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(54) **A razor and a razor head**

(57) A razor (1) comprises a handle (2) including a drive means, a razor blade unit (7) which is movable with respect to the handle (2) and which is provided with at least a razor blade (8) including a cutting edge (9), and a transmission through which the drive means drives the razor blade unit (7). The transmission is adapted such that said cutting edge (9) is moved reciprocatingly in transverse direction of itself under operating conditions.

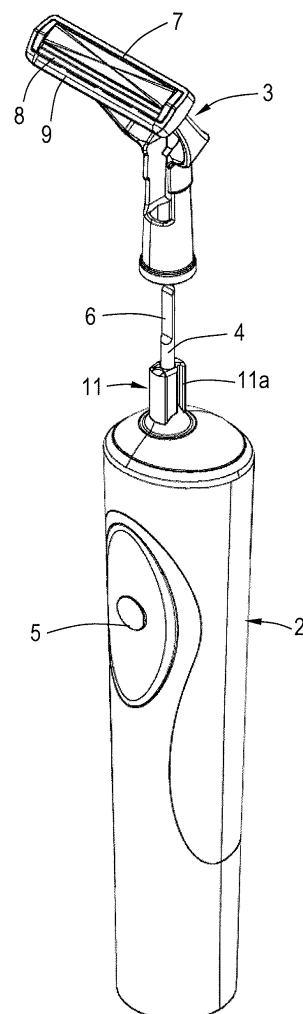


Fig.2

Description

[0001] The present invention relates to a razor, which comprises a handle including a drive means, a razor blade unit which is movable with respect to the handle and which is provided with at least a razor blade including a cutting edge, and a transmission through which the drive means drives the razor blade unit.

[0002] Such razors are known, for example devices as described in WO 2005/105395 and US 5,007,169. The known razors comprise transmissions for transferring a rotational motion of an output shaft of an electric motor to a vibration of the razor blade unit. Furthermore, shavers are known in which an eccentric weight is attached to a drive shaft of an electric motor. This causes vibration of the body of the shaver and an attached shaving head. An example of such a device is described in US 5,261,430. However, the resulting motion of the shaving head provides a significant risk of cutting into the skin. Besides, vibration of the entire shaver gives an unpleasant feeling to the user.

[0003] It is an object of the present invention to provide a razor which improves the shaving performance.

[0004] This is achieved by the razor according to the invention of which the transmission is adapted such that the cutting edge is moved reciprocatingly in transverse direction of itself under operating conditions.

[0005] This means that under operating conditions the cutting edge is oscillated back and forth such that it may follow substantially the same path in opposite directions. Since the cutting edge is moved in transverse direction of itself, cutting into the skin due to moving the cutting edge in longitudinal direction of itself can be minimized or limited. More specifically, the cutting edge may move only substantially perpendicular to itself. The razor according to the invention has the advantage that the oscillating cutting edge of the razor blade matches with the movement of a shaving head along the skin as used in practice in case of wet shaving. If the razor blade has a flat shape the direction of movement of the cutting edge may lie more or less within the plane of the razor blade and/or the skin, when in use. Preferably, the angle between the direction of movement of the cutting edge and the plane of the razor blade is small. Correspondingly, in use the angle between the plane of the razor blade and the skin may be small, for example between 10 and 20°, but a smaller or larger angle is conceivable.

[0006] In a practical embodiment the drive means comprises an electric motor having a drive shaft as power output and the transmission is adapted for transferring a rotational movement of the drive shaft to a reciprocating movement of the razor blade unit. This may be achieved by an eccentric on the drive shaft. More specifically, the transmission may further comprise a lever which is pivotally mounted to the handle about a pivoting axis and drivable by the eccentric.

[0007] The lever may comprise a driven part extending between the pivoting axis and the razor blade unit, and

a drive part that contacts the eccentric and is located at the opposite side of the pivoting axis with respect to the driven part.

[0008] In a preferred embodiment the centre line of the driven part is angled with respect to the centre line of the drive shaft. In practice the electric motor may be elongated and the centre line of the handle may extend more or less parallel to the centre line of the drive shaft. Due to the angled orientation of the driven part the razor can be designed ergonomically; for example, the user can hold the handle in upward orientation whereas the driven part is directed to the skin.

[0009] The lever may be pivotally mounted to the handle through a housing which is releasably fitted to the handle. This means that the housing, the lever and the razor blade unit together can be removed from the handle. The housing, the lever and the razor blade can comprise a razor head as a single unit. The razor head may be replaced entirely in case of a worn razor blade or transmission, for example. It is noted that the position of the lever with respect to the housing is such that the eccentric is able to drive the lever when the housing is fitted to the handle. The handle comprising the drive means may be used for different objects, for example for driving another personal care item such as a tooth brush.

[0010] It is also possible that the razor blade unit is replaceable instead or in addition to the razor head.

[0011] The lever and the drive shaft may comprise locking means for maintaining the mutual positions of the housing and the handle when the housing is fitted to the handle. This prevents the housing and the lever from undesired removal from the handle under operating conditions. In practice, the locking means may comprise a snap connection, which gives a safe feeling to the user because of the typical locking click. Of course, the housing may also be directly attached to the handle to achieve a locking condition between the housing and the handle. The housing and the handle may be provided with interlocking portions or keys to define particular relative orientation and/or prevent mutual rotation of the housing and the handle.

[0012] Preferably, the transmission comprises a resiliency in order to enable the user to limit the amplitude of the razor blade unit without damaging the transmission. In case of the lever the drive part may be flexible to form the resiliency. An additional advantage of the flexibility is that it provides the opportunity of integrating the function of a snap connection between the lever and the drive shaft as mentioned hereinbefore.

[0013] The invention is also related to a razor head, comprising a housing, a razor blade unit which is movable with respect to the housing and which is provided with at least a razor blade including a cutting edge, and an actuator for moving the razor blade unit, wherein the razor head is adapted such that said cutting edge is moved in transverse direction of itself upon operating the actuator.

[0014] The razor blade unit may be pivotable with respect to the housing about a pivoting axis.

[0015] The housing may be tubular and the actuator has an actuator contact location for moving the razor blade unit which actuator contact location is located inside the housing.

[0016] The actuator contact location may be provided with a wear indicator, for example a coating which wears during a certain period of contacting a driving object. This indicates the user to replace the razor head.

[0017] The razor head may be provided with features related to the razor as defined hereinbefore. For example, the razor head may comprise a resilient actuator which provides the opportunity to design different razor heads which have different resiliencies. The razor head may be made as a single replaceable piece, or the razor blade unit and/or the blade may be replaceable. The razor head may comprise a disposable and/or may comprise a biodegradable plastic, for example the razor head may be manufactured by means of injection moulding.

[0018] The razor head may be made of different materials. Particularly, the material at the actuator contact location may be relatively highly wear-resistant in case of being contacted by an eccentric under operating conditions. Furthermore, using materials of different colours and or textures for aesthetic reasons of fo improving grip to a particular portion is conceivable.

[0019] It is noted that the pivoting axis may be substantially parallel to the cutting edge of the razor blade. In case of the razor it may also extend substantially perpendicularly to the centre line of the handle.

[0020] Preferably the razor head fits to a handle for driving another personal care item, for example an electrical toothbrush, since this provides the opportunity to use a universal handle for both the personal care item, e.g. the toothbrush head, and the razor head.

[0021] The razor head may be sold as a separate unit; it is also possible to sell an assembly of a razor head for receiving a razor blade unit, and a razor blade unit. Furthermore, an assembly of a handle including a drive means and a razor head which fits to and can be driven by the handle can be sold.

[0022] The invention will hereafter be elucidated with reference to the very schematic drawings showing an embodiment of the invention by way of example.

Fig. 1 is a perspective front view of an embodiment of a razor according to the invention.

Fig. 2 is a similar view as Fig. 1 showing a disassembled condition of the razor.

Fig. 3 is a similar view as Fig. 2 showing the razor in cross-section.

Fig. 4 is an enlarged view of a part of the embodiment of Figs. 1-3, as seen from the back side.

Fig. 5 is a similar view as Fig. 4 showing the embodiment in cross-section.

Fig. 6 is a perspective cross-sectional view of a part of the embodiment of Fig. 1.

[0023] Fig. 1 shows an embodiment of a razor 1 ac-

cording to the invention in assembled condition. Fig. 2 shows the embodiment of the razor 1 in disassembled condition and Fig. 3 shows a cross-sectional view thereof. The razor 1 is suitable for wet shaving. It comprises a handle 2 and a razor head 3.

[0024] The handle 2 is provided with an electric motor (not shown) and a power source such as a possibly rechargeable battery (not shown). The electric motor and the power source are elongated and the centre lines thereof are in similar direction as the centre line of the handle 2 and may coincide in practice. The power output of the electric motor is a drive shaft 4. The electric motor can be activated by a switch 5 on the handle 2. The drive shaft 4 comprises an eccentric 6 which is a flattened end portion of the cylindrical drive shaft 4 in this embodiment. Such a handle 2 may be multi-functional; for example it may drive a toothbrush head if this replaces the razor head 3.

[0025] Figs. 4 and 5 show the razor head 3 from the back side. The razor head 3 comprises a razor blade unit 7 which is provided with a plurality of razor blades 8. Each of the razor blades has a cutting edge 9. The razor head 3 comprises a housing 10 which can be fitted to the handle 2. In this embodiment, the housing 10 is tubular and has a tapered inner wall which fits to a tapered outer wall of an end portion 11 of the handle 2. The end portion 11 partly surrounds the drive shaft 4. The eccentric 6 protrudes from the end portion 11. In practice the housing 10 will be a rigid part which is made from a plastic. The housing 10 and the end portion 11 may have matching interlocking means or keys to prevent relative rotation. In the embodiment as shown in Figs. 2 and 5 the interlocking keys comprise a longitudinal ribs 10a at the inner wall of the housing 10 and corresponding grooves 11a in the end portion 11 which fit to each other.

[0026] The razor blade unit 7 is pivotable with respect to the housing 10 about a pivoting axis P. In the embodiment as shown the pivot is formed by a flexible portion of the razor head 3 at an elbow 12. The razor head 3 is also provided with an actuator 13 which has an actuator contact location 14 close to a free end of the actuator 13. The actuator 13 is attached to the razor blade unit 7 and when the actuator 13 is displaced at the actuator contact location 14 the razor blade unit 7 is pivoted with respect to the housing 10 about the pivoting axis P. As a result the cutting edges 9 of the razor blades 8 are moved substantially in perpendicular direction to themselves.

[0027] It can be seen in Fig. 5 that the actuator contact location 14 is located inside the tubular housing 10. When the housing 10 is put onto the handle 2 the actuator contact location 14 will contact the eccentric 6 of the drive shaft 4. This means that parts which move with respect to each other under operating conditions are inside the housing 10 which provides a safe feeling to the user.

[0028] Fig. 6 shows a part of the razor 1 in assembled condition. The actuator 13 of the razor head 3 is now part of a transmission for transferring a rotational movement of the drive shaft 4 to a reciprocating movement of the

razor blade unit 7 such that the cutting edges 9 move in transverse direction of themselves under operating conditions. In this embodiment the transmission comprises the eccentric 6 on the drive shaft 4 and the actuator 13. The actuator 13 comprises a lever which is pivotally mounted to the handle 2 through the housing 10. As described hereinbefore the pivoting axis P is located at the elbow 12. The pivoting axis extends substantially perpendicular with respect to the centre line of the handle 2. The lever or actuator 13 is provided with a driven part 15 and a drive part 16. The driven part 15 extends between the pivoting axis P and the razor blade unit 7, whereas the drive part 16 is located at the opposite side of the pivoting axis P. The actuator contact location 17 of the drive part 16 contacts the eccentric 14 under operating conditions.

[0029] Fig. 6 shows that the centre line of the driven part 15 is angled with respect to the centre line of the drive shaft 4, whereas the centre lines of the drive part 16 and the drive shaft 4 extend in similar direction.

[0030] The drive shaft 4 may rotate entirely or oscillate about its centre line. Upon rotational motion of the eccentric 6 the drive part 16 will be moved in radial direction of the drive shaft 4. As a consequence, the driven part 15 including the razor blade unit 7 will be pivoted about the pivoting axis P. The contact between the eccentric 6 and the drive part 16 may be maintained by means of a resiliency in the transmission. The resiliency may be fully or partly created by the elbow 12. In the embodiment as shown the drive part 16 is a flexible portion of the actuator 3 to form at least a part of the resiliency of the transmission.

[0031] The drive part 15 is provided with a protrusion 17 which fits in a corresponding recess in the drive shaft 4. Due to the flexibility of the drive part 16 the protrusion 17 and the recess form a snap connection for maintaining the mutual positions of the housing 10 and the handle 2 when the housing 10 is fitted to the handle 2. Of course, the housing 10 itself may also be fixed to the handle 2, for example by clamping the housing 10 on the end portion 11, or by alternative fixing means.

[0032] The driven part 15 is provided with a surface portion that comprises ribs. Under operating conditions the user may press a finger on the surface portion in order to affect the motion amplitude of the razor blade unit 7. Alternative friction-creating materials may be used instead of ribs. A certain degree of friction may be desired if the razor head 3 becomes wet under operating conditions.

[0033] During wet shaving a user normally moves the razor blade unit 7 in a direction substantially perpendicular to the cutting edges 9 along the skin. The razor blade unit 7 of the razor 1 more or less oscillates in the same direction. It will be clear that the razor according to the invention provides a good shaving performance.

[0034] The invention is not limited to the embodiment shown in the drawings and described hereinbefore, which may be varied in different manners within the scope

of the claims and their technical equivalents. It is conceivable to apply an alternative transmission, which provides a sliding movement of the razor blade unit instead of a pivoting movement.

Claims

1. A razor (1), comprising a handle (2) including a drive means, a razor blade unit (7) being movable with respect to the handle (2) and provided with at least a razor blade (8) including a cutting edge (9), a transmission through which the drive means drives the razor blade unit (7), wherein the transmission is adapted such that said cutting edge (9) is moved reciprocatingly in transverse direction of itself under operating conditions.
2. A razor (1) according to claim 1, wherein the drive means comprises an electric motor having a drive shaft (4) and wherein the transmission is adapted for transferring a rotational movement of the drive shaft (4) to a reciprocating movement of the razor blade unit (7).
3. A razor (1) according to claim 2, wherein the transmission comprises an eccentric (6) on the drive shaft (4).
4. A razor (1) according to claim 3, wherein the transmission further comprises a lever (13) which is pivotally mounted to the handle (2) about a pivoting axis (P) and drivable by the eccentric (6).
5. A razor (1) according to claim 4, wherein the lever (13) comprises a driven part (15) extending between the pivoting axis (P) and the razor blade unit (7), and a drive part (16) that contacts the eccentric (6) and is located at the opposite side of the pivoting axis (P) with respect to the driven part (15).
6. A razor (1) according to claim 5, wherein the centre line of the driven part (16) is angled with respect to the centre line of the drive shaft (4).
7. A razor (1) according to one of the claims 4-6, wherein the lever (13) is pivotally mounted to the handle (2) through a housing (10) which is releasably fitted to the handle (2).
8. A razor (1) according to claim 7, wherein the lever (13) and the drive shaft (4) comprise locking means (17) for maintaining the mutual positions of the housing (10) and the handle (2) when the housing (10) is fitted to the handle (2).
9. A razor (1) according to one of the preceding claims, wherein the transmission comprises a resiliency.

10. A razor (1) according to claims 5 and 9, wherein the drive part (16) is flexible to form the resiliency.
11. A razor head (3), comprising a housing (10), a razor blade unit (7) which is movable with respect to the housing (10) and which is provided with at least a razor blade (8) including a cutting edge (9), and an actuator (13) for moving the razor blade unit (7), wherein the razor head (3) is adapted such that said cutting edge (9) is moved in transverse direction of itself upon operating the actuator (13).
12. A razor head (3) according to claim 11, wherein the razor blade unit (7) is pivotable with respect to the housing (10) about a pivoting axis (P).
13. A razor head (3) according to claim 12, wherein the housing (10) is tubular and the actuator (13) has an actuator contact location (14) for moving the razor blade unit (7) which actuator contact location (14) is located inside the housing (10).
14. A razor head (3) according to claim 13, wherein the actuator contact location (14) is provided with a wear indicator.
15. A razor head (3) according to one of the claims 11-14, which fits to a handle (1) for an electrical toothbrush.

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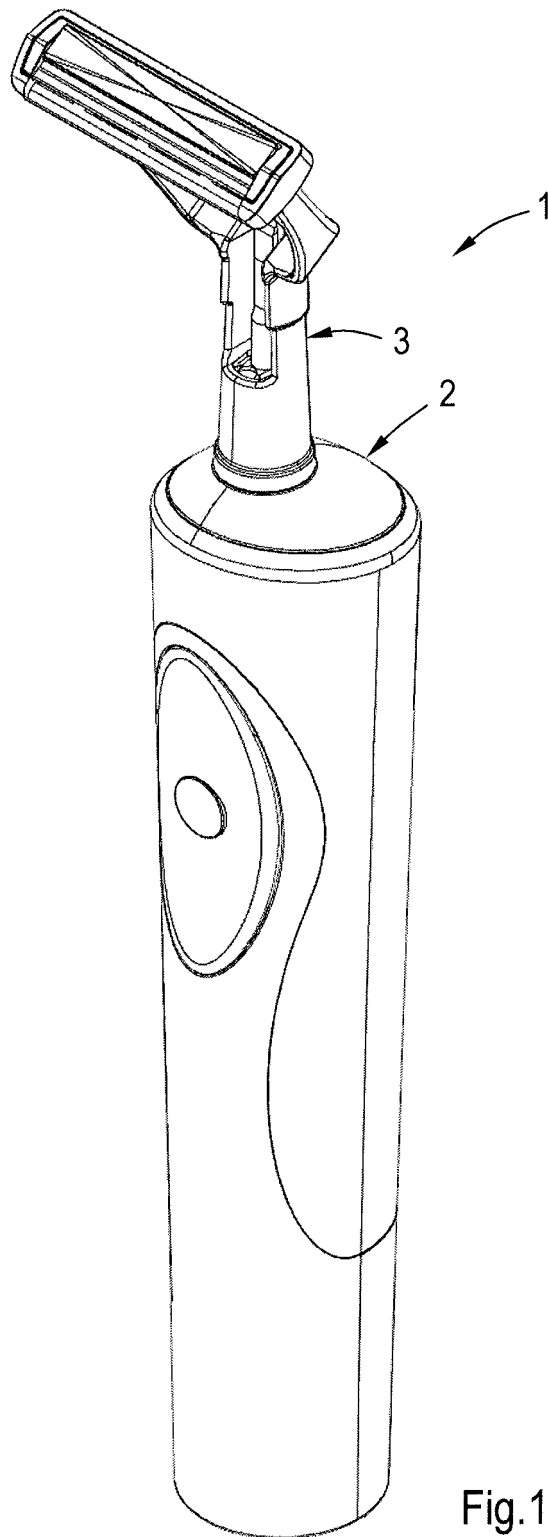


Fig.1

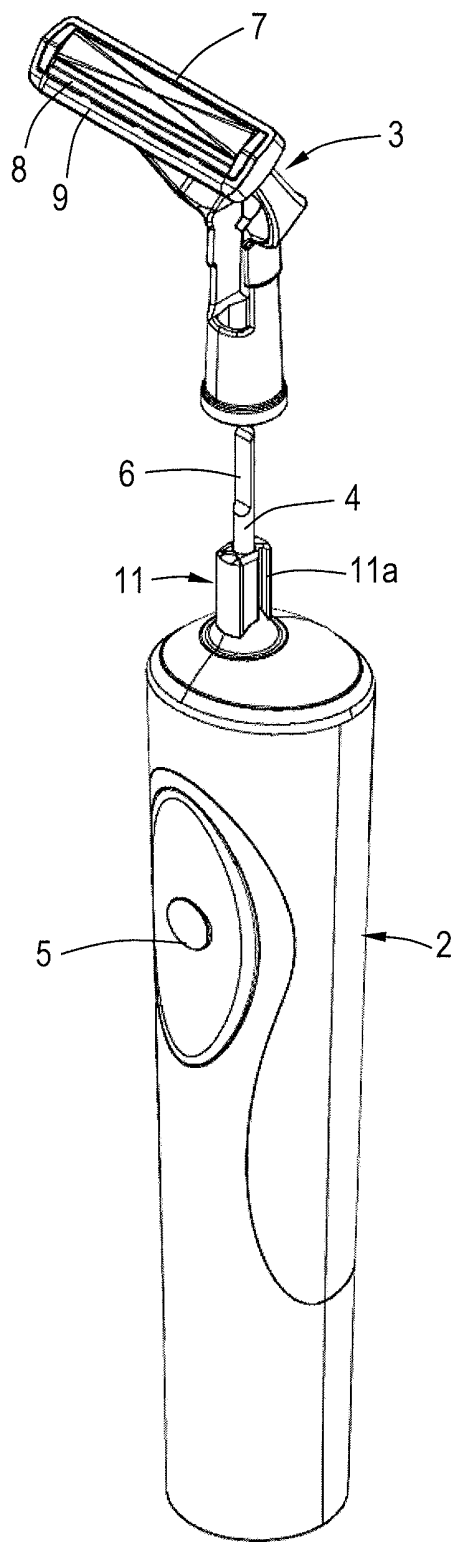


Fig.2

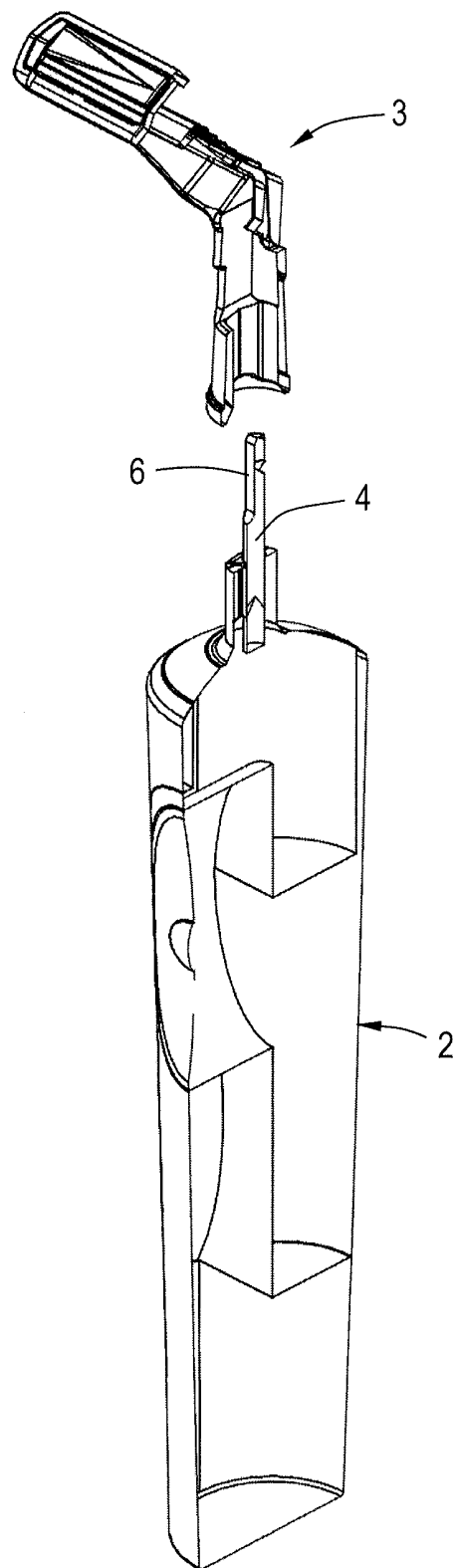


Fig.3

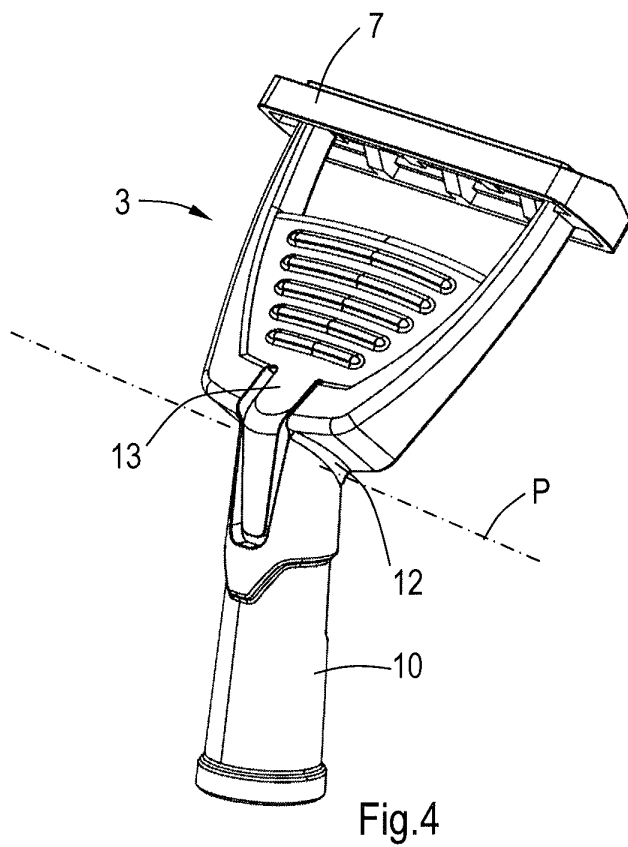


Fig.4

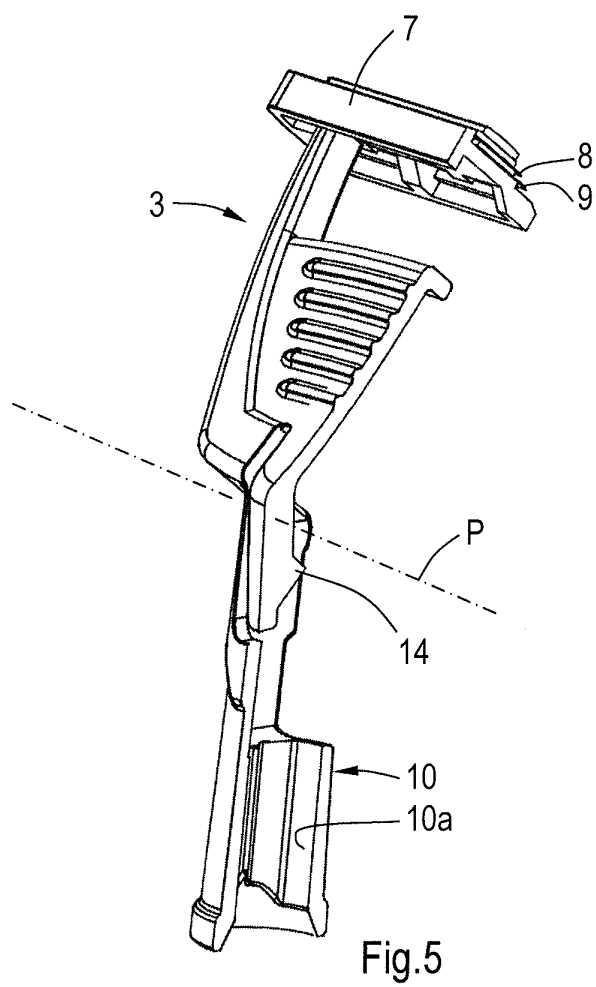


Fig.5

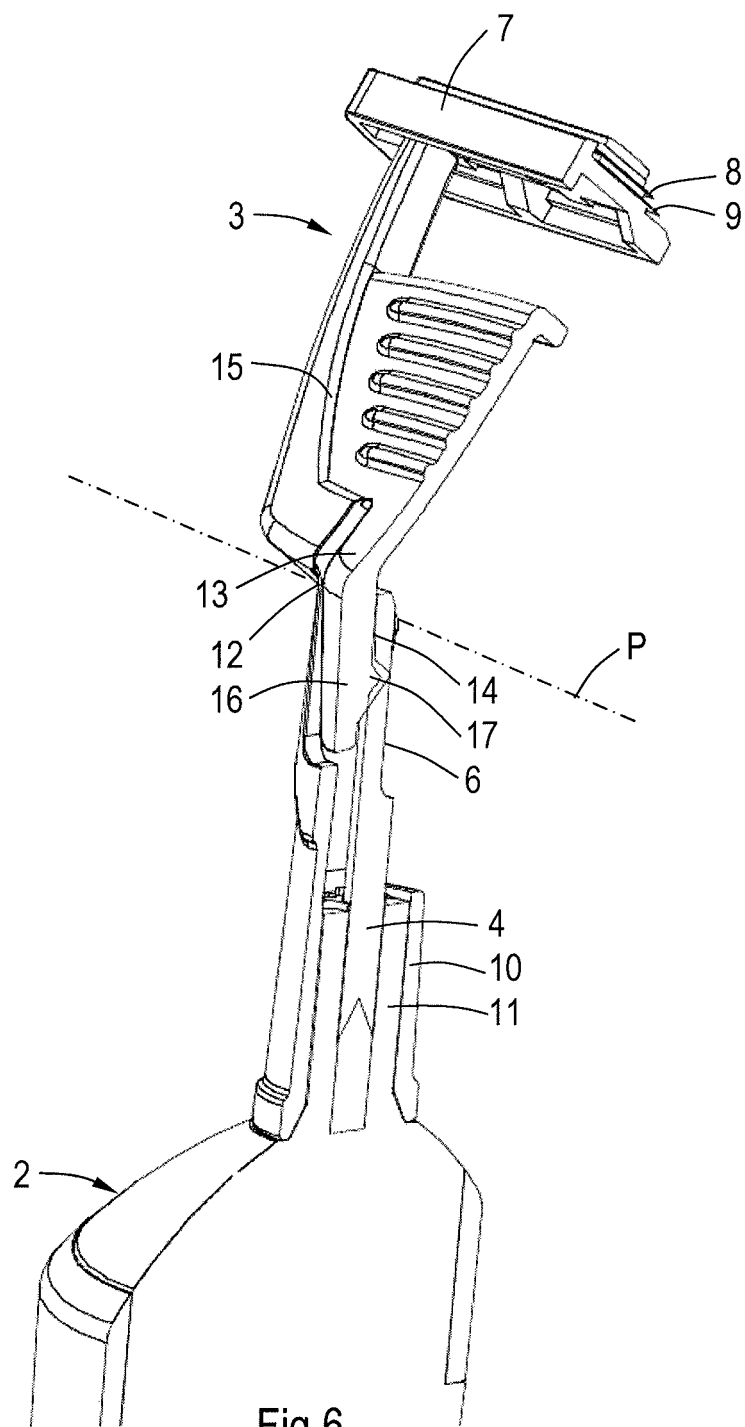


Fig.6



EUROPEAN SEARCH REPORT

Application Number
EP 11 16 8179

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Place of search		Date of completion of the search	Examiner
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CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 11 16 8179

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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