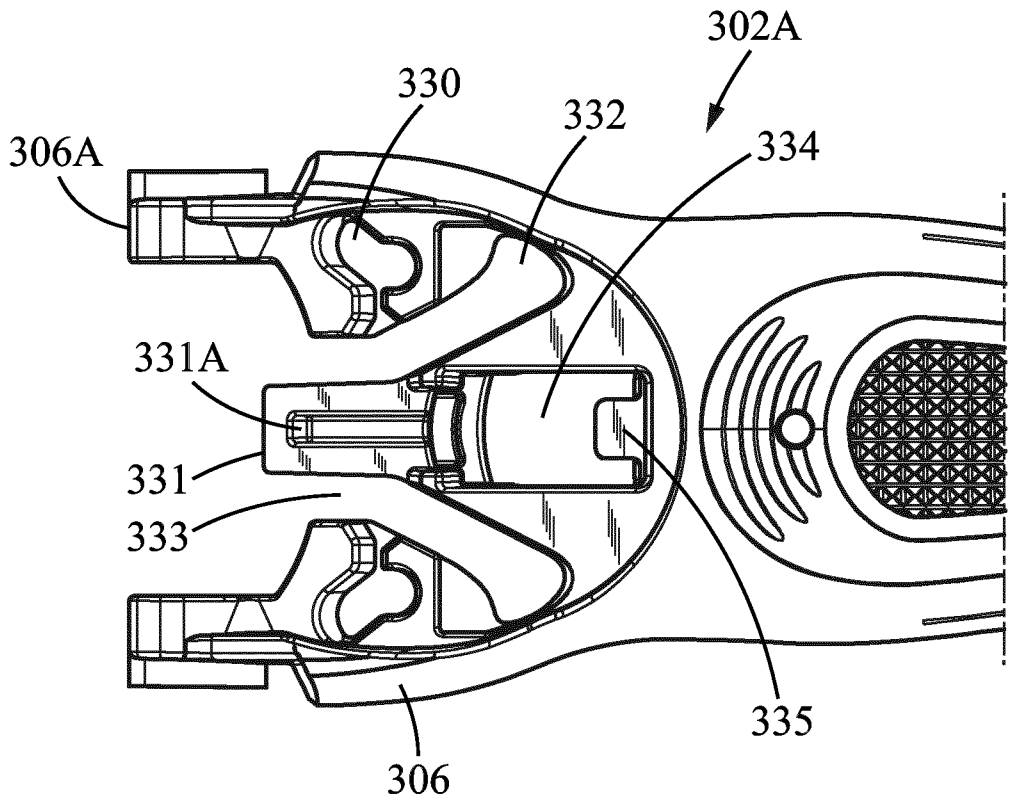

302A
330
332
334
306A
331A
331
333
335
306

FIG. 10

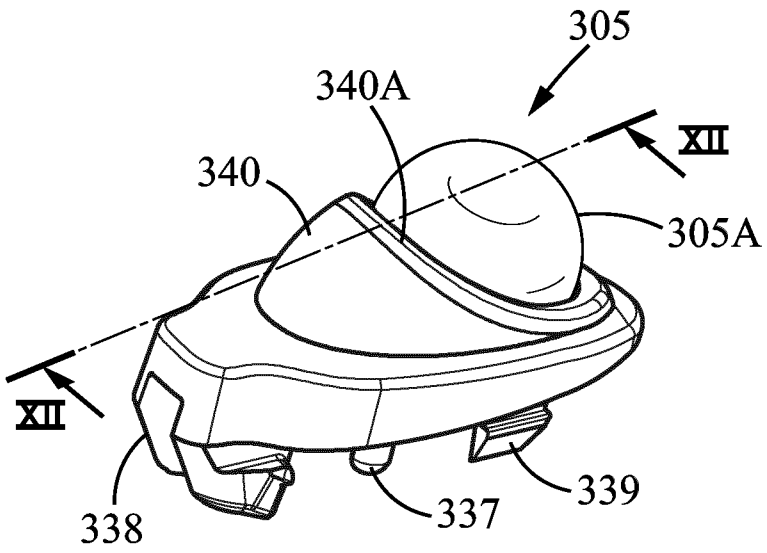

305
340A
XII
340
305A
XII
338
337
339

FIG. 11

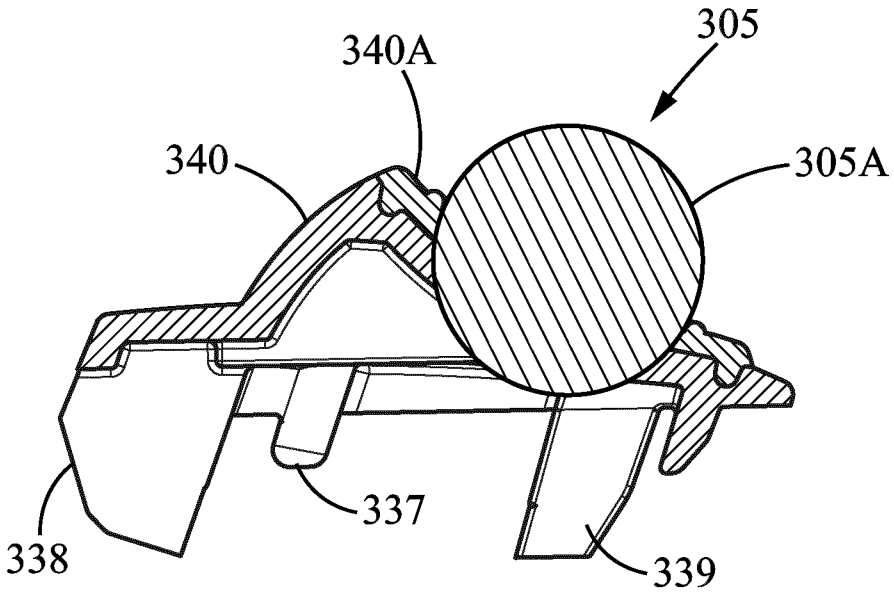


FIG. 12

FIG. 13

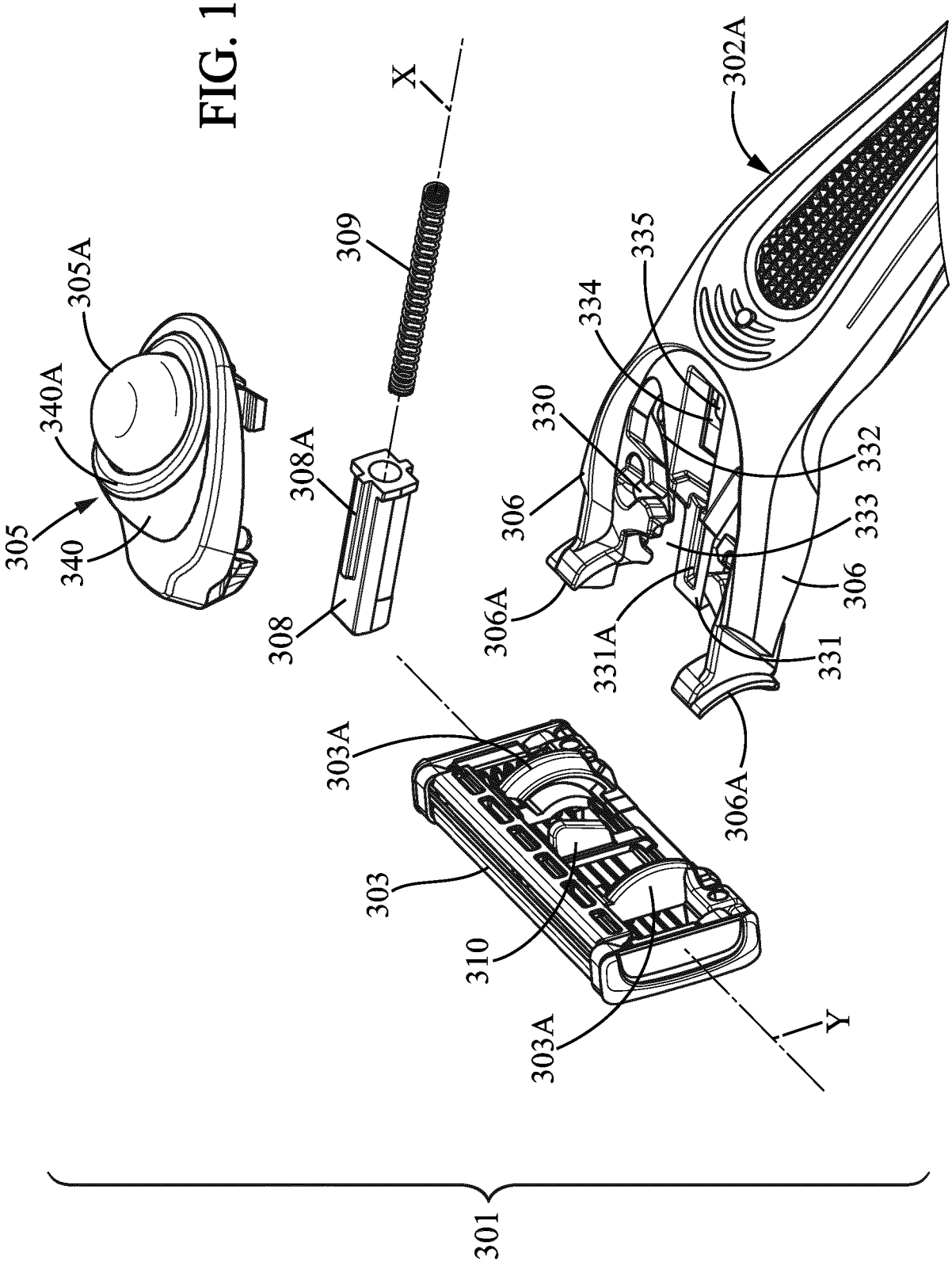

305A
340A
305
340
309
X
308A
308
302A
335
334
330
332
306
333
306
306A
331A
331
306A
303A
303
310
303A
Y
301

FIG. 14

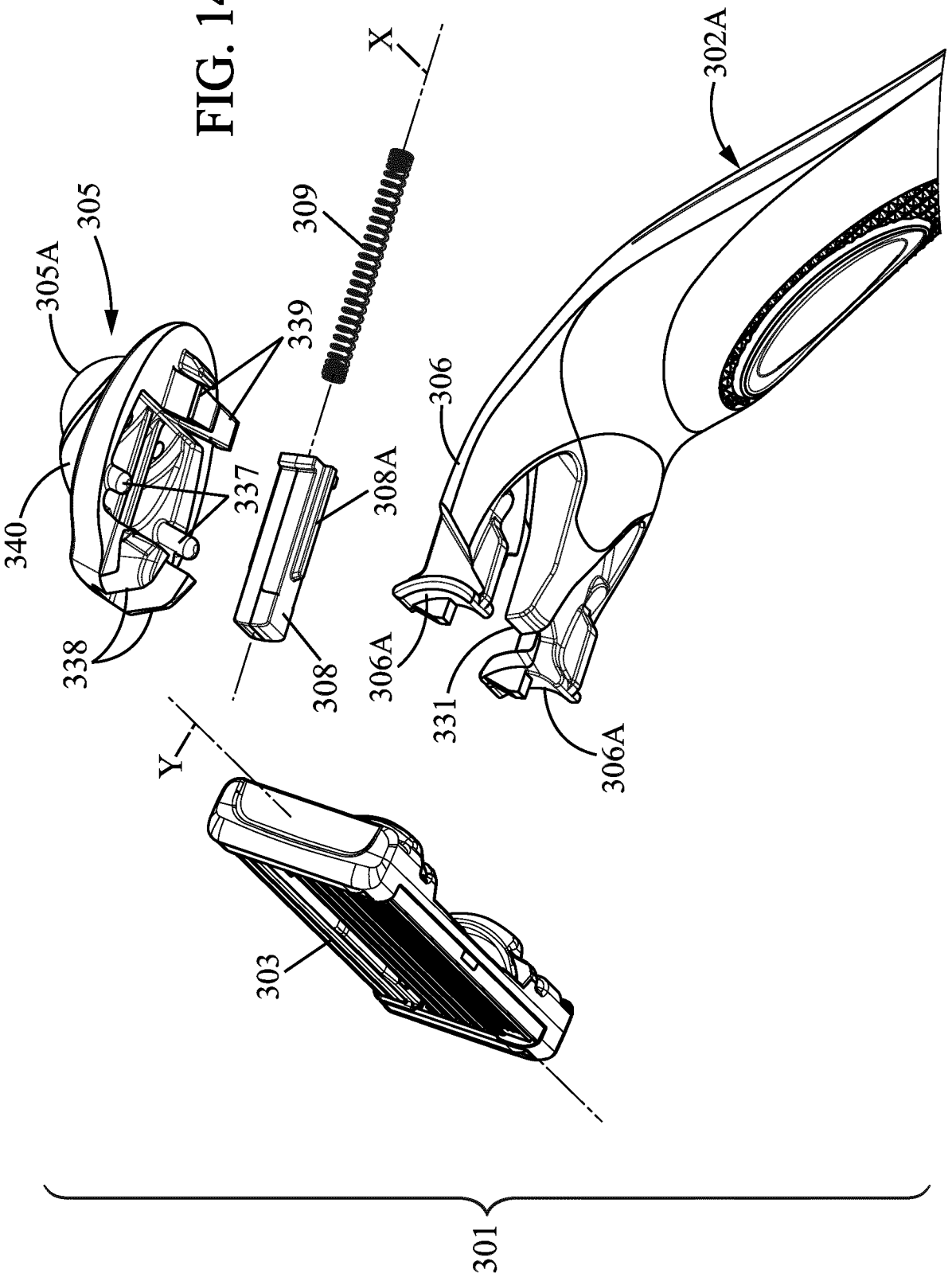
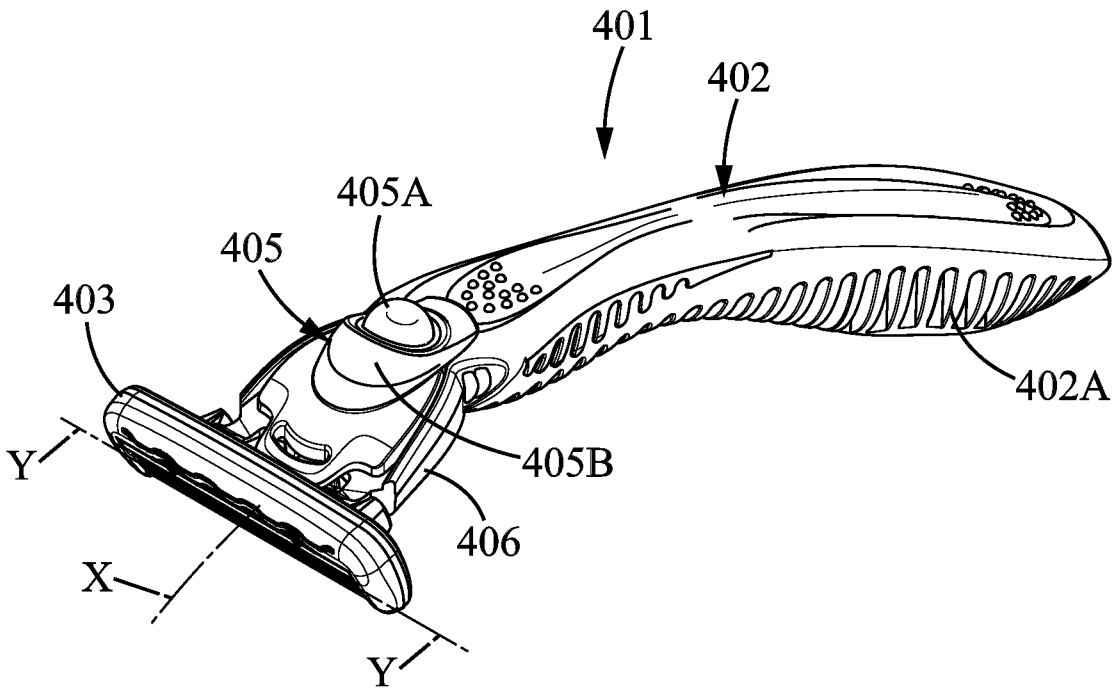

X
302A
305
305A
309
339
340
337
308A
306
338
308
306A
331
306A
Y
303
301

FIG. 15



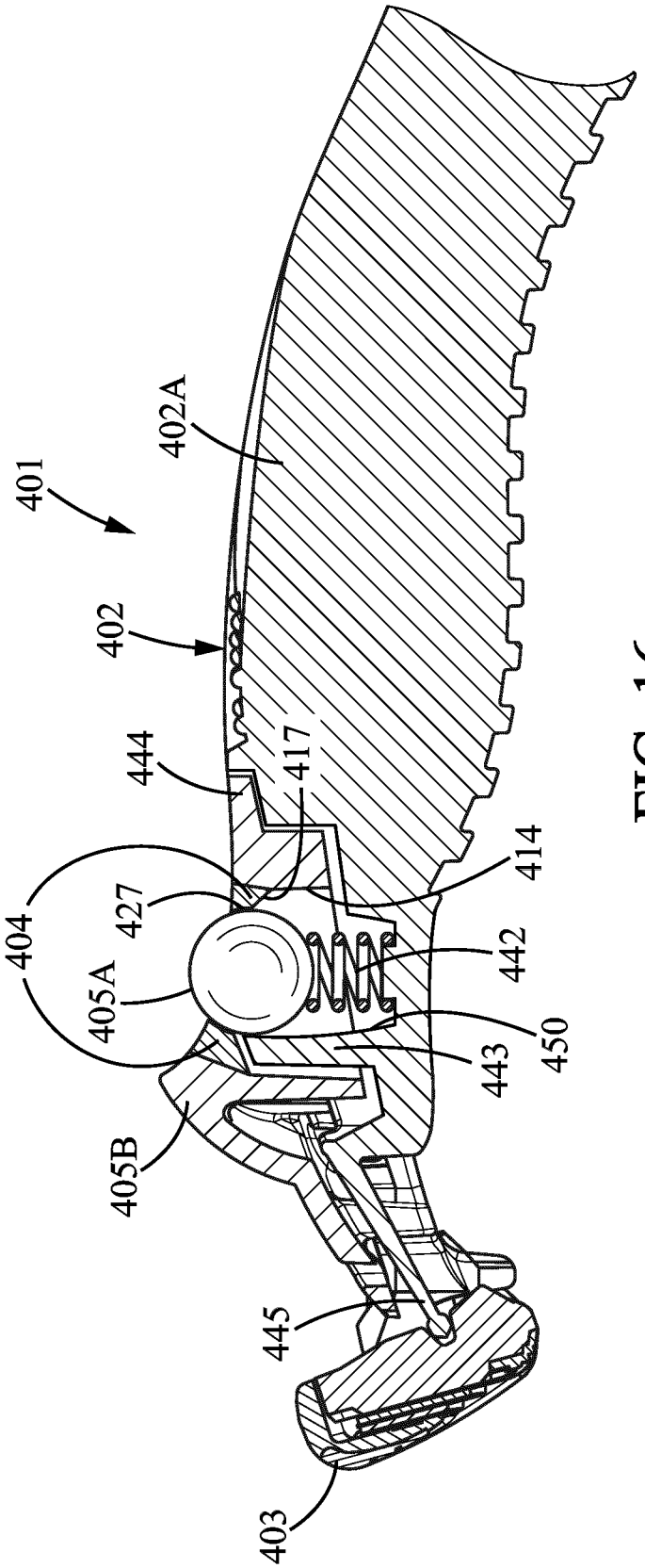


FIG. 16

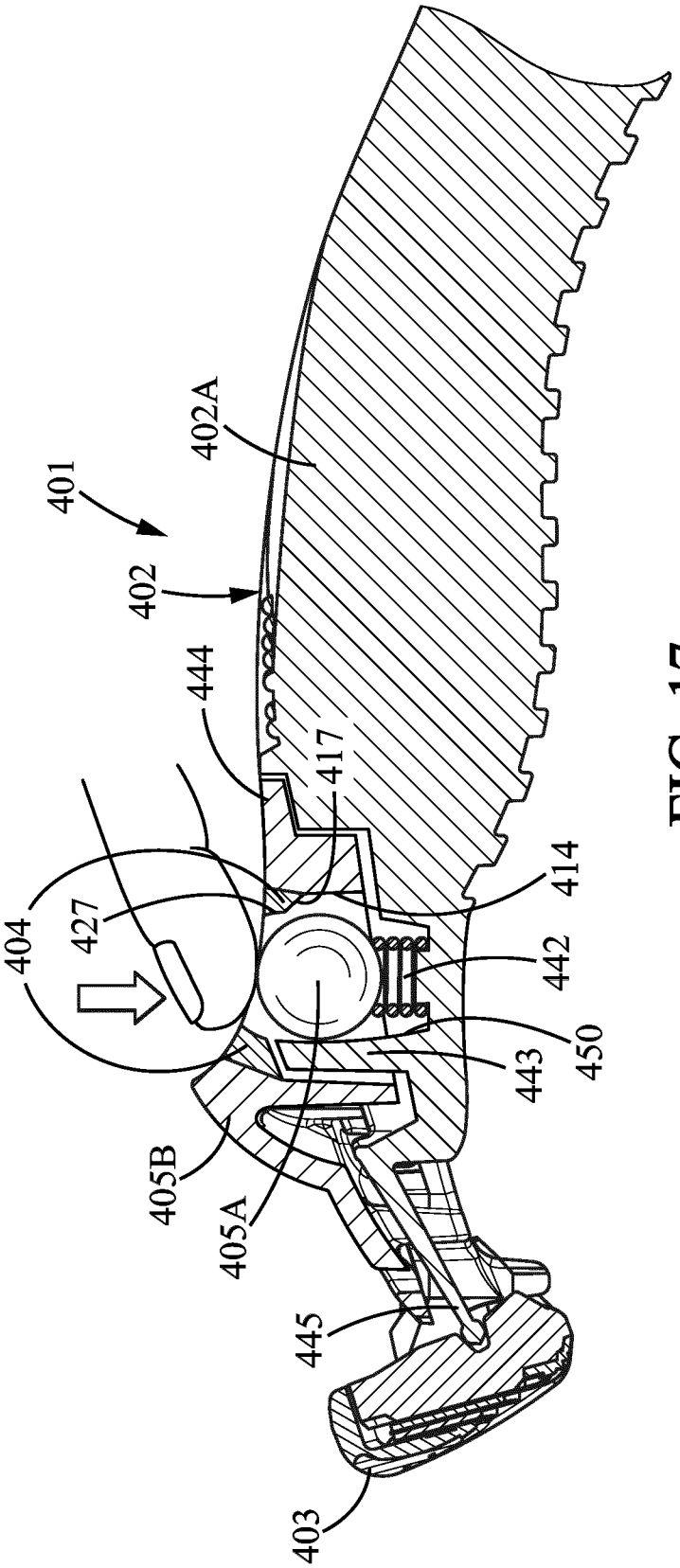


FIG. 17

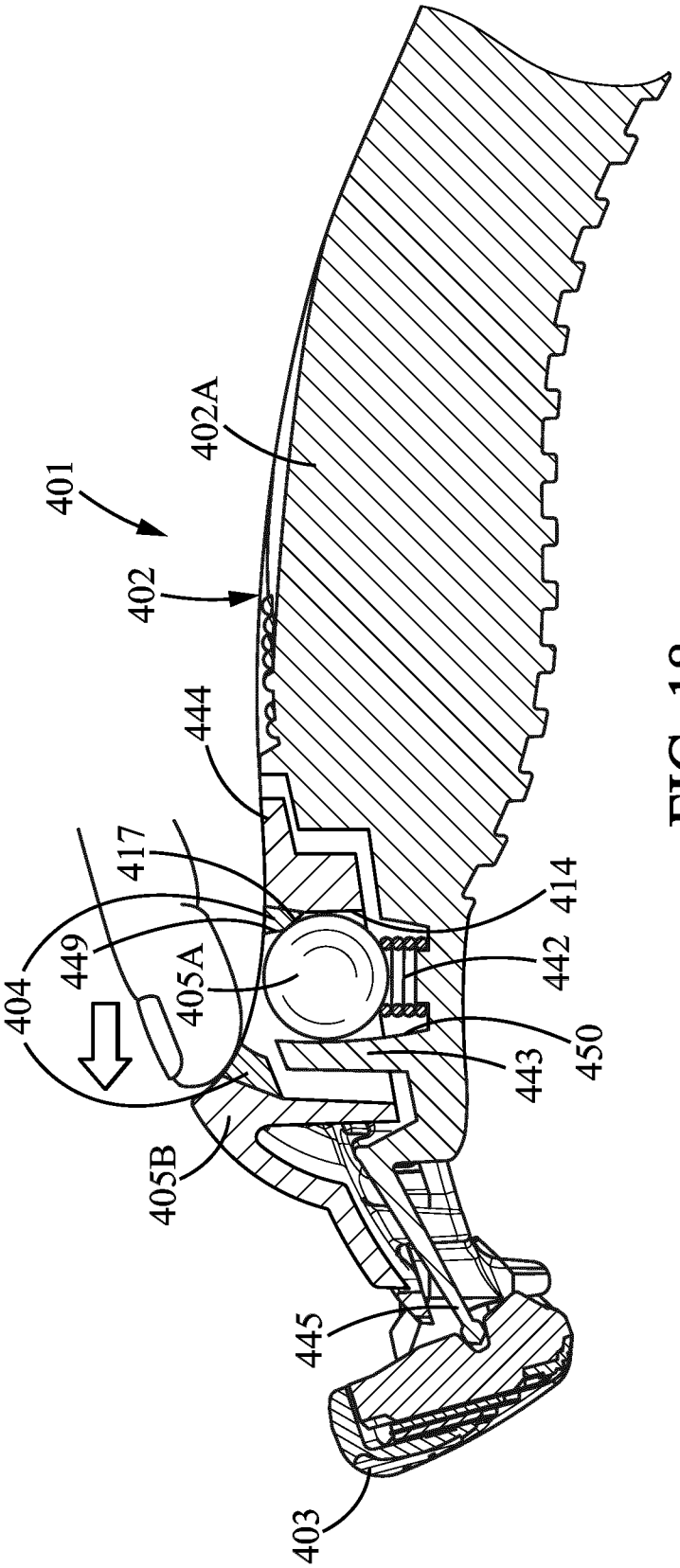


FIG. 18

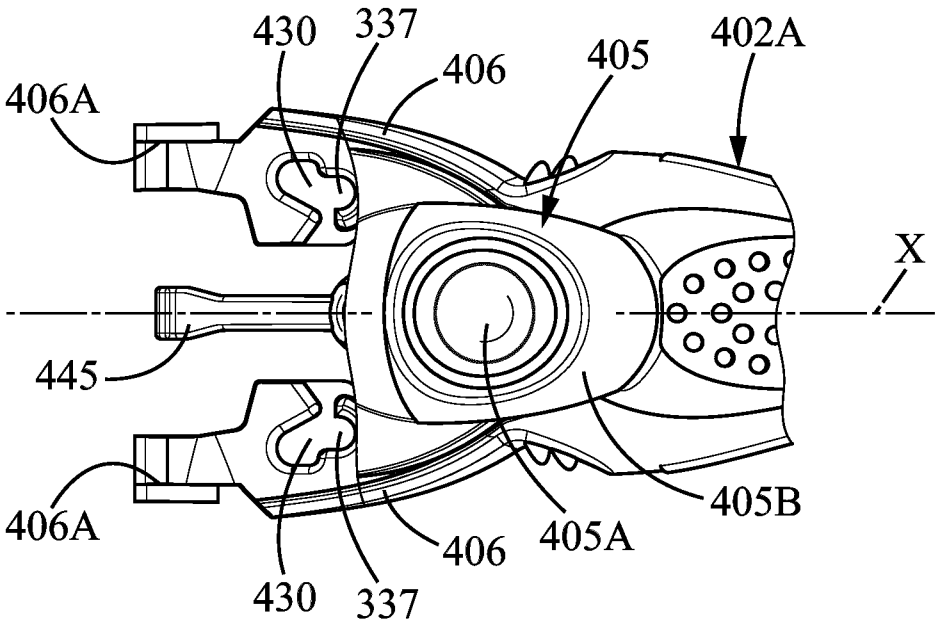

430
337
406
405
402A
406A
X
445
406A
406
405A
405B
430
337

FIG. 19

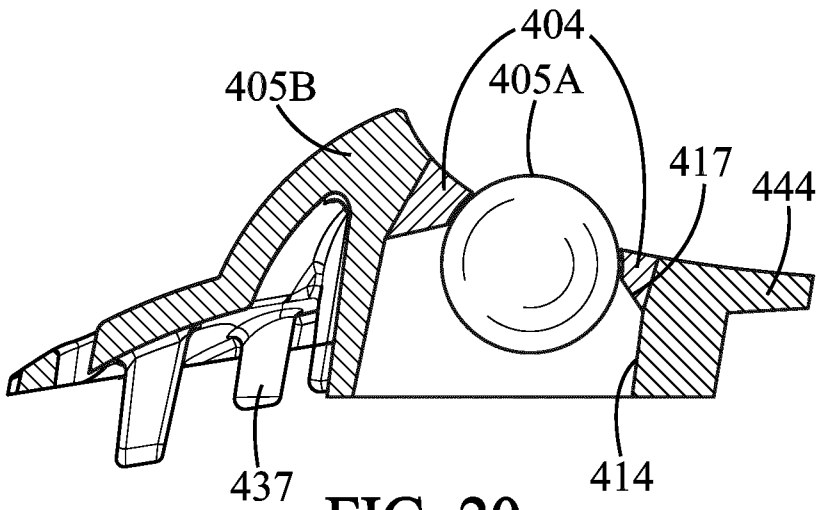

404
405B
405A
417
444
437
414

FIG. 20

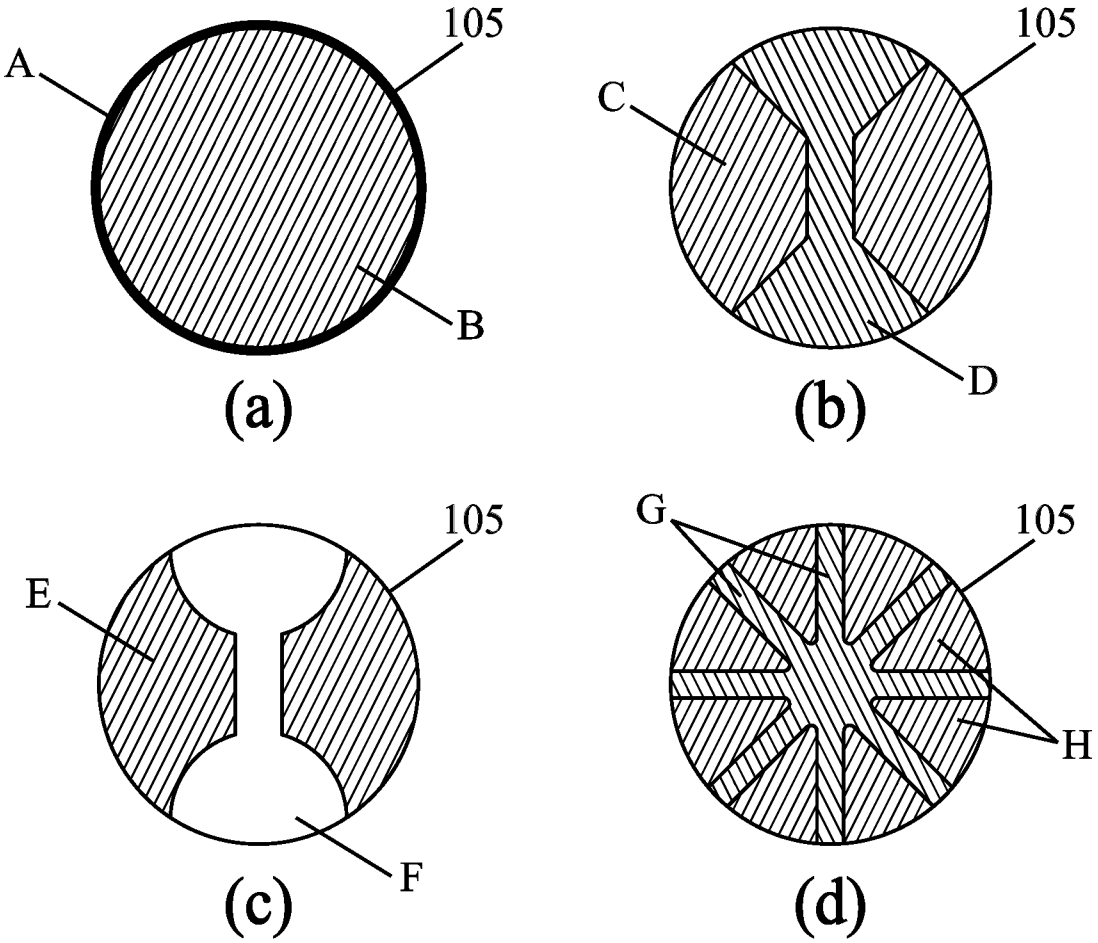
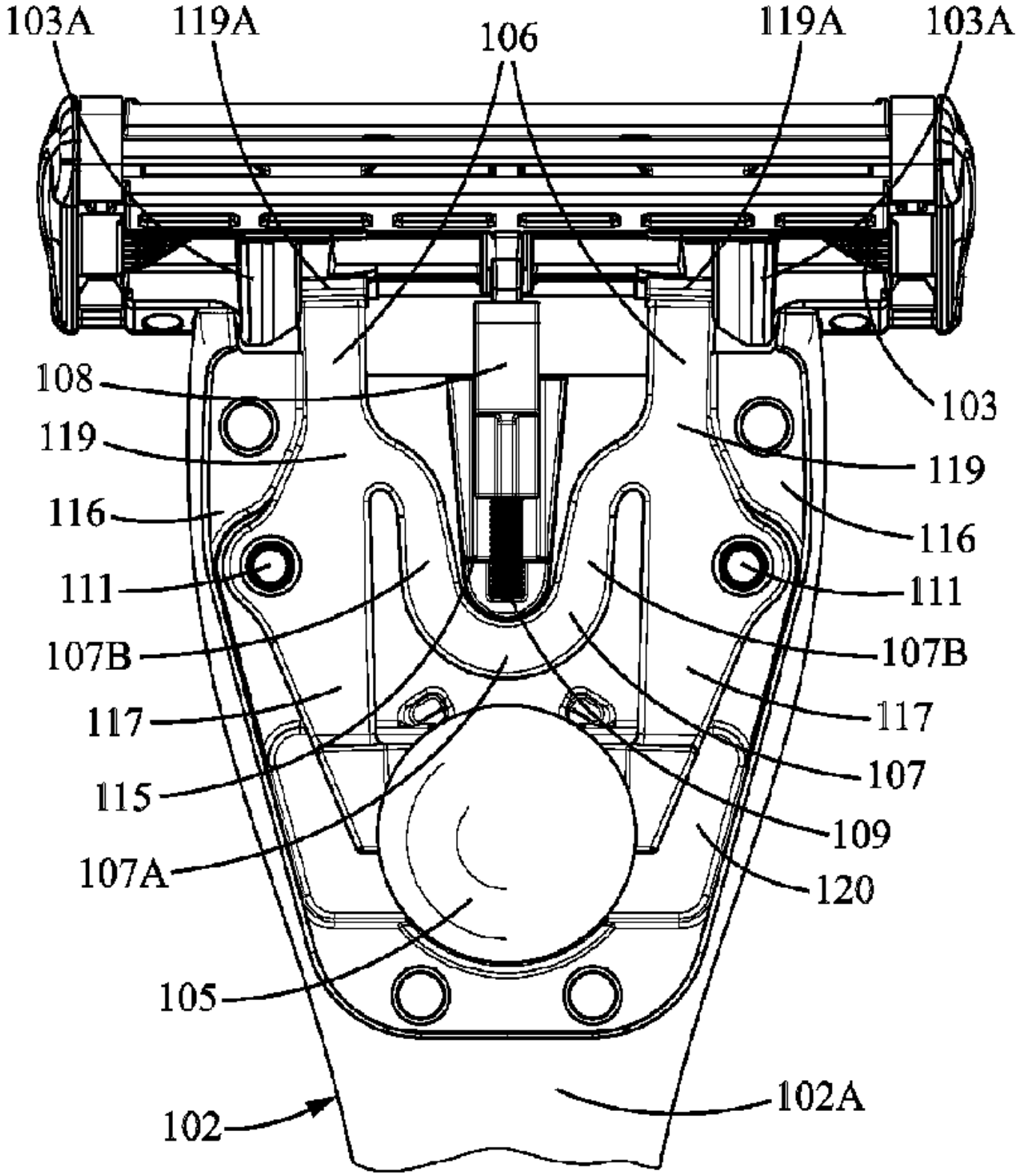


FIG. 21


103A
119A
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119A
103A
108
103
119
119
116
116
111
111
107B
107B
117
117
107
115
109
107A
120
105
102A
102