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(54) **Electrical Trimmer**

(57) An electrical trimmer as proposed comprises a pivotable trimmer head (10a) and an actuation unit (20) having a movably mounted actuator (21) being provided to be moved by a user, the actuator (21) being mechanically linked with the pivotable trimmer head (10a) such that the pivotable trimmer head (10a) is pivoted at least between a first angular operating position and a second angular operating position when the actuator (21) is moved from a first actuator position to a second actuator position.

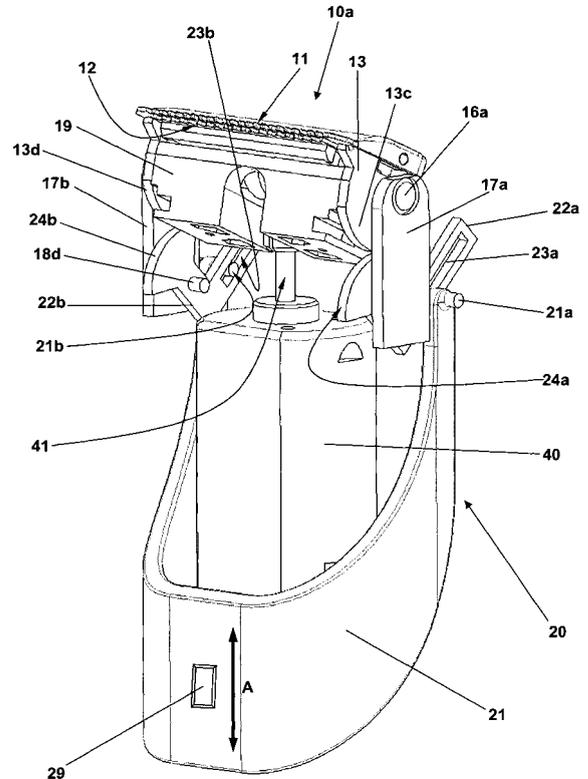


Fig. 3

Description

FIELD OF THE INVENTION

[0001] The present invention relates to electrical trimmers and in particular it relates to electrical trimmers that have a pivotably mounted trimmer head.

BACKGROUND OF THE INVENTION

[0002] Patent document US 1,997,096 describes a cutter head for a power driven hair clipping and shaving device. A cutter head is provided that can be rotatively adjusted to hold the cutters either in a hair clipping or a hair shaving position. To avoid an accidental displacement of the cutter head from any given position of adjustment, one end of the head is provided with a socket to receive a compression spring and a friction plunger which is urged by the spring against a casing of the device. More than operating pressure is required to effect a change of adjustment.

[0003] It is a disadvantage of this device that any adjustment of the cutter head requires that the device is switched off.

[0004] It is hence desired to provide an electrical trimmer that is improved over the known device.

SUMMARY OF THE INVENTION

[0005] An electrical trimmer that fulfills this desire is given by claim 1. Further embodiments are given by the dependent claims.

[0006] The electrical trimmer as proposed comprises a pivotable trimmer head and an actuation unit. The actuation unit comprises a movably mounted actuator being provided for user operated movement. The actuator could in various embodiments be realized as a slider element or a rotatable element that is mechanically linked with the pivotable trimmer head such that the pivotable trimmer head is pivoted at least between a first angular operating position and a second angular operating position when the actuator is moved from a first actuator position to a second actuator position. Here, "operating position" does not imply that the trimmer head must be operable in the respective angular position. The pivotable trimmer head may in each operating position also only be stored (and an operation may be prohibited) or may be switchable between an on operation and an off operation. As the actuation unit and the pivotable trimmer head are mechanically linked and the rotation of the pivotable trimmer head is affected by a user by moving the actuator, the trimmer head can remain in an "on" operation state while the trimmer head is pivoted from one angular operating position to another as the user must not touch the pivotable trimmer head itself to pivot it. The user moves the actuator and thereby pivots the pivotable trimmer head. In an embodiment, the actuation unit is provided to swivel the pivotable trimmer head between

a plurality of angular operation positions (e.g. if the pivotable trimmer head can be pivoted over an angular range of 30 degrees then an angular operating position could be provided at every degree). The actuator is arranged to be movable by a user and the actuator is moveable relatively to a housing of the electrical trimmer.

[0007] In an embodiment, the actuator is realized as a slider element that is linearly moved by a user relatively to the housing of the electrical trimmer. In such an embodiment, the slider element may be arranged to act on at least a pivoting actuation element by which the sliding (or linear) motion of the slider element is translated into a rotational movement of the pivoting actuation element. The pivoting actuation element is then coupled to the pivotable trimmer head so as to swivel the pivotable trimmer head when the slider element is linearly moved. In another embodiment, the actuator is realized as a rotary element, e.g. a rotary knob that is arranged on the outside of the housing of the trimmer or a part of the trimmer housing can be arranged so as to be rotatable, in particular rotatable around the longitudinal axis of the electrical trimmer. In a further embodiment, a transmission element is arranged between the actuator and the pivotable trimmer head (such that in essence a step-up gear unit or a reduction gear unit is formed), which transmission element can e.g. be used to increase the length the actuator has to be moved to actuate the pivotable trimmer head between a first and a second angular operation position. An increased length will result in a better tactile impression for the user. E.g. incremental changes in the angular operating position can be obtained by a considerable moving length when using a transmission element so that the user has a good tactile control over such incremental angular adjustments.

[0008] In a further embodiment, the electrical trimmer comprises a snap-in element for locking the actuator in at least a first actuator position or a second actuator position. The first and second actuator positions correspond then to the first and second angular operating positions of the pivotable trimmer head. If such a snap-in element is used, the user does not need to keep the actuator of the actuation unit at a certain position but the position is mechanically locked and hence stable against any unintended displacement. The snap-in element could be designed so as to unlatch from its locked position under a certain force applied in an unlatch direction. In another embodiment, the electrical trimmer has a release element for selectively releasing the snap-in element from its locked position. The release element is e.g. designed that it releases a force when operated, which force keeps the snap-in element in its locked position. When operated, the release element could e.g. release a spring tension used to lock the snap-in element into a certain position.

[0009] In another embodiment, the electrical trimmer has a first blade and a second blade and the first and second blade each have first and second toothed sides that are arranged oppositely to each other. The first

toothed sides of the first and second blade and the second toothed sides of the first and second blade cooperate during operation to cut-off or shear-off hairs that feed in between the teeth. In a variant of this embodiment, the first toothed sides of the first and second blades and the second toothed sides of the first and second blades differ from each other in a geometrical factor. The geometrical factor could be a cutting width or a size value of the teeth etc. This allows adapting each of the sides to a specific need.

[0010] The invention is also concerned with a hair removing device that comprises an electrical trimmer as proposed, e.g. an electrical dry shaver that comprises an electrical trimmer or a combination of a wet shaver (such as a safety razor) and an electrical trimmer.

[0011] The invention further is concerned with a hair comb that is attachable to an electrical trimmer as proposed and which hair comb is designed to allow pivoting the pivotable trimmer head when the hair comb is attached so that a hair length of hairs to be trimmed is varied when the pivotable trimmer head is pivoted.

[0012] The invention is also concerned with a method to trim hair, which method comprises the steps of: providing an electrical trimmer having a pivotable trimmer head; attaching a hair comb to the electrical trimmer into a fixed position; rotating the pivotable trimmer head into an angular operating position that relates to a desired length of the trimmed hair; and trimming the hair while contacting the skin with a frontal part of the hair comb.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The present invention will be elucidated by detailed description of an exemplary embodiment and by reference to figures. In the figures

- Fig. 1 shows an exemplary electrical trimmer as proposed of which those parts of an actuation unit that are not integral with the housing of the electrical trimmer are not depicted;
- Fig. 2 is an exploded view of the pivotable trimmer head;
- Fig. 3 is a perspective frontal view of the pivotable trimmer head, part of the mounting structure, the motor, and those parts of the actuation unit that are not integral with the housing of the electrical trimmer;
- Fig. 4 is a perspective back view of the pivotable trimmer head and the actuation unit;
- Fig. 5 shows a schematic depiction of an electrical trimmer as proposed with a mounted hair comb.

DETAILED DESCRIPTION OF THE INVENTION

[0014] Fig. 1 is a depiction of an electrical trimmer 1 that has a head section 10 and a housing 30 to which the head section 10 is mounted. The head section 10 comprises a pivotable trimmer head 10a and a mounting

frame 10b. The pivotable trimmer head 10a comprises a first blade 11. In the shown embodiment, the first blade 11 has a first toothed side 11a and a second toothed side 11 b that differ in a geometrical factor, namely in their cutting widths, which allows accommodating different trimming needs, e.g. for trimming a beard or for trimming sideburns. In another embodiment, the first toothed side and the second toothed side differ from each other alternatively or additionally in their teeth geometry (like blade thickness, tooth length, tooth width, teeth spacing etc.) so that, e.g., one side is optimized for trimming body hair and the other side is optimized for trimming beard hairs. In the shown embodiment, the mounting frame 10b has elevated sides so that in an extreme angular position of the pivotable trimmer head 10a either the first toothed side 11a or the second toothed side 11 b (as is shown in Fig. 1) is protected by an elevated side. Hence, any unintended contact with the respective toothed side of the first blade 11 is effectively avoided in such an extreme angular position. Obviously, the presence of the second toothed side 11 b is only an additive feature and the invention clearly also works for electrical trimmers that have only a first toothed side 11 a.

[0015] The housing 30 comprises a switch 31 for selectively switching the electrical trimmer 1 on or off. The housing 30 further has a compulsory guide 32 for guiding an actuator (in this embodiment, the actuator is a slider element 21 shown in Fig. 3 and Fig. 4) of the actuation unit (guiding bolts 27a and 27b as shown in Fig. 4 will engage with the compulsory guide 32). The housing 30 also has several snap-in recesses 33a, 33b, and 33c to lock a snap-in element of the actuation unit into definite actuator positions (spring tensioned edge 26a of snap-in hook 26 as shown in Fig. 4 will selectively snap-in into the snap-in recesses 33a, 33b, and 33c when the actuator is moved so that by locking of the actuator the pivotable trimmer head can be fixedly held in various angular operating positions). Snap-in recess 33a may then be associated with a first actuator position and snap-in recess 33b with a second actuator position.

[0016] Fig. 2 is an exploded view of the pivotable trimmer head 10a. The pivotable trimmer head 10a comprises a first blade 11 that has a first toothed side 11 a and a second toothed side 11 b that are oppositely arranged at the first blade 11. In the shown embodiment, the first blade 11 is a fixed blade that is clicked onto an upper head frame 13. The upper head frame 13 has two lateral arms that each have a bore 13a, 13b and that each conclude in a semicircular gear wheel segment 13c, 13d. The pivotable trimmer head 10a further comprises a second blade 12 that also has a first toothed side 12a and a second toothed side 12b that are oppositely arranged at the second blade 12. The second blade 12 is clicked onto a carrier element 14. The carrier element 14 has a slotted guide 14a. An eccentric tappet 43 of a motor shaft top part 42 engages into the slot of the slotted guide 14a. During operation, the eccentric tappet 43 rotates and thereby moves the carrier element 14 in a linear oscillat-

ing manner as the movement of the eccentric tappet 43 in the slot direction does not result in a movement of the carrier element 14. Springs 15a and 15b are arranged between a lower head frame 19 and the carrier element 14. The lower head frame 19 has recesses into which protrusions of the upper head frame 13 engage so as to connect the upper head frame 13 and the lower head frame 19 fixedly together. Hence, the loosely arranged carrier element 14 is pushed by a spring force exerted by the springs 15a and 15b against the upper head frame 13. As a result, the second blade 12 mounted on the carrier element 14 is pushed against the first blade 11 that is mounted on the upper head frame 13 so that during operation the teeth of the first toothed side 11a of the first blade 11 and the teeth of the first toothed side 12a of the second blade 12 cooperate to cut-off or sheer-off hairs that feed in between the teeth. The same happens with the teeth of the second sides 11 b and 12b of the first and second blades 11 and 12. It becomes clear from Fig. 2 and above description that the pivotable trimmer head 10a is operatively connected to the motor in every angular position into which the pivotable trimmer head 10a can be pivoted as the eccentric tappet 43 will in all allowed angular positions engage into the slotted guide 14a of the carrier 14.

[0017] Mounting bars 17a and 17b, which are part of the mounting frame 10b, have each a bore 18a and 18b, respectively. In a mounted state, mounting pins 16a and 16b will extend through the bores 18a and 18b of the mounting bars 17a and 17b, respectively, and also through the bores 13a and 13b of the upper head frame 13, so that as a result the pivotable trimmer head 10a is pivotably mounted to the mounting bars 17a and 17b. The mounting bars 17a and 17b also each have a mounting bolt 18c and 18d, respectively, for mechanically linking the actuation unit to the pivotable trimmer head, as will be described with reference to Fig. 3 and Fig. 4.

[0018] Fig. 3 is a perspective view onto the pivotable trimmer head 10a, a motor 40, the mounting bars 17a and 17b, and the actuation unit 20. The motor 40 has a motor shaft 41 onto which the motor shaft top part 42 is attached, which motor shaft top part 42 carries the eccentric tappet 43 that engages with the slot of the slotted guide 14a of the carrier element 14, as was described with reference to Fig. 2.

[0019] The actuation unit 20 comprises as an actuator a slider element 21 and as pivoting actuation elements two essentially L-shaped lever arms 22a and 22b. The slider element 21 has a centre part that is located at the front of the housing 30 of the electrical trimmer 1 and it has two lateral arms so as to partially embrace the housing 30. The lateral arms each end in a guiding pin 21 a and 21 b, respectively, which guiding pins 21 a, 21 b each engages with a respective long slot 23a and 23b in each of the longer arms of the two L-shaped lever arms 22a and 22b. The L-shaped lever arms 22a and 22b are each pivotably mounted to one of the mounting bars 17a and 17b by attaching the L-shaped lever arms 22a and 22b

onto the respective mounting bolts 18c and 18d of the mounting bars 17a and 17b. When the slider element 21 is vertically moved with respect to the electric trimmer in the direction of double arrow A so that the actuator (here: the slider element 21) is moved from a first actuator position to a second actuator position, the guiding pins 21 a and 21 b slide within the long slots 23a and 23b and thereby translate the vertical movement of the slider element 21 into a rotational movement of the L-shaped lever arms 22a and 22b. As the movement of the guiding pins 21 a and 21b is confined to a vertical movement, the L-shaped lever arms that are slanted with respect to this vertical direction are forced to rotate around their pivot axes defined by the mounting bolts 18c and 18d. The respective ends of the shorter arms of the L-shaped lever arms 22a and 22b are realized as toothed gear wheel segments 24a and 24b, which in turn mesh with the toothed semicircular gear wheel segments 13c and 13d of the upper head frame 13. Hence, a vertical movement of the slider element 21 from a first actuator position to a second actuator position is translated into a rotational movement of the L-shaped lever arms 22a and 22b around their pivot points defined by mounting bolts 18c and 18d, which in turn leads to a rotation of the pivotable trimmer head 10a around its pivot axis defined by mounting pins 16a and 16b. The pivotable trimmer head 10a is thereby moved from a first angular operating position that is associated with the first actuator position to a second angular operating position that is associated with the second actuator position. The actuation unit 20 also comprises a release element 29 that can act on a snap-in element (e.g. a snap-in hook 26 as shown in Fig. 4). In the shown embodiment, the release element 29 is arranged on the slider element 21 so that a user can also operate the release element 29 when the user wants to vertically shift the slider element 21.

[0020] Fig. 4 is a perspective view on the back side of the electrical trimmer parts as shown in Fig. 3, but the motor 40 and the mounting bars 17a, 17b are not shown for sake of clarity. Most of the elements of the pivotable trimmer head 10a and the actuation unit 20 have been discussed concerning their arrangement and function with respect to Fig. 3. In addition to these elements, Fig. 4 shows additional elements not visible in Fig. 3. Mounting bores 28a and 28b are visible that will receive the mounting bolts 18c and 18d of the mounting bars 17a and 17b. The slider element 21 has guiding bolts 27a and 27b that are provided to engage with the compulsory guides 32 provided in the outer surface of the trimmer housing 30 (only one such compulsory guide 32 is visible in the perspective view of Fig. 1). Further, the actuation unit 20 has as a snap-in element a snap-in hook 26 that is fixedly mounted to the inside of the centre part of the slider element 21. The snap-in hook 26 is e.g. made from a sheet metal, e.g. stainless steel. It has a projecting portion that has an edge 26a that is under spring tension in a mounted state as the projecting portion is bent as long as edge 26a slides over the outer surface of the

trimmer housing 30. As the trimmer housing 30 is provided with snap-in recesses 33a, 33b, and 33c, the bent projecting portion will cause the spring tensioned edge 26a to snap into one of the snap-in recesses 33a, 33b, or 33c so that the actuator 21 is then locked in the respective position. As the actuator is mechanically linked to the pivotable trimmer head 10a, and angular movement of the pivotable trimmer head 10a is effectively prevented and the pivotable trimmer head 10a is fixedly held in its respective angular operating position. By applying a certain force in the vertical direction (double arrow A in Fig. 3) onto the slider element 21, a user can overcome the spring tension that holds the actuation unit in the locked position and the slider element 21 can be moved into another locked position that relates to another angular operating position of the pivotable trimmer head 10a. The actuation unit 20 may also comprise a release element 29 as shown in Fig. 3 for releasing upon operation the spring tension that keeps the slider element in the locked position.

[0021] In another embodiment, the pivotable trimmer head is pivotable between -30 degrees and +30 degrees, where 0 degrees relates to a horizontal alignment of the first and second blade with respect to the longitudinal extension of the electrical trimmer. The trimmer housing has then 11 snap-in recesses to allow adjusting the angular position of the pivotable trimmer head in steps of 6 degrees. The actuation unit may have a transmission element with a certain gear transmission ratio so that a relatively long vertical movement of the slider element is translated into only a relatively small angular movement (e.g. a 2 mm vertical shift could be translated into a 6 degrees step). Such a transmission element supports a good tactile impression of the slider mechanism. Obviously, L-shaped lever arms 22a and 22b can serve as transmission elements depending on their specific design, e.g. by placement of the pivoting axis defined by the bores 28a and 28b or by the radius of the semicircular gear wheel segments 24a and 24b.

[0022] In another embodiment, the electrical trimmer has as an actuator a rotary knob arranged on the outer surface of the trimmer housing, which rotary knob is mechanically linked via toothed gear wheels with the semicircular gear wheel segments of the upper head frame so that turning the rotary knob results in an adjustment of the angular position of the pivotable trimmer head.

[0023] Fig. 5 is a schematic depiction of another exemplary electrical trimmer 1 as proposed with a hair comb 50 attached to the head section 10. In the shown embodiment, the actuation unit comprises a rotatable housing part 35 of the trimmer housing 30 (the rotation direction of the rotatable housing part 35 is indicated by double arrow D; the rotation axis coincides with the longitudinal axis of the electrical trimmer), which rotatable housing part 35 may have a toothed ring at its upper side, which toothed ring meshes with gear wheels to act on the semicircular gear wheel segments of the upper head frame to pivot the pivotable trimmer head 10a in the direction

of the double arrow R. The rotatable housing part 35 may be a lower housing part as is shown in Fig. 5 but it could also be e.g. a cylindrical segment of the housing.

[0024] The hair comb 50 has a frontal part 51 that is intended for contacting the skin 90 during operation. As is known in the art, a hair comb 50 is used with an electrical trimmer to trim long hairs 91 growing on the skin to a certain length such that trimmed hairs 92 result that have a determined length. It is known to either provide an electrical trimmer with a variety of detachably mountable hair combs designed for trimming long hairs to a certain length or to arrange the hair comb to be movable between several positions at the electrical trimmer, where each position is associated with a certain hair length. In contrast, the detachably mountable hair comb 50 of the proposed electrical trimmer 1 has typically only one attachment position, which hair comb 50 can hence be relatively strongly fixed to the electrical trimmer 1 as the hair comb 50 needs not to be moved. Various hair lengths are then achievable by pivoting the pivotable trimmer head 10a of the electrical trimmer 1 into a desired angular operating position that relates to a given hair length. The hair comb 50 therefore has an inner geometrical shape 52 that allows for pivoting the pivotable trimmer head 10a at least between a first angular operating position and a second angular operating position. In the shown position, relatively short trimmed hairs result, which might be the most extreme angular operating position (the most extreme angular operating position could also be a position in which the hairs can be trimmed at about skin level, but this can also be achieved without a hair comb). Other positions into which the pivotable trimmer head 10a can be rotated in anti-clockwise direction of the double arrow R then result in somewhat longer trimmed hair.

[0025] The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm."

45 Claims

1. An electrical trimmer comprising:

- a pivotable trimmer head (10a); and
- an actuation unit (20) having a movably mounted actuator (21) being provided to be moved by a user;
- the actuator (21) being mechanically linked with the pivotable trimmer head (10a) such that the pivotable trimmer head (10a) is pivoted at least between a first angular operating position and a second angular operating position when the actuator (21) is moved from a first actuator position

- to a second actuator position.
2. The electrical trimmer according to claim 1, wherein the actuator (21) is realized as a slider element.
 3. The electrical trimmer according to claim 2, wherein the slider element is mechanically coupled to a pivoting actuation element (22a; 22b) so as to translate a sliding motion of the slider element into a rotating motion of the pivoting actuation element (22a; 22b).
 4. The electrical trimmer according to claim 1, wherein the actuator (21) is realized as a rotary element.
 5. The electrical trimmer according to claim 4, wherein the rotary element is a rotatable housing part (35) of a housing (30) of the electrical trimmer (1).
 6. The electrical trimmer according to claim 1, wherein the actuator (21) is arranged to pivot the pivotable trimmer head (10a) between a plurality of angular operating positions.
 7. The electrical trimmer according to claim 1, wherein the actuation unit (20) comprises a snap-in element (26, 26a) for locking the actuator (21) in at least the first and the second actuator position.
 8. The electrical trimmer according to claim 7, wherein the actuation unit (20) comprises a release element (29) arranged for selectively releasing the snap-in element (26, 26a) from its snapped-in position.
 9. The electrical trimmer according to claim 1, wherein the actuation unit (20) comprises a transmission element.
 10. The electrical trimmer according to claim 1, wherein the pivotable trimmer head (10a) comprises a first blade (11) and a second blade (12) that each have first and second toothed sides (11a, 11b, 12a, 12b) where the respective first sides (11a, 12a) and the second sides (11 b, 12b) cooperate during operation to cut-off hairs.
 11. The electrical trimmer according to claim 10, wherein the first sides (11a, 12a) of the first and second blades (11, 12) and the second sides (11b, 12b) of the first and second blades (11, 12) differ in a geometrical factor from each other.
 12. The electrical trimmer according to claim 1 that further comprises a hair comb (50) that is detachably mounted to the electrical trimmer (1) to define a remaining length of the hairs to be cut during operation, wherein the remaining length of hairs can be varied by swiveling the pivotable trimmer head (10a).
 13. Hair removal device comprising an electrical trimmer according to any one of claims 1 to 11.
 14. Hair comb (50) attachable to an electrical trimmer (1) according to any one of claims 1 to 10 in a fixed position, which hair comb (50) allows in its attached state for rotating the pivotable trimmer head (10a) at least between the first angular operating position and the second angular operating position.
 15. A method to trim hairs comprising the steps of:
 - providing an electrical trimmer (1) having a pivotable trimmer head (10a);
 - attaching a hair comb (50) to the electrical trimmer (1) into a fixed position;
 - rotating the pivotable trimmer head (10a) into an angular operating position that relates to a desired length of the trimmed hair; and
 - trimming the hair while contacting the skin with a frontal part (51) of the hair comb (50).

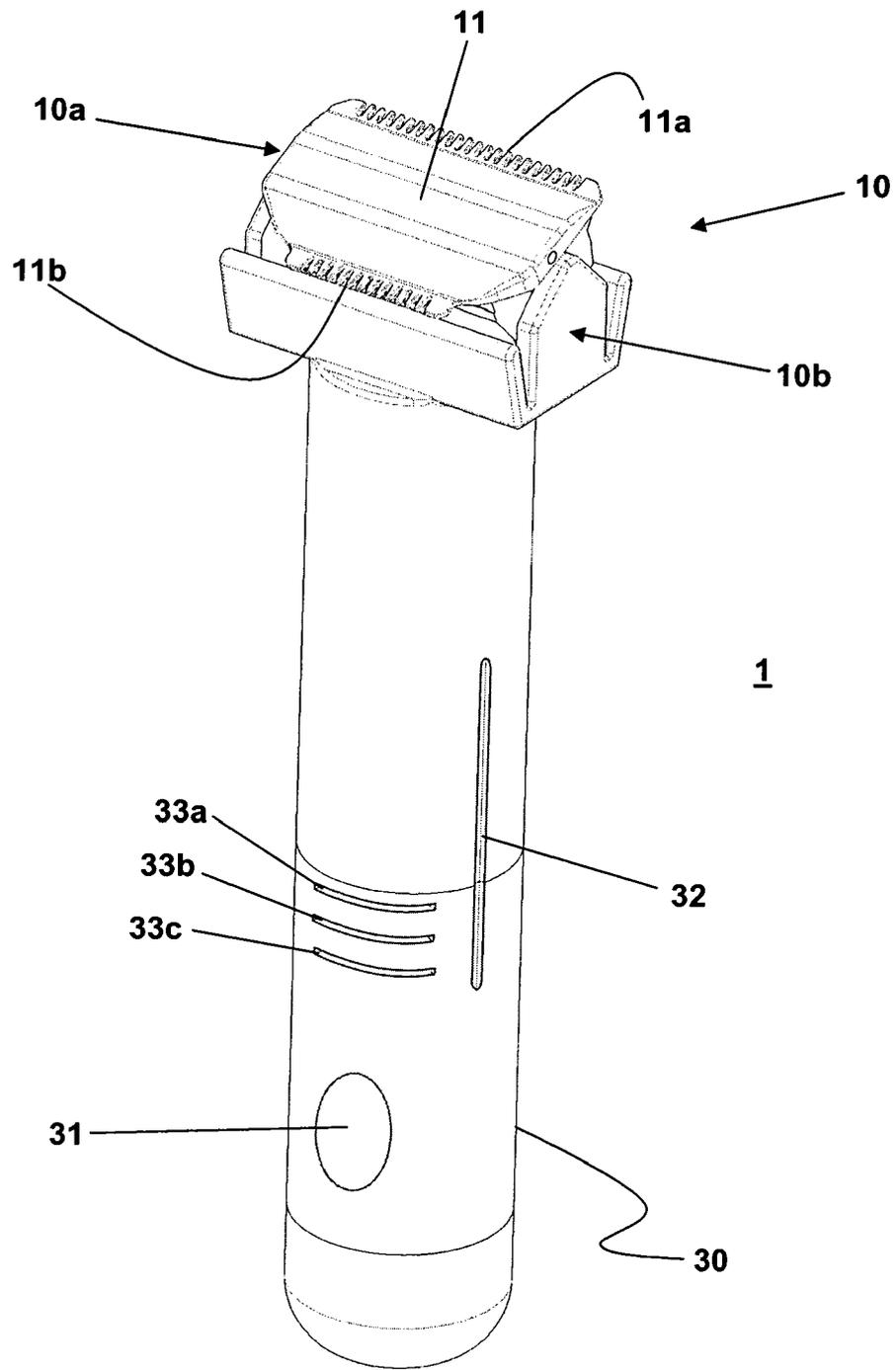


Fig. 1

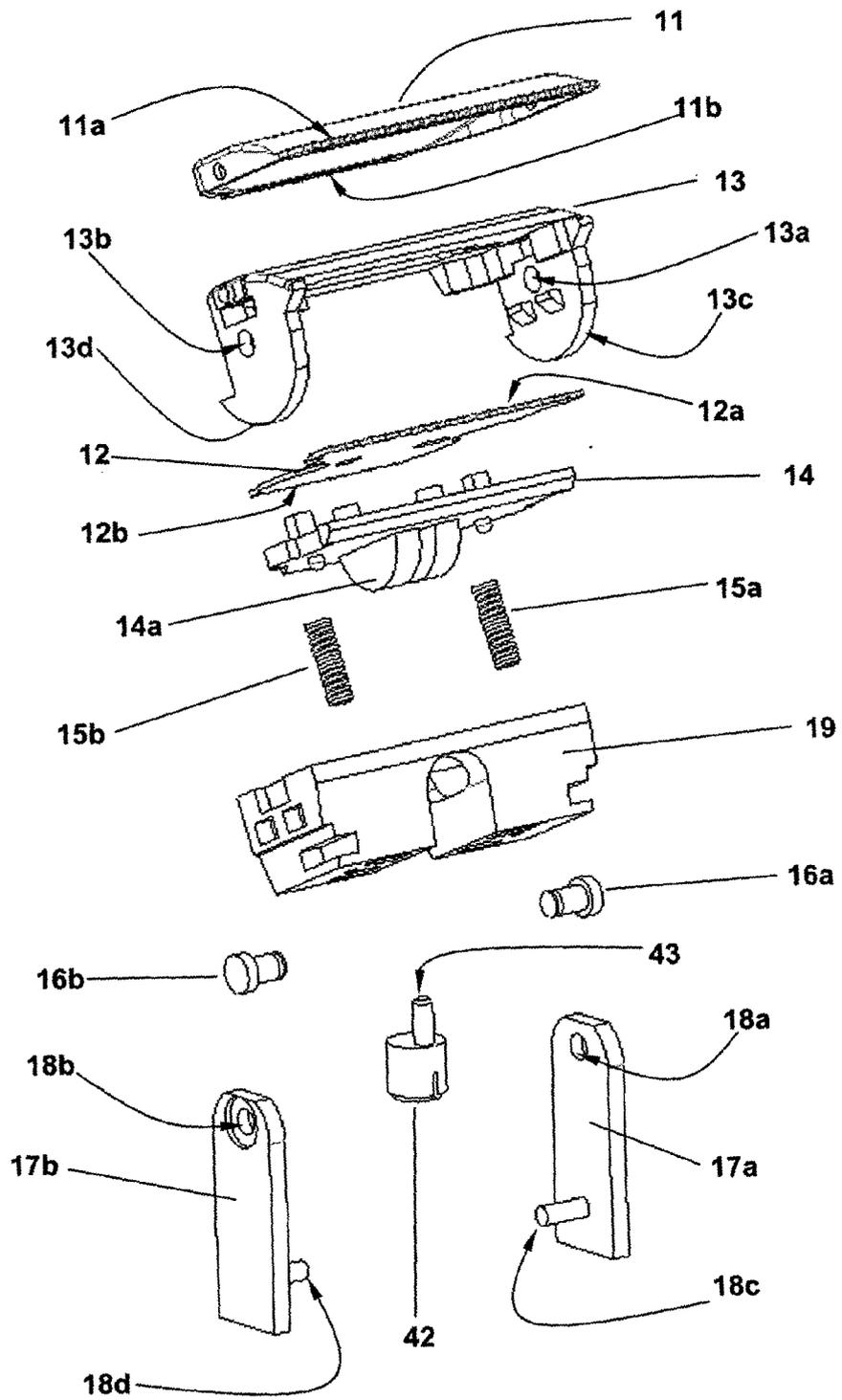


Fig. 2

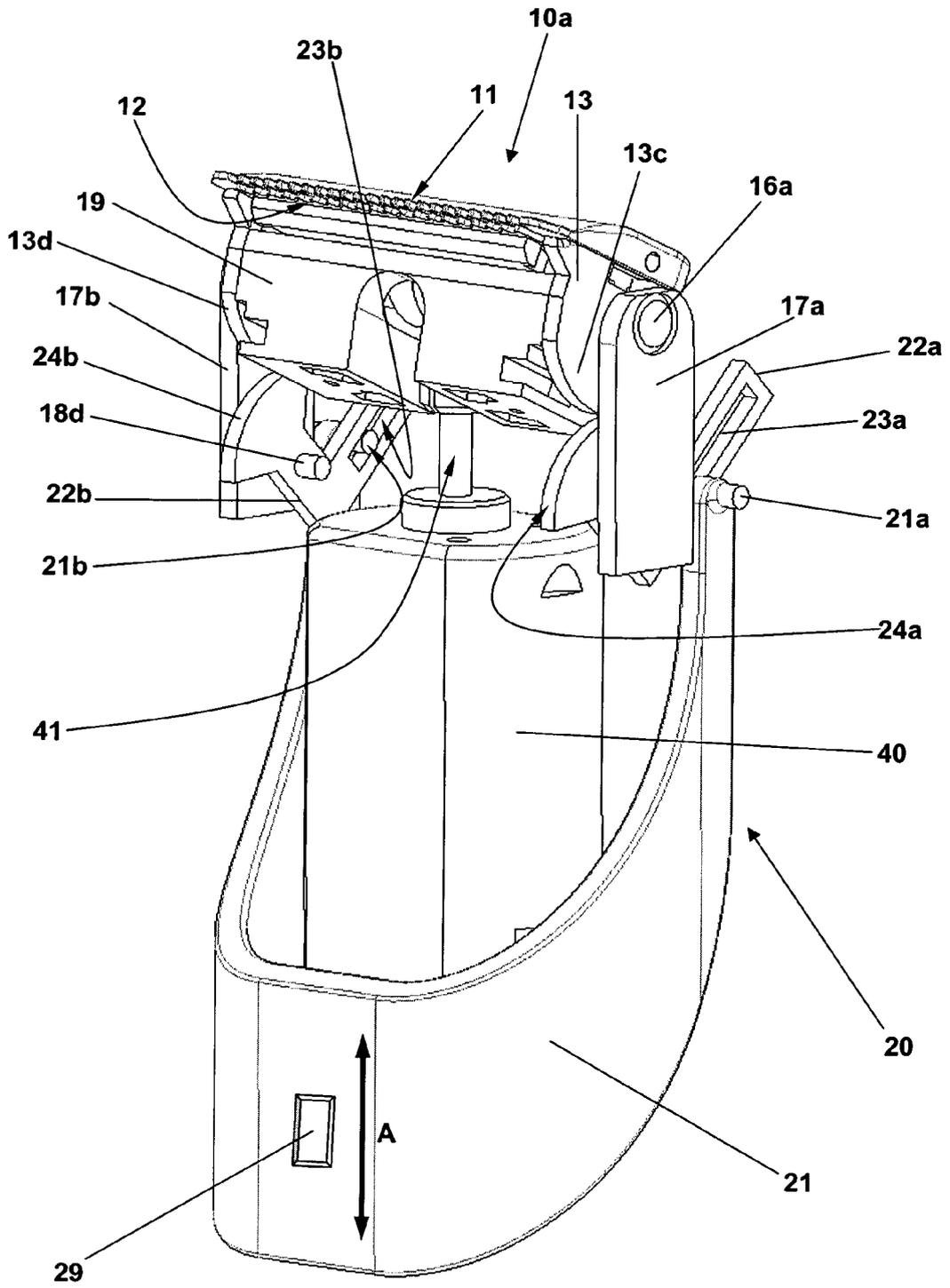


Fig. 3

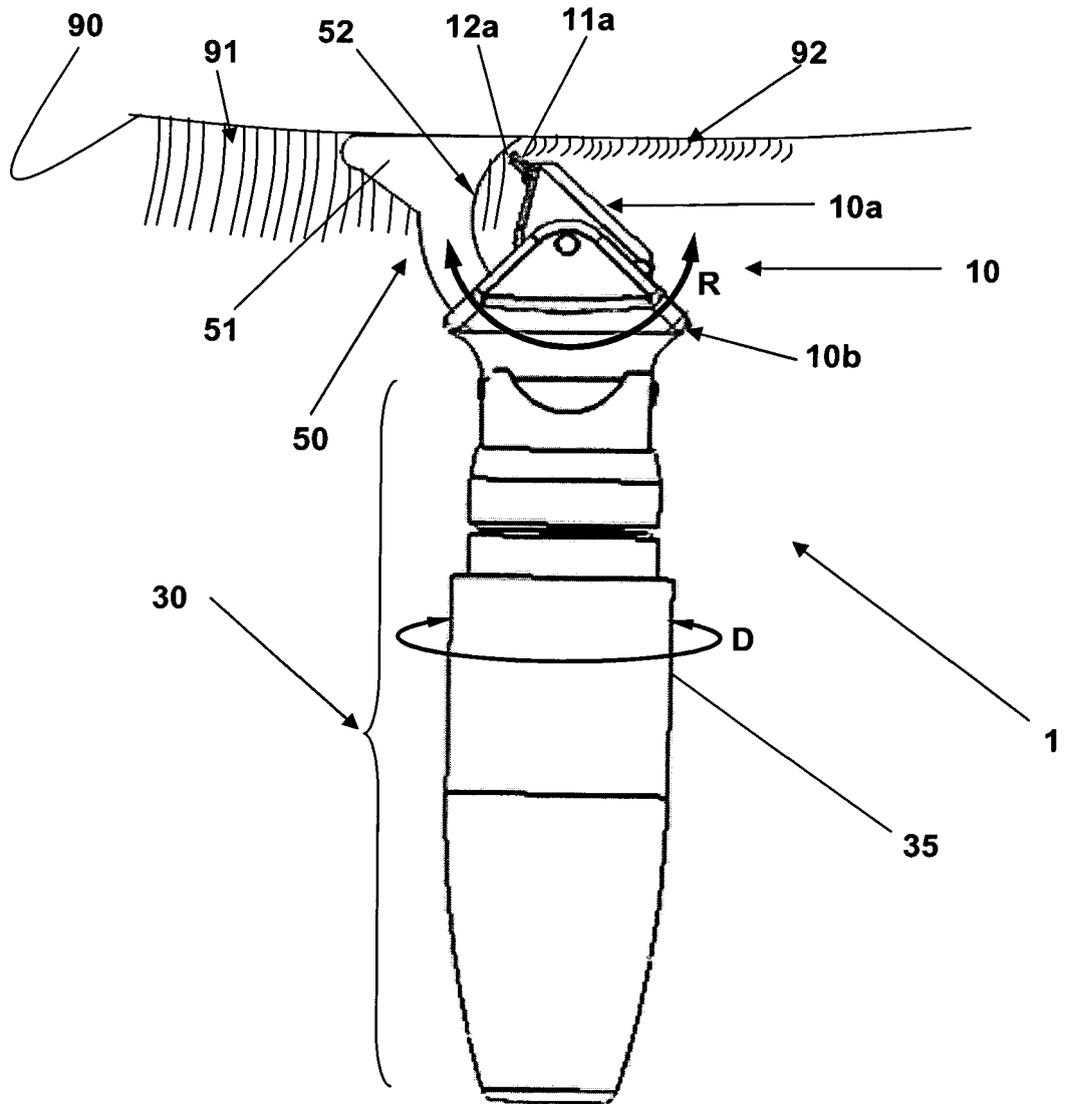


Fig. 5



EUROPEAN SEARCH REPORT

 Application Number
 EP 08 01 2725

DOCUMENTS CONSIDERED TO BE RELEVANT			
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC) B26B
Place of search Munich		Date of completion of the search 3 December 2008	Examiner Rattenberger, B
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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