



(11) **EP 2 123 408 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:
16.05.2012 Bulletin 2012/20

(51) Int Cl.:
B26B 19/06 (2006.01) B26B 19/28 (2006.01)

(21) Application number: **08156531.9**

(22) Date of filing: **20.05.2008**

(54) **Electric hair cutting machine**

Elektrische Haarschneidemaschine

Appareil électrique pour la coupe de cheveux

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT
RO SE SI SK TR**

(43) Date of publication of application:
25.11.2009 Bulletin 2009/48

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Description

[0001] The subject matter of the invention relates to the salon industry and an electric hair cutting machine therein.

[0002] Electric hair cutting machines are sufficiently well-known. They are used to cut scalp hair and are an alternative to cutting hair using scissors.

[0003] US 3,959,878 discloses a cutting machine for lawn-mowing whose drive technology could be used in a hairdressing salon if it were adapted to the requirements in the salon industry with respect to its dimensions and cutting accuracy. This electric cutting machine is equipped with a gripping piece, which has a longitudinal axis, as well as a drive, a fixed clipper blade, a clipper blade that is aligned parallel to and adjoins the fixed clipper blade and can be moved back and forth on a cutting plane, as well as gearing, which transfers a rotational movement of a drive shaft to the movable clipper blade. The drive shaft has a reversing device that has an eccentric in order to convert the rotational movement into a linear back-and-forth movement. A reversing lever, which can be swiveled around a bearing axle, connects the reversing device to the movable clipper blade. A disk, in the form of a sliding block, is attached to a pin on the eccentric, wherein the sliding block is held in position by a retainer on the end of the reversing lever, and the retainer is designed, in a direction that is vertical with respect to the drive shaft, such that the sliding block executes an up-and-down movement in this direction.

[0004] DE 103 38 401 A1 discloses a hair cutting machine from the hair salon industry, wherein the cutting plane forms an angle between 10 and 70 degrees with the longitudinal axis of the gripping piece. This angle enables easy handling and function.

[0005] The known prior art has the disadvantage that there is no particularly location-specific and smooth-operating reversing device for an electric hair cutting machine that is also easy to handle. Thus, the subject matter of US 3,959,878 requires a relatively high amount of drive capacity and the subject matter of DE 103 38 401 A1 has a relatively imprecisely functioning reversing device.

[0006] Prior art document US 4,723,362 discloses a hair cutter, in which an eccentric comprising an eccentric drive knob is attached to the motor axle. The eccentric drive knob being shaped in a particular concave form is directly inserted in a notch, which is fixedly connected to an oscillating lever, which drives the cutting mechanism. The only moving parts between motor axle and oscillating lever is the eccentric drive knob inserted within the notch resulting in a longitudinal rolling movement between knob and notch with an oscillatingly moving contact point between the knob and the notch.

[0007] Prior art document DE 142358, shows a hair cutting mechanism with an eccentric cylindrical element and a corresponding notch. The notch is formed by an end of an oscillating lever. This arrangement leads to an oscillating distance between eccentric cylindrical ele-

ment and notch depending on the inclination of the lever.

[0008] GB 2 378 407 A discloses bearing assemblies for a shearing handpiece, wherein a bearing means is provided between a stem on a crank head and a crank roller.

[0009] The object was to further develop the subject matter of the preamble of Claim 1 in a manner such that the disadvantage mentioned is eliminated.

[0010] The object is achieved in that the cutting plane forms an angle of from 10 to 70 degrees with the longitudinal axis of the gripping piece and that the sliding block is constructed in the form of a cylinder that extends in a direction that is vertical with respect to the drive shaft or is constructed in the form of a ball.

[0011] The proposed hair cutting machine has the advantage that it has an advantageous angle, because said angle is between 10 and 70 degrees. It is preferable if said angle is between 20 and 30 degrees, with between 20 and 25 degrees being particularly preferred, such that this angle enables a haircut that essentially corresponds to hair that is cut with scissors and that this is accomplished with ergonomically advantageous handling and function that is suitable for the application. The drive capacity, meaning the size of the drive, and optionally the usage time of a battery are minimized, because the reversing device transfers the forces to be transferred precisely and beneficially and thus the forces are transferred in a manner that is low-wearing. Thus, the design of the sliding block as a cylinder or as a ball is suitable for ensuring a secure and low-wearing transfer of force. The sliding block can have a drill hole, in a well-known design, in which the pin is inserted, and whereby the sliding block is connected to the pin in a rotating manner.

[0012] Advantageous embodiments of the suggested innovation are described also in dependent claim 2.

[0013] If the sliding block is designed as a cylinder having at least one flat spot (A2), this results in multiple advantages. On one hand, a recess provided in the external surface of the cylinder, which is wearing along the entire length of the cylinder, serves to define a location-specific reference, which can be used to calculate relative movements. On the other hand, non-flattened surface areas of the cylinder are used for location-specific transfer of force. A flat spot that is transverse with respect to the center axis of the pin (A3) has the advantage that it does not change any surface area of the cylinder that is important for the transfer of movement. The same thing applies to a flat spot that is parallel with respect to the center axis of the pin (A4). A particularly precise production of the sliding block is possible and the transfer of force is optimized when there is a flat spot that is transverse with respect to the center axis as well as a flat spot that is parallel with respect to the center axis (A5). The flat spots are taken into consideration when the sliding block is held in an end of the reversing lever, and they do not interfere with the swivel movement of the reversing lever if, according to A6, the sliding block is held in the retainer via positive engagement on the curved surface

of the sliding block, and the sliding block can be slid along the pin.

[0014] In principle, the sliding block can be held stationary in the retainer and can be slid along the pin. Alternatively, the technical embodiment can also be designed such that the sliding block is movable in the retainer in the direction of the extension of the reversing lever and that the sliding block is mounted on the pin (12) in a manner that is stationary.

[0015] This embodiment is suitable for both a sliding block in the form of a ball as well as a sliding block in the form of a cylinder. In this embodiment, no flat spot is provided parallel to a wall of the retainer if, according to A8, the retainer has two walls that are parallel with respect to one another that extend in the direction of the reversing lever and that adjoin the sliding block on opposing sides with play between the sliding block and the walls. The play is at its maximum when the reversing lever is in the center, i.e. when it is aligned straight out. Furthermore, if the play is zero when the reversing lever is swiveled to the maximum on the left and the right, this results in the maximally precise transfer of the drive to the movable clipper blade.

[0016] The proposed hair cutting machine is described in more detail in the following using figures showing two exemplary embodiments. The following is shown:

- Figure 1 shows a vertical section of a hair cutting machine with a sharp angle between both of its clipper blades as well as a longitudinal axis of a gripping piece;
- Figure 2 shows a horizontal section of the subject matter of Figure 1;
- Figure 3 shows a perspective representation with components that are separated from one another, a drive, an eccentric that can be placed on a drive shaft, a cylindrical sliding block, with flat spots, that can be attached to a pin of the eccentric, and a reversing lever with a retainer to hold the sliding block;
- Figure 4 is a view from above showing the subject matter of Figure 3, but in an assembled state in a first rotational condition of the eccentric;
- Figure 5 is a view from above of the subject matter of Figure 4, but with the eccentric rotated an additional 90 degrees;
- Figure 6 is a view from above of the subject matter of Figure 5, but with the eccentric rotated an additional 90 degrees;
- Figure 7 is a view from above of the subject matter of Figure 6, but with the eccentric rotated

an additional 90 degrees;

- Figure 8 shows an embodiment with a spherical sliding block which does not fall within the scope of the claims.
- Figure 9 is a view from above showing the subject matter of Figure 8, but in an assembled state in a first rotational condition of the eccentric;
- Figure 10 is a view from above of the subject matter of Figure 9, but with the eccentric rotated an additional 90 degrees;
- Figure 11 is a view from above of the subject matter of Figure 10, but with the eccentric rotated an additional 90 degrees; and
- Figure 12 is a view from above of the subject matter of Figure 11, but with the eccentric rotated an additional 90 degrees.

[0017] With an electric hair cutting machine 1 having a gripping piece 2, a longitudinal axis 17 of the gripping piece 2, a drive 3, a fixed clipper blade 4, a clipper blade 5 that is aligned parallel to the fixed clipper blade 4 and that adjoins it in a cutting plane 16 and that can be moved back and forth, gearing 6 transfers a rotational movement of a drive shaft 7 to the movable clipper blade 5 (Figures 1 and 2). The drive shaft 7 has an eccentric 8 as a reversing device (Figure 3) in order to convert the rotational movement into a linear back-and-forth movement (Figures 4 through 7). A reversing lever 10, which can be swiveled around a bearing axle 9, connects the reversing device to the movable clipper blade 5. A sliding block 11 is provided on a pin 12 of the eccentric 8, wherein the sliding block 11 is held in position by a retainer 13 on one end 14 of the reversing lever 10. The retainer 13 is designed in a direction 15 that is vertical with respect to the drive shaft 7 such that the sliding block 11 executes an up-and-down movement in this direction 15. The cutting plane 16 forms an angle 18 of 23 degrees with the longitudinal axis 17 of the gripping piece 2. The sliding block 11 is designed in the form of a cylinder 19 that extends vertically upwards in the indicated direction 15. The gripping piece 2 is designed to hold a battery, wherein the hair cutting machine 1 is designed to charge the battery at a charging station.

[0018] The sliding block 11 has two flat spots 21 that are transverse with respect to the center axis 22 of the pin 12, on opposing sides of the sliding block 11 (Figure 3). In addition, a flat spot 21 is provided which is parallel with respect to the center axis 22. As an alternative to this, a flat spot 21 that is parallel with respect to the center axis 22 could be designed on each of the two opposing sides of the sliding block 11. The sliding block of 11 is held in the retainer 13 via positive engagement 23 on the

curved surface 25. The sliding block 11 has a drill hole 26 in which the pin 12 is inserted so that the sliding block 11 can be slid along the pin 12.

[0019] With the comparative example according to Figures 8 through 12, the sliding block 11 is designed in the form of a ball 20. Said ball 20 can be moved in the retainer 13 in the direction of the extension of the reversing lever, because the sliding block 11 is mounted on the pin 12 in a stationary manner. The retainer 13 has two walls 24, which are parallel with respect to one another and which extend in the direction of the reversing lever 10, and which adjoin the sliding block 11 on opposing sides with play between the sliding block 11 and the walls 24.

[0020] As an alternative to both of the examples, the cylindrical sliding block 11 of the first example could also be attached to the pin 12 in a stationary manner and be held in a retainer 13 with parallel walls, and the spherical sliding block 11 of the second example could be held in a sliding manner on the pin 12 and limited by the retainer 13 via positive engagement.

Reference numerals

[0021]

1	Hair cutting machine	
2	Gripping piece	
3	Drive	
4	Clipper blade, fixed	
5	Clipper blade, moveable	
6	Gearing	
7	Drive shaft	
8	Eccentric	
9	Bearing axle	
10	Reversing lever	
11	Sliding block	
12	Pin	
13	Retainer	
14	End	
15	Direction	
16	Cutting plane	
17	Longitudinal axis	
18	Angle	
19	Cylinder	
20	Ball	
21	Flat spot	
22	Center axis of the pin	
23	Positive engagement	
24	Wall	
25	Surface	
26	Drill hole	

[0022] 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 dis-

closed as "40 mm" is intended to mean "about 40 mm."

Claims

1. An electric hair cutting machine (1) having a gripping piece (2), a longitudinal axis (17) of the gripping piece (2), a drive (3), a fixed clipper blade (4), a clipper blade (5) that is aligned parallel to the fixed clipper blade (4) and that adjoins it in a cutting plane (16) and that can be moved back and forth, as well as gearing (6) that transfers a rotational movement of a drive shaft (7) to the movable clipper blade (5), wherein the drive shaft (7) has a reversing device in the form of an eccentric (8) in order to convert the rotational movement into a linear back-and-forth movement, with a reversing lever (10), which can be swiveled around a bearing axle (9), wherein the reversing lever (10) connects the reversing device to the movable clipper blade (5), as well as with a sliding block (11) on a pin (12) of the eccentric (8), wherein the sliding block (11) is held in position by a retainer (13) on one end (14) of the reversing lever (10), and the retainer (13) is designed in a direction (15) that is vertical with respect to the drive shaft (7) such that the sliding block (11) executes an up-and-down movement in this direction (15), wherein the cutting plane (16) forms an angle (18) of from 10 to 70 degrees with the longitudinal axis (17) of the gripping piece (2), **characterized in that** the sliding block (11) is designed in the form of a cylinder (19) that extends in the direction (15) that is vertical with respect to the drive shaft (7), the sliding block (11) is held in the retainer (13) via positive engagement (23) on a curved surface (25) of the sliding block (11), the sliding block (11) can be slid along the pin (12), and the sliding block (11) has at least one flat spot (21) which is provided transverse with respect to the center axis (22) of the pin (12).
2. The hair cutting machine according to Claim 1, **characterized in that** a further flat spot (21) is provided that is parallel with respect to the center axis (22) of the pin (12).

Patentansprüche

1. Elektrische Haarschneidemaschine (1) mit einem Greifstück (2), einer Längsachse (17) des Greifstücks (2), einem Antrieb (3), einer festen Schneidklinge (4), einer Schneidklinge (5), die parallel zu der festen Schneidklinge (4) gerichtet ist und an diese in einer Schneidebene (16) grenzt und die vor und zurück bewegt werden kann, sowie einem Getriebe (6), das eine Drehbewegung einer Antriebswelle (7) auf die bewegliche Schneidklinge (5) überträgt, wobei die Antriebswelle (7) eine Umkehrvorrichtung in

Form eines Exzentrers (8) aufweist, um die Drehbewegung in eine lineare Vor- und Rückwärtsbewegung umzuwandeln, mit einem Umkehrhebel (10), der um eine Tragachse (9) geschwenkt werden kann, wobei der Umkehrhebel (10) die Umkehrvorrichtung mit der beweglichen Schneidklinge (5) verbindet, sowie mit einem Gleitblock (11) auf einem Stift (12) des Exzentrers (8), wobei der Gleitblock (11) von einem Halter (13) an einem Ende (14) des Umkehrhebels (10) in Position gehalten wird und der Halter (13) in einer Richtung (15) ausgeführt ist, die in Bezug auf die Antriebswelle (7) vertikal ist, sodass der Gleitblock (11) eine Auf- und Abbewegung in diese Richtung (15) ausführt, wobei die Schneidebene (16) einen Winkel (18) von 10 bis 70 Grad mit der Längsachse (17) des Greifstücks (2) bildet, **dadurch gekennzeichnet, dass** der Gleitblock (11) in Form eines Zylinders (19) ausgeführt ist, der sich in die Richtung (15) erstreckt, die in Bezug auf die Antriebswelle (7) vertikal ist, der Gleitblock (11) in dem Halter (13) durch Formschluss (23) auf einer gekrümmten Oberfläche (25) des Gleitblocks (11) gehalten wird, wobei der Gleitblock (11) entlang dem Stift (12) verschoben werden kann und der Gleitblock (11) mindestens eine Flachstelle (21) aufweist, die in Bezug auf die Mittelachse (22) des Stiftes (12) querverlaufend bereitgestellt ist.

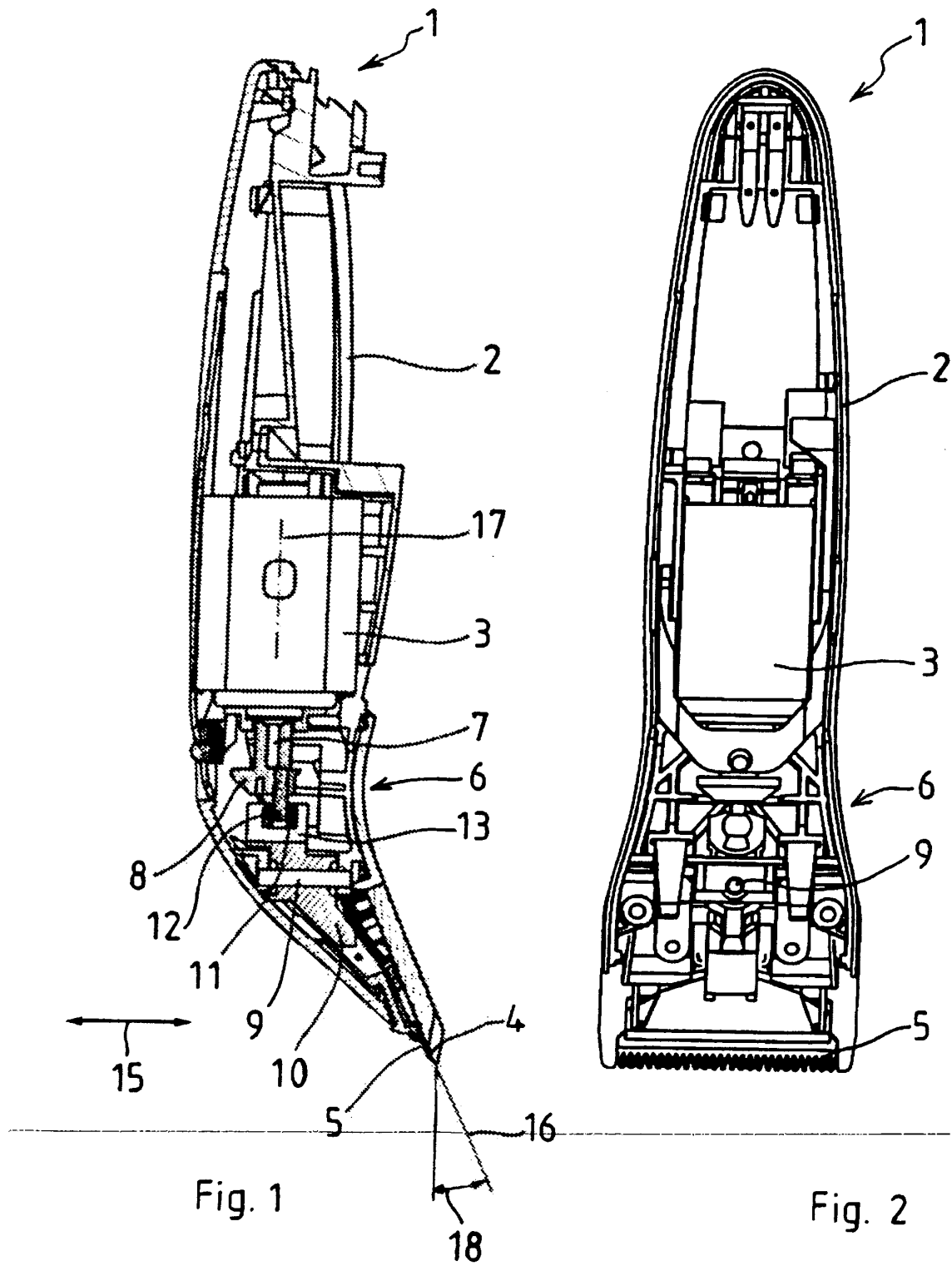
2. Haarschneidemaschine nach Anspruch 1, **dadurch gekennzeichnet, dass** eine weitere Flachstelle (21) bereitgestellt ist, die in Bezug auf die Mittelachse (22) des Stiftes (12) parallel ist.

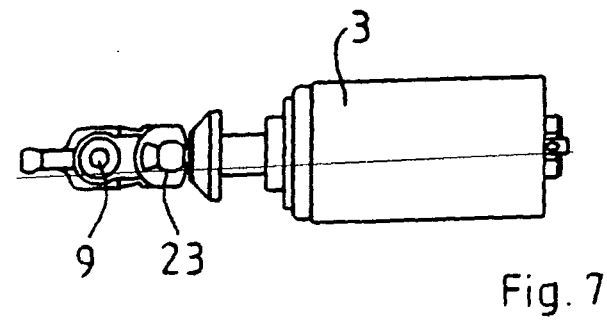
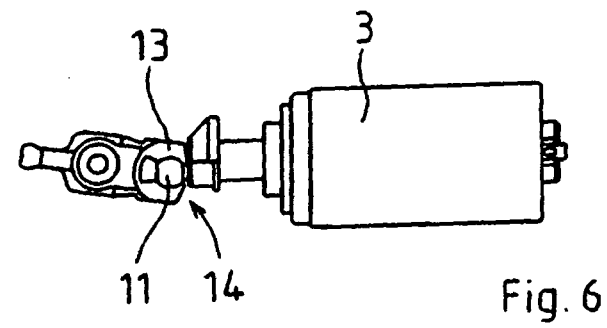
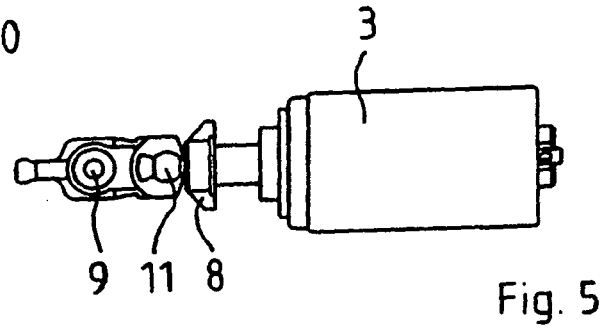
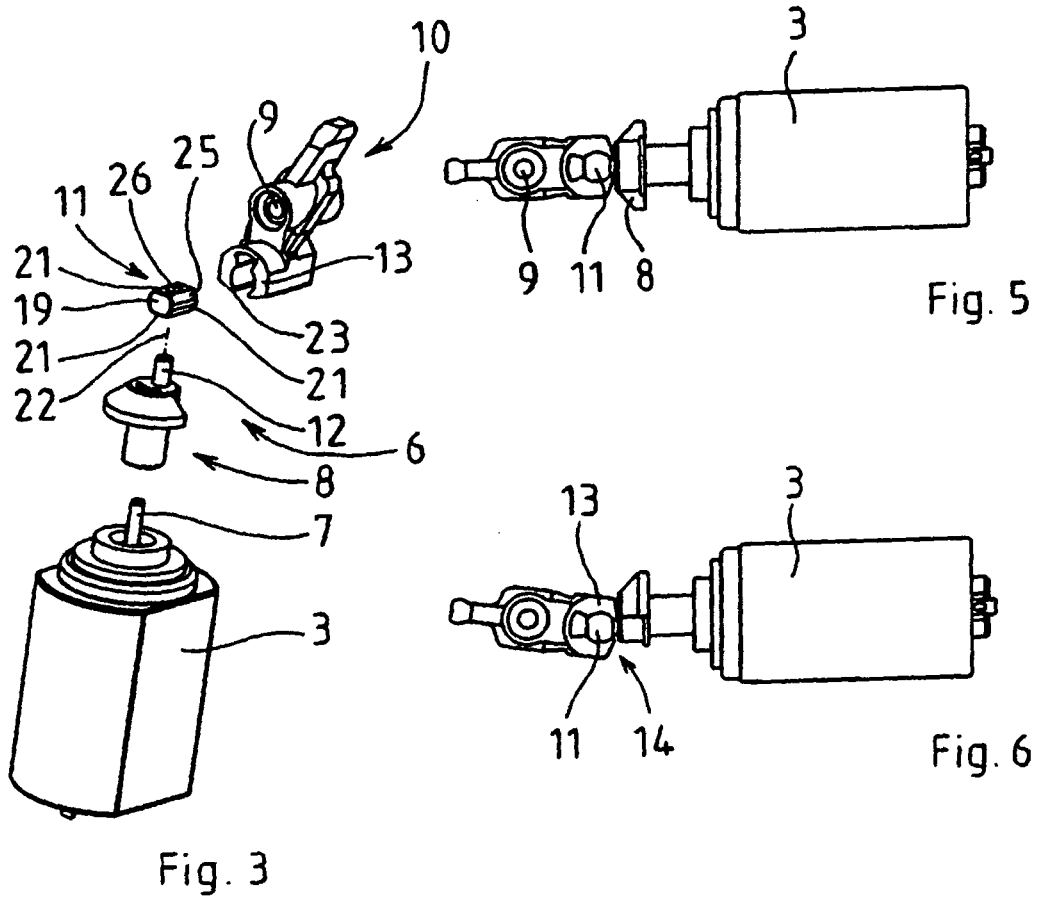
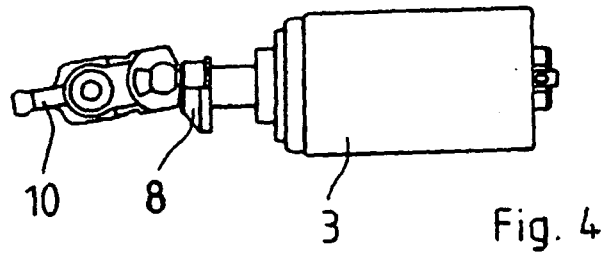
Revendications

1. Machine électrique pour couper les cheveux (1) ayant une pièce de préhension (2), un axe longitudinal (17) de la pièce de préhension (2), un entraînement (3), une lame de tondeuse fixe (4), une lame de tondeuse (5) qui est alignée parallèle à la lame de tondeuse fixe (4) et qui est contiguë à celle-ci dans un plan de coupe (16) et qui peut être déplacée vers l'arrière et vers l'avant, ainsi qu'un engrenage (6) qui transfère un mouvement de rotation d'un arbre d'entraînement (7) à la lame de tondeuse mobile (5), dans laquelle l'arbre d'entraînement (7) a un dispositif d'inversion sous la forme d'un excentrique (8) afin de convertir le mouvement de rotation en un mouvement linéaire vers l'arrière et vers l'avant, avec un levier d'inversion (10), qui peut être pivoté autour d'un arbre de palier (9), dans laquelle le levier d'inversion (10) relie le dispositif d'inversion à la lame de tondeuse mobile (5), ainsi qu'à un patin (11) sur une goupille (12) de l'excentrique (8), dans laquelle le patin (11) est maintenu en position par un arrêtoir (13) sur une extrémité (14) du levier d'inversion (10), et l'arrêtoir (13) est conçu dans une direction (15)

qui est verticale par rapport à l'arbre d'entraînement (7) de telle sorte que le patin (11) exécute un mouvement vers le haut et vers le bas dans cette direction (15), dans laquelle le plan de coupe (16) forme un angle (18) allant de 10 à 70 degrés avec l'axe longitudinal (17) de la pièce de préhension (2), **caractérisée en ce que** le patin (11) est conçu sous la forme d'un cylindre (19) qui s'étend dans la direction (15) qui est verticale par rapport à l'arbre d'entraînement (7), **caractérisée en ce que** le patin (11) est maintenu dans l'arrêtoir (13) par le biais d'une mise en prise positive (23) sur une surface courbe (25) du patin (11), le patin (11) peut être coulissé le long de la goupille (12), et le patin (11) a au moins un point plat (21) qui est fourni transversal par rapport à l'axe central (22) de la goupille (12).

2. Machine pour couper les cheveux selon la revendication 1, **caractérisée en ce qu'**on fournit un autre point plat (21) qui est parallèle par rapport à l'axe central (22) de la goupille (12).





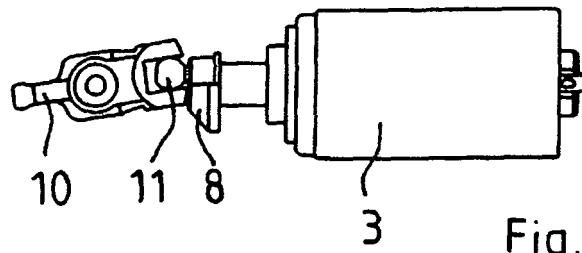


Fig. 9

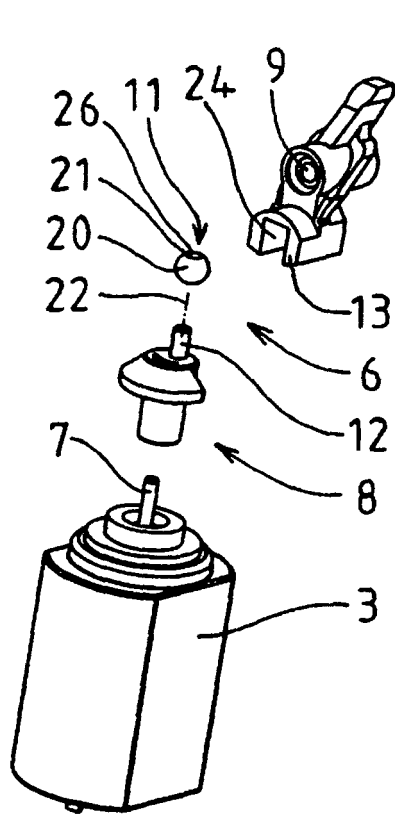


Fig. 8

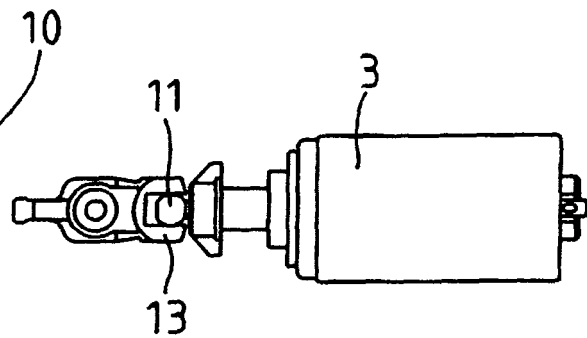


Fig. 10

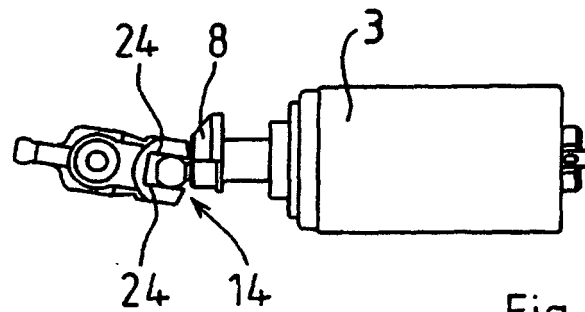


Fig. 11

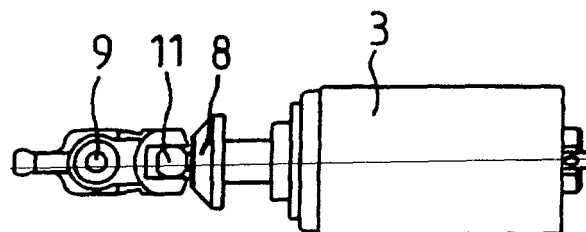


Fig. 12

REFERENCES CITED IN THE DESCRIPTION

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