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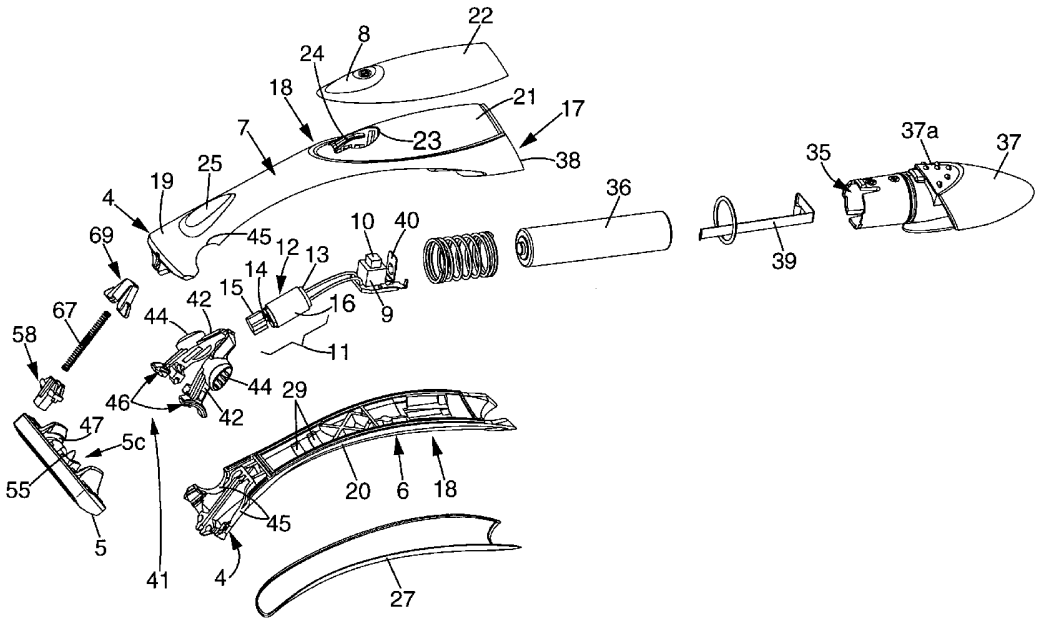
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(54) Title: VIBRATING WET SHAVER



(57) Abstract: A vibrating wet shaver comprising a hollow handle (2), a shaving head (5) borne by the handle and an electric vibrator (11) including a rigid casing (13) which is fixed inside the handle, for transmitting vibrations to the shaving head through the handle. The casing of the vibrator is tightly fitted in the handle, and an elastomeric layer (16) is interposed between the casing and the handle.

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VIBRATING WET SHAVER.

FIELD OF THE INVENTION

The invention relates to vibrating shavers.

BACKGROUND OF THE INVENTION

More precisely, the invention relates to a vibrating wet shaver (i.e., a shaver the blades of which are not driven by a motor relative to the shaving head) comprising:

- a hollow handle,
- a shaving head borne by said handle,
- an electric vibrator including a rigid casing which is fixed inside said handle, for transmitting vibrations to the shaving head through the handle.

In vibrating shavers of this type, it is necessary to achieve an intimate contact between the rigid casing of the vibrator and the handle, in order to efficiently transmit vibrations from the electric vibrator to the handle and then from the handle to the shaving head.

US-A-5 299 354 discloses an example of such a known vibrating shaver, in which the intimate contact between the casing of the electric vibrator and the handle is obtained by gluing said casing in the handle, which makes the manufacturing process of the shaver more expensive.

OBJECTS AND SUMMARY OF THE INVENTION

One objective of the present invention is to avoid this drawback.

To this end, according to the invention, in a vibrating shaver of the type in question, the casing of the vibrator is tightly fitted in the handle, and at least an elastomeric layer is interposed between said casing and said handle.

Thanks to these dispositions, it is possible to obtain a tight fitting of the rigid casing of the electric vibrator inside the handle without requiring excessively precise tolerances of the rigid casing and/or of the handle.

Further, these dispositions also limit noises generated by the vibrator, by reliably and durably ensuring an intimate contact between the rigid casing of the electric vibrator and the handle. In particular, these dispositions avoid attrition phenomena of the bearing surfaces of the handle which bear the electric casing, which attrition phenomena would progressively create a clearance enabling the casing to noisily hit the bearing surfaces, especially when these bearing surfaces are made out of plastic material.

In various embodiments of the invention, one may possibly have recourse in addition to one and/or other of the following arrangements:

- the elastomeric layer has a thickness comprised between 0,2 and 1 mm;
- the elastomeric layer has a thickness comprised between 0,2 and 0,6 mm where said elastomeric layer is compressed between the casing of the vibrator and the handle;
- the elastomeric layer comprises a silicon layer;
- the elastomeric layer has a Shore hardness comprised between 70 Shore A and 90 Shore A;
- the elastomeric layer includes an elastomeric sleeve surrounding the casing of the vibrator;
- the handle extends between a proximal portion and a distal portion in a longitudinal direction (straight or curved), said handle including a body comprising first and second body portions which are fixed to one another and which face each other in a first transverse direction substantially perpendicular to said longitudinal direction, the first body portion including at least a first bearing surface and the second body portion including at least a second bearing surface, said casing of the vibrator being tightly fitted between said first and second bearing surfaces;
- the handle comprises several similar first bearing surfaces and/or several similar second bearing surfaces;

- the body is made out of thermoplastic material;
- the first bearing surface has a substantially U shape, with a base surface and two substantially parallel side surfaces facing each other in a second transverse direction substantially perpendicular to the first transverse direction and substantially perpendicular to the longitudinal direction;
- the casing of the vibrator is substantially circular in cross section and has two diametrically opposed portions clamped between said side surfaces of the first bearing surface, which facilitates the manufacturing process of the shaver;
- the elastomeric layer is more compressed in the second transverse direction between the two side surfaces of the first bearing surface than in the first transverse direction between the second bearing surface and the base surface of the first bearing surface, which again facilitates the manufacturing process, since it is easier to obtain precise tolerances between the side surfaces, which belong to the same body portion, than between the second bearing surface and the base surface which belong to two different body portions;
- the casing of the vibrator is axially fitted between two abutments belonging to the first body portion, parallel to the longitudinal direction;
- the vibrator includes an electric motor comprising said casing, an output shaft adapted to be rotated by the motor and an eccentric mass borne by said shaft;
- the handle extends longitudinally between a proximal portion and a distal portion bearing the shaving head, the electric vibrator being situated close to said distal portion;
- the shaver further comprises a switch adapted to control the electric vibrator, said switch being mounted inside said handle between the vibrator and the proximal portion;
- the switch includes a pusher and the handle

includes a flexible wall in correspondence with the pusher, enabling a user to act on said pusher by deforming said flexible wall;

- the handle includes a body made out of plastic material and having a hollow portion in correspondence with said switch, said hollow portion being covered by an elastomeric trim including said flexible wall;
- said body includes a flexible tongue which is interposed between said flexible wall and said pusher of the switch;
- the handle further includes a battery housing which is situated between the switch and the proximal portion, said battery housing including electrical contacts connected to the switch;
- the proximal portion of the handle includes a removable end cap which enables to open the battery housing in order to exchange batteries.

BRIEF DESCRIPTION OF THE DRAWINGS

Other features and advantages of the invention appear from the following detailed description of one of its embodiments, given by way of non-limiting example, and with reference to the accompanying drawings.

In the drawings:

- figures 1a and 1b are respectively perspective views of a shaver according to one embodiment of the invention, seen from above and from below,
- figure 2 is an exploded perspective of the shaver of figures 1a and 1b, seen from above,
- figure 3 is an exploded perspective view of the shaver of figures 1a and 1b, seen from below,
- figure 4 is a longitudinal cross section of the shaver of figure 1,
- figures 5-7 are respectively transverse cross sections along lines V-V, VI-VI and VII-VII of figure 4,
- figures 8a and 8b are two perspective views, seen in two different directions, of the lock / release

mechanism connecting the razor handle to the shaving head in the shaver of figures 1a and 1b,

- figure 9 is a rear view of the shaving head in the shaver of figures 1a and 1b,

- and figures 10 and 11 are cross sections of the lock/release mechanism of figures 8a and 8b, respectively in the head locking position and in the head release position.

In the figures, the same references denote identical or similar elements.

Figures 1a and 1b show a wet shaver 1, i.e. a shaver the blades of which are not driven by a motor relative to the shaving head.

The shaver 1 includes a hollow handle 2 extending in a longitudinal direction L between a proximal portion 3 and a distal portion 4 bearing a shaving head 5. The shaving head 5 includes a front face 5a equipped with one or several blades 5b and a rear face 5c which is connected to the handle 2.

The longitudinal direction L may be curved or include one or several straight portions. In the present case, the longitudinal direction L is curved, with a concavity which is constantly directed toward the underside 6 of the handle (i.e. the side of the handle which faces substantially the same direction as the front face 5a of the shaving head).

The shaver may further include, for instance on the top side 7 of the handle (i.e. the side of the handle which faces opposite the front face 5a of the shaving head), a flexible wall 8 which enables to actuate a switch 9 (see figures 2 and 3) mounted inside the hollow handle 2, for instance by pressing on a pusher 10 of said switch when depressing said flexible wall 8.

The switch 9 controls an electric vibrator 11 (see figures 2-4) which is able to generate vibrations and

transmits them to the handle 2. The electric vibrator may include for instance:

- an electric motor 12 having a rigid outer casing 13,
- an output shaft 14 rotated by the electric motor 12,
- and an eccentric mass 15 which is mounted on the output shaft 14.

As it will be explained in further details hereafter, the rigid outer casing 13 of the electric motor 12 is tightly fitted in the handle 2, in the vicinity of the distal portion 4, with interposition of an elastomeric layer 16 between the casing and the handle.

The casing 13 may be circular in cross section, and may in particular have substantially the shape of a circular cylinder and the elastomeric layer 16 may surround the casing 13 of the vibrator. The elastomeric layer may be in the form of an elastomeric sleeve surrounding the casing of the vibrator or more generally may include such elastomeric sleeve.

As shown in figures 5-7, the thickness e of the elastomeric layer may be comprised for instance between 0,2 and 1 mm. More particularly, where said elastomeric layer 16 is compressed between the casing 13 and the handle 2, the thickness e may be comprised between 0,2 and 0,6 mm, and for instance be around 0,4 mm, whereas in the portions where said elastomeric layer is not compressed between the casing and the vibrator, the thickness e of such layer may be comprised for instance between 0,4 and 1 mm.

The elastomeric layer 16 may for instance be a silicone layer or more generally may comprise such silicone layer, and said elastomeric layer may have a Shore hardness comprised for instance between 70 Shore A and 90 Shore A. Said Shore hardness may be for instance around 75 Shore A.

In the example considered here, as shown for

instance in figures 2 and 3, the handle may include a substantially rigid hollow body 17 (as opposed to softer elastomeric parts of the handle), made out for instance of plastic material, e.g. of molded thermoplastic.

The body 17 may form the distal portion 4 of the handle and the medial portion 18 of said handle, and said body 17 may comprise:

- a first body portion 19 forming for instance part of the top side 7 of the handle,
- and a second body portion 20 which may form for instance part of the underside 6 of the handle.

The first body portion 19 may include a recessed portion 21 on which is fixed an elastomeric trim 22 which includes said flexible wall 8 in correspondence with a hollow portion 23 which is hollowed out in said recessed portion 21 in correspondence with the pusher 10 of the switch 9.

The first body portion 19 may also include a flexible tongue 24 protruding substantially parallel to the longitudinal direction L in the hollow portion 23 and interposed between the flexible wall 8 and the pusher 10. The flexible tongue 24 is elastically flexed and presses on the pusher 10 when a user depresses the flexible wall 8, and said flexible tongue 24 thereafter elastically returns the flexible wall 8 toward its normal position. In this normal position, the flexible wall 8 may for instance slightly protrude upwardly from the elastomeric trim 22.

Besides, the first body portion 19 may also include, in the example shown in the drawings, an index pad 25 on which the index finger of the user of the shaver may rest (see figure 2). This index pad 25 may for instance extend with an increasing width, between a rear tip 25a and a front end which is wider than said rear tip and which is closer to the shaving head 5 (see figure 1a). The index pad 25 may be made for instance out of elastomer.

Besides, as shown for instance on figures 2 and 3, the second body portion 20 may also include an outer recess portion 26 in which is fixed a further elastomeric trim 27. The trim 27 may include for instance transverse ribs 27a at the end of said trim which is opposite the distal portion 4 of the handle.

The elastomeric trims 22, 27 may be fixed to the corresponding body portions 19, 20 by any suitable means, for instance by co-injection.

The first and second body portions 19, 20 are facing each other in a first transverse direction T1 (figure 4) which is substantially perpendicular to the longitudinal direction L at the level of the motor 12 and which is comprised in a medial plane of symmetry of the shaver 1. More precisely, the first transverse direction, as shown in figure 4, is perpendicular to the output shaft 14 of the motor.

The first and second body portions 19, 20 may be fixed together by fitting and by ultrasonic welding. However, the first and second body portions could be fixed together by any other means, such as snap fitting, gluing, etc.

The casing 13 of the motor may be for instance tightly fitted between:

- at least one, for instance two concave bearing surfaces 28 belonging to the first body portion 19 and facing toward the second body portion 20 parallel to the first transverse direction T1 (see figures 3 and 6),
- and at least one, for instance two second concave bearing surfaces 29 belonging to the second body portion 20 and facing toward the first body portion 19 in the first transverse direction T1 (figures 2 and 7).

These first and second bearing surfaces, which may be either in mutual correspondence on both sides of the motor 12 or axially offset along the longitudinal direction

L of the motor 12, are more clearly visible on figures 6 and 7.

As shown on figure 6, the or each first bearing surface 28 may have a substantially U shape, with a base surface 28a and two substantially parallel side surfaces 28b facing each other in a second transverse direction T2 substantially perpendicular to the first transverse direction and to the longitudinal direction. These side surfaces 28b may be disposed to be clamped onto substantially diametrically opposed portions of the casing 13, with interposition of the elastomeric layer 16. This feature enables an easier manufacturing process, since the motor 12 may thus be retained in the first bearing surface 28 after being mounted therein, before mounting of the second body portion 20 onto the first body portion 19.

Besides, in the embodiment shown in the drawings, the elastomeric layer 16 may be more compressed in the second transverse direction T2 between the two side surfaces 28b of the first bearing surface 28 (figure 6), than in the first transverse direction T1 between the second bearing surface 29 and the base surface 28a of the first bearing surface.

This feature may also facilitate the manufacturing process, particularly since the tolerances of mutual positioning between the second bearing surface 29 and the base surface 28a parallel to the first transverse direction T1 may be larger than the tolerances between the side surfaces 28b parallel to the second transverse direction T2. As shown in figures 3 and 4, the casing 13 of the motor is also axially fitted between two abutments, parallel to the longitudinal direction L, to wit a rear abutment 30 belonging for instance to the first body portion and a front abutment 31 which may also belong to the first body portion.

The front abutment 31 which may include a cut out

31a for the output shaft 14 of the motor, said front abutment being axially interposed between the casing 13 and the eccentric mass 15, preferably without contact between front abutment 31 and said eccentric mass 15.

As shown in figure 3, the switch 9 is mounted between the vibrator 11 and the proximal portion 3 of the handle, close to said vibrator 3, and is connected to the motor 12 by electric wires 32. The switch 9 may be fixed to a base plate 33 such as an electronic circuit board, which is itself fitted in support members 34 belonging for instance to the first body portion 19.

Besides, the handle further includes a battery housing 35 (see figures 3 and 4) which is situated between the switch 9 and the proximal portion 3. This battery housing is adapted to receive a battery 36 extending longitudinally substantially parallel to the longitudinal direction L of the handle. This battery may be inserted in and removed from the battery housing 35 parallel to the longitudinal direction L, after removing an end cap 37 which forms the proximal portion 3 of the handle and which is axially fitted at the rear open end 38 of the body 17, said rear end being formed for instance by a portion of circular cross section of the first body portion 19, opposite to the shaving head 5.

As shown in figures 2 and 4, the battery housing may further include two electrical contacts 39, 40 for connecting the battery to the switch. The electrical contact 39 may be in the form of a metallic strip which is fitted inside the end cap 37.

Besides, the end cap 37 may include for instance an upper finger rest portion 37a with protruding dots on the top surface of the handle, and a lower flattened portion 41 also with protruding dots. Both upper finger rest portion 37a and lower flattened portion 41 may be formed for instance out of elastomer or include an elastomeric trim.

As discussed previously, the distal portion 4 of the razor handle bears the shaving head 5. As shown in figures 1a and 1b, the shaving head 5 includes a front face 5a having one or several blades 5b exposed thereon, and a rear face 5c which is connected to the handle 2.

In the example shown in the drawings, the rear face 5c of the shaving head is connected to the handle 2 by a lock/release mechanism 41 which is shown in greater details in figures 8a, 8b and 10 and which enables to selectively:

- either connect the shaving head 5 to the handle,
- or release said shaving head in order to exchange shaving heads.

It should be noted that:

- the vibrating mechanism described previously could be used with another type of connection between the shaving head and the handle,
- and that the lock/release mechanism 41, which will now be described in greater details, could be used without any vibrating mechanism, or with a different vibrating mechanism.

As shown in greater details in figures 2, 8a, 8b and 10, the lock/release mechanism 41 includes two arms 42 which can be made for instance out of molded plastic material. The two arms 42 may each extend from a first end 42a situated inside the handle body 17 toward a second end 42b which may protrude toward the outside at the distal portion 4 of the handle 2. The two arms may be disposed in a V shape, diverging from a medial axis X from their first end 42a toward their second end 42b. The medial axis X is substantially parallel to the curved longitudinal axis L of the handle.

The first ends 42a of the two arms 42 may be connected together by a hinge 43, formed for instance as a thin bridge of plastic material connecting the two arms 42 to each other when said arms are molded as a single piece.

The hinge 43 may have a negligible resilient action, or no resilient action, on the two arms 42.

The two arms 42 further include respectively two push buttons 44 which may be formed integrally therewith and which may protrude laterally out of the handle body 17, for instance through two holes 45 formed in said handle body (see figures 1a, 1b and 2). The pushbuttons 44 may thus be surrounded by the handle body in all directions around the holes 45.

Returning to figures 2, 8a, 8b and 10, the second ends 42b of the arms 42 may include respectively two bearings, in particular two shell bearings 46 which are exposed toward the outside. Each shell bearing 46 may for instance include a cylindrical concave front face 46a and a lateral edge 46b which protrudes outwardly and which has also a cylindrical shape. The two front faces 46a and the two lateral edges 46b have the same cylindrical axis, corresponding to the axis of rotation of the shaving head 5.

As shown in figure 9, the rear face 5c of the shaving head may include two inwardly facing arcuate slots 47 shaped in correspondence with the lateral edges 46b of the shell bearings and adapted to receive said lateral edges for pivotally mounting the shaving head 5 onto the handle 2. These arcuate slots 47 may be formed respectively in two protruding ribs 48 and may be limited:

- toward the handle, by a first arcuate concave surface 49 facing toward the shaving head 5,
- and away from the handle, by a larger second arcuate convex surface 50 facing toward the handle 2.

The front faces 46a of the shell bearings 46 bear respectively on the arcuate convex surfaces 50. Said arcuate convex surfaces 50 may include respectively two notches 51 for receiving corresponding protrusions 52 of the shell bearings 46 (see figures 8a and 8b), so as to

limit the angular range of rotation of the shaving head 5.

Besides, as shown in figure 9, the ribs 48 may include two inclined surfaces 53 facing each other and extending slantwise toward each other from the top of the ribs 48 toward the arcuate slots 47, so as to facilitate the insertion of the shell bearings 46 in the arcuate slots 47.

The rear face 5c of the shaving head 5 may further include a central rib 54 having an edge forming a top cam surface 55 facing away from the shaving head 5 toward the handle 2. The cam surface 55 may have a generally V shape, and may for instance include two substantially flat surfaces 56 which are slightly inclined relative to one another and which may be for instance separated from one another by a notch 57 hollowed out in the rib 54 in order (e.g. to adapt the shaving head 5 on a other type of handle having a flexible tongue which is inserted into said notch 57).

Returning to figures 2, 8a, 8b and 10, the lock/release mechanism 41 includes a plunger 58 which is movably mounted, substantially along the medial axis X between the two arms 42. This plunger 58 has a central body 59 and two lateral wings 60 extending opposite to one another toward the two arms 42. The central body 59 extends longitudinally parallel to the medial axis X, between a first, substantially flat free end 59a which bears against the cam surface 55 of the shaving head, and a second end 59b facing away from the shaving head 5. A recess 61 may be hollowed out in the central body 59, said recess forming a blind hole which opens at the second end 59b of the central body 59, in the direction of the handle 2.

Each lateral wing 60 may include a detent 62 protruding parallel to the medial axis X toward the shaving head 5, said detent facing an inwardly extending protrusion 63 belonging to the corresponding arm 42. The protrusion 63

has an opening 64 which is limited inwardly by a rim 65 belonging to said protrusion. Besides, the lateral wings 60 of the plunger 58 may each have respectively two ribs 66 which extend in a medial plane of the arms 42, opposite to the central body 59.

The plunger 58 is elastically biased toward the cam surface 55 of the shaving head so as to cooperate therewith by camming action to bias said shaving head in rotation toward a rest position. In the example shown in the drawings, the plunger 58 is elastically biased by a spring 67, for instance a helicoidal spring, which has a first spring end fitted into the recess 61. The spring 67 also has a second spring end fitted into a recess 68, for instance in the form of a blind hole, hollowed out in an arm pusher 69.

The arm pusher is disposed between the arms 42 in line with the plunger 58 along the medial axis X. Said arm pusher 69 is disposed between the plunger 58 and the hinge 43 along the medial axis X. The recess 68 opens parallel to the medial axis X toward the plunger 58.

Besides, in the example shown in the drawings, the spring coils of the helicoidal spring 67 may be in mutual contact in a central portion of the spring 67, between the recesses 61, 68, and may be separate from each other between this central portion of the spring, except for the last spring coils at both ends of the spring.

The arm pusher is slidably mounted between the arms 42, substantially parallel to the medial axis X and is elastically biased by said spring 67 toward the handle, i.e. away from the shaving head 5. Said arm pusher 69 cooperates by camming action with the two arms 42 for biasing said arms outwardly away from each other, toward a head locking position shown in figures 8a, 8b and 10, where lateral edges 46b of the shell bearings 46 penetrate in the corresponding arcuate slots 47 of the shaving head.

The arm pusher 69 may have a central body 70 in which the recess 68 is hollowed out, and two lateral extensions 71 extending opposite to one another toward the two arms 42 and cooperating by camming action respectively with said two arms for biasing the arms toward the head locking position.

More particularly, the lateral extensions 71 may penetrate in two slots 72 formed respectively in the two arms and facing each other. The two lateral extensions 71 of the arm pusher may have lateral edges 74 which cooperate by camming action with the respective bottoms 73 of the slots. Said lateral edges may be diverging from the medial axis X in a direction away from the handle 2, whereas the bottoms 73 may also diverge from the medial axis in the direction away from the handle.

Thanks to these dispositions, the same spring 67 is used to bias the plunger 58 elastically toward the cam surface 55 of the shaving head and to bias the arm pusher 69 away from the shaving head, thus biasing both the shaving head in rotation toward the rest position and the arms 42 toward the head lock position.

It should be noted that, in the position of figures 8a, 8b, and 10, the plunger 58 is maintained between the two arms 42 both by cooperation with the spring 67, by abutment against the cam surface 55 of the shaving head, and eventually by abutment against the protrusions 63 of the arms 42.

When a shaving head 5 is mounted on the handle 2, the lock/release mechanism 41 is normally in the head lock position. Starting from this position, when a user wishes to exchange shaving heads, he first pushes on both pushbuttons 44, which rotates the arm 42 toward each other against the camming action of the arm pusher 69. During this movement, the arm pusher 69 slides along the medial axis X toward the plunger 58, and said arm pusher partially

penetrates between the ribs 66 of the plunger. When the arms 42 have sufficiently rotated toward each other to reach the head release position shown in figure 11, the head is released by the shell bearings 46 and is simultaneously ejected by the plunger 58.

The plunger 58 then moves forward to an outwardly protruding position, so that the detents 62 of said plunger penetrate in the recesses 64 of the extensions 63 of the arms. In this position, as shown in figure 11, the arms 42 are maintained in the head release position by abutment of the rims 65 against said detents 62, thus cooperating by hooking action. Afterwards, when a new shaving head 5 is fixed to the handle 2, the shell bearings 46 are inserted between the arcuate slots 47 of the new shaving head 5 and the cam surface 55 of said new shaving head pushes the plunger 58 backward toward the handle. The arms 42 are then released and rotate away from each other under the action of the arm pusher 69, so that the shell bearings 46 insert themselves in the arcuate slots 47 of the new shaving head, and the lock/release mechanism 41 is again in the position shown in figures 8a, 8b and 10.

WE CLAIM:

1. A vibrating wet shaver comprising:
- a hollow handle (2),
- a shaving head (5) borne by said handle (2),
- an electric vibrator (11) including a rigid casing (13) which is fixed inside said handle (2), for transmitting vibrations to the shaving head (5) through the handle (2),

wherein the casing (13) of the vibrator is tightly fitted in the handle (2), and at least an elastomeric layer (16) is interposed between said casing (13) and said handle (2).

2. A vibrating wet shaver according to claim 1, wherein the elastomeric layer (16) has a thickness (e) comprised between 0,2 and 1 mm.

3. A vibrating wet shaver according to claim 1 or claim 2, wherein the elastomeric layer (16) has a thickness (e) comprised between 0,2 and 0,6 mm where said elastomeric layer (16) is compressed between the casing (13) of the vibrator and the handle (2).

4. A vibrating wet shaver according to anyone of the preceding claims, wherein the elastomeric layer (16) comprises a silicon layer.

5. A vibrating wet shaver according to anyone of the preceding claims, wherein the elastomeric layer (16) has a Shore hardness comprised between 70 Shore A and 90 Shore A.

6. A vibrating wet shaver according to anyone of the preceding claims, wherein the elastomeric layer (16) includes an elastomeric sleeve surrounding the casing of the vibrator.

7. A vibrating wet shaver according to anyone of the preceding claims, wherein the handle (2) extends between a proximal portion (3) and a distal portion (4) in a longitudinal direction (L), said handle including a body (17) comprising first and second body portions (19, 20) which are fixed to one another and which face each other in a first transverse direction (T1) substantially

perpendicular to said longitudinal direction (L), the first body portion (19) including at least a first concave bearing surface (28) and the second body portion including at least a second concave bearing surface (29), said casing (13) of the vibrator being tightly fitted between said first and second bearing surfaces (28, 29).

8. A vibrating wet shaver according to claim 7, wherein the handle comprises several similar first bearing surfaces (28) and/or several similar second bearing surfaces (29).

9. A vibrating wet shaver according to anyone of claims 7 and 8, wherein the body (17) is made out of thermoplastic material.

10. A vibrating wet shaver according to anyone of claims 7 to 9, wherein the first bearing surface (28) has a substantially U shape, with a base surface (28a) and two substantially parallel side surfaces (28b) facing each other in a second transverse direction (T2) substantially perpendicular to the first transverse direction (T1) and substantially perpendicular to the longitudinal direction (L).

11. A vibrating wet shaver according to claim 10, wherein the casing (13) of the vibrator is substantially circular in cross section and has two diametrically opposed portions clamped between said side surfaces (28b) of the first bearing surface.

12. A vibrating wet shaver according to anyone of claims 10 and 11, wherein the elastomeric layer (16) is more compressed in the second transverse direction (T2) between the side surfaces (28b) of the first bearing surface than in the first transverse direction (T1) between the second bearing surface (29) and the base surface (28a) of the first bearing surface.

13. A vibrating wet shaver according to anyone of claims 7 to 12, wherein the casing (13) of the vibrator is axially fitted between two abutments (30, 31) belonging to the first body portion (19), parallel to the longitudinal direction (L).

14. A vibrating wet shaver according to anyone of the preceding claims, wherein the vibrator (11) includes an electric motor (12) comprising said casing (13), an output shaft (14) adapted to be rotated by the motor and an eccentric mass (15) borne by said shaft (14).

15. A vibrating wet shaver according to anyone of the preceding claims, wherein the handle (2) extends longitudinally between a proximal portion (3) and a distal portion (4) bearing the shaving head (5), the electric vibrator (11) being situated close to said distal portion (4).

16. A vibrating wet shaver according to claim 15, wherein the shaver further comprises a switch (9) adapted to control the electric vibrator (11), said switch being mounted inside said handle (2) between the vibrator (11) and the proximal portion (3).

17. A vibrating wet shaver according claim 16, wherein the switch (9) includes a pusher (10) and the handle (2) includes a flexible wall (8) in correspondence with the pusher, enabling a user to act on said pusher (10) by deforming said flexible wall (8).

18. A vibrating wet shaver according to claim 17, wherein the handle (2) includes a body (17) having a hollow portion (23) in correspondence with said switch (9), said hollow portion (23) being covered by an elastomeric trim (22) including said flexible wall (8).

19. A vibrating wet shaver according to claim 17 or claim 18, wherein said body (17) includes a flexible tongue (24) which is interposed between said flexible wall (8) and said pusher (10) of the switch.

20. A vibrating wet shaver according to anyone of claims 16 to 19, wherein the handle further includes a battery housing (35) which is situated between the switch (9) and the proximal portion (3), said battery housing (35) including electrical contacts (39, 40) connected to the switch (9).

21. A vibrating wet shaver according to claim 20, wherein the proximal portion (3) of the handle includes a

removable end cap (37) which enables to open the battery housing (35) in order to exchange batteries (36).

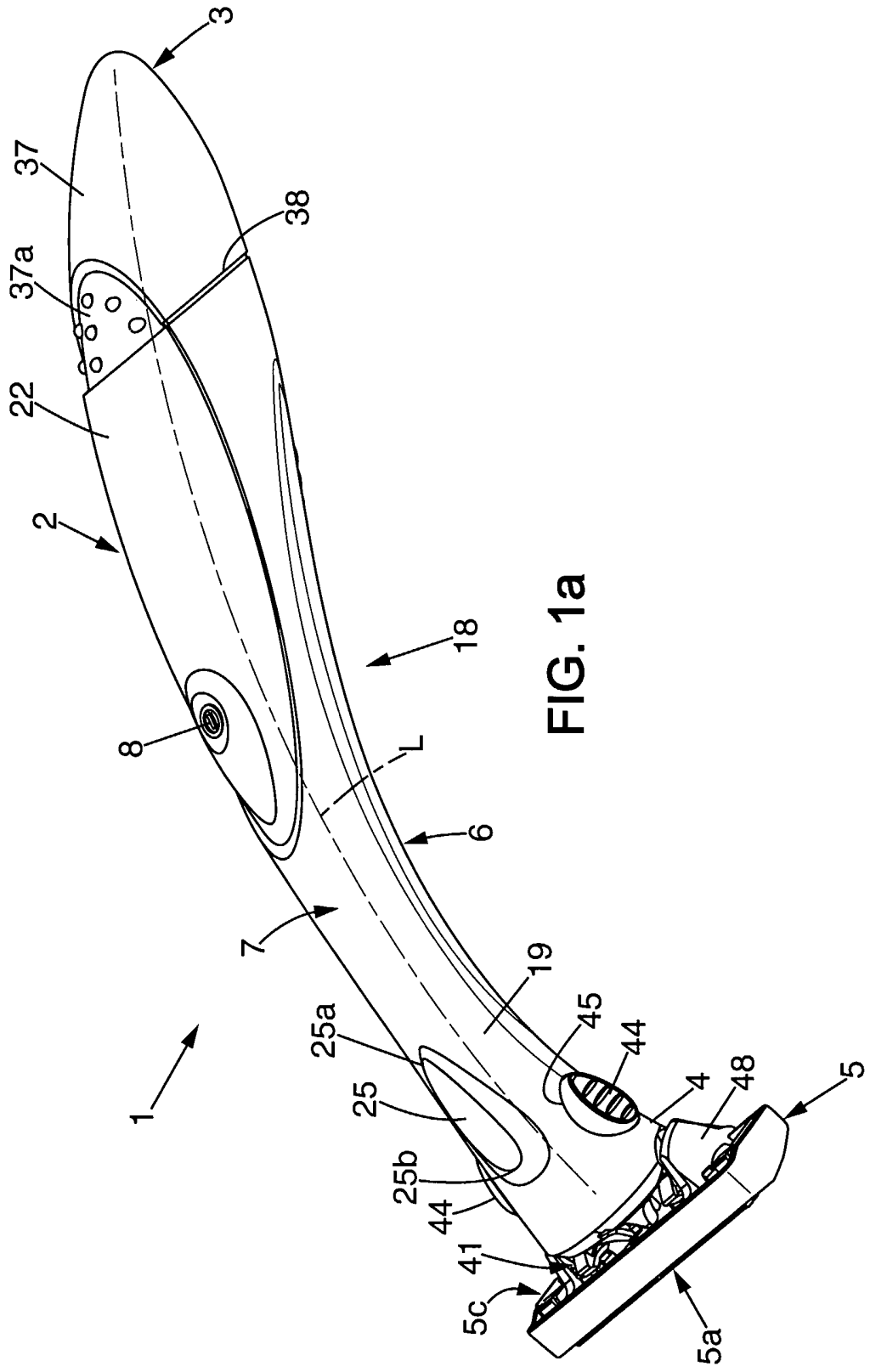


FIG. 1a

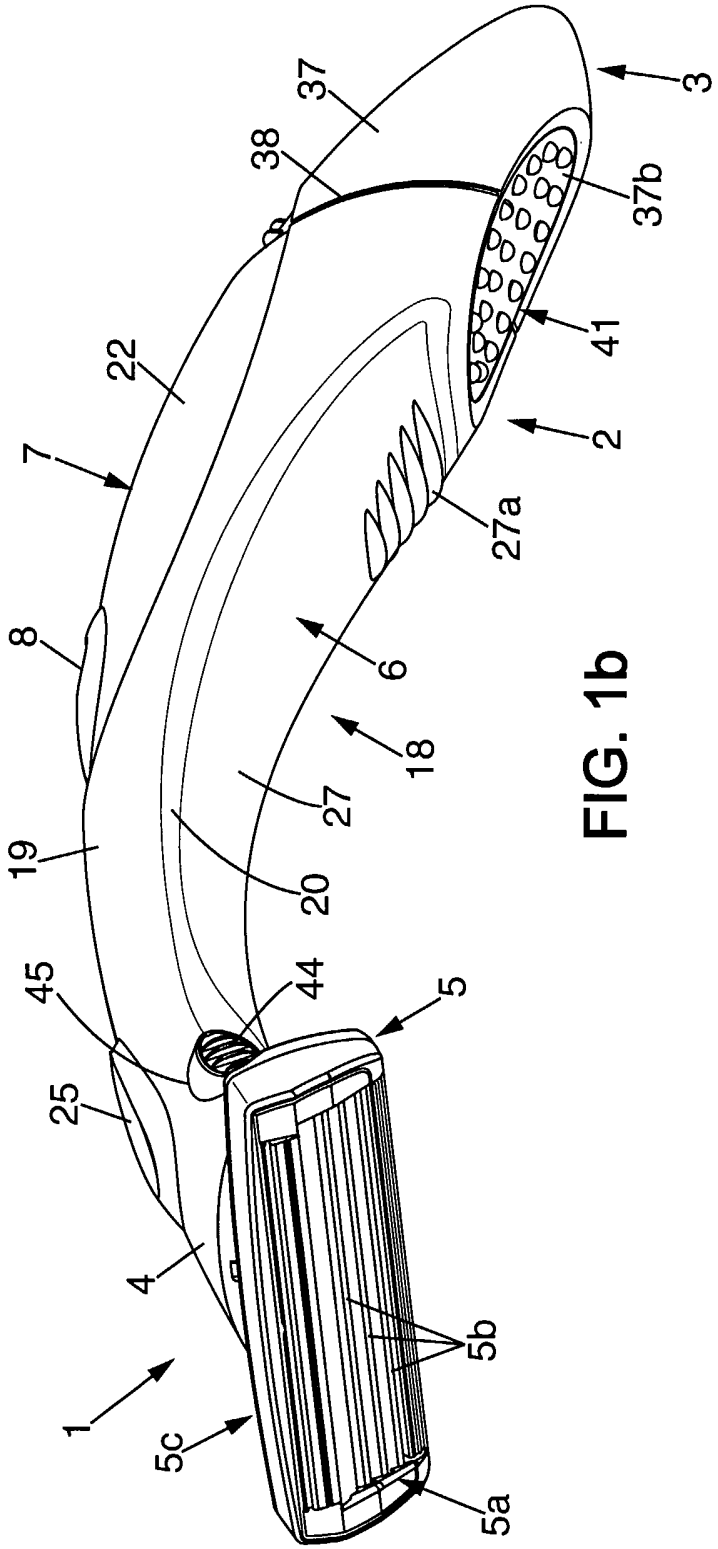


FIG. 1b

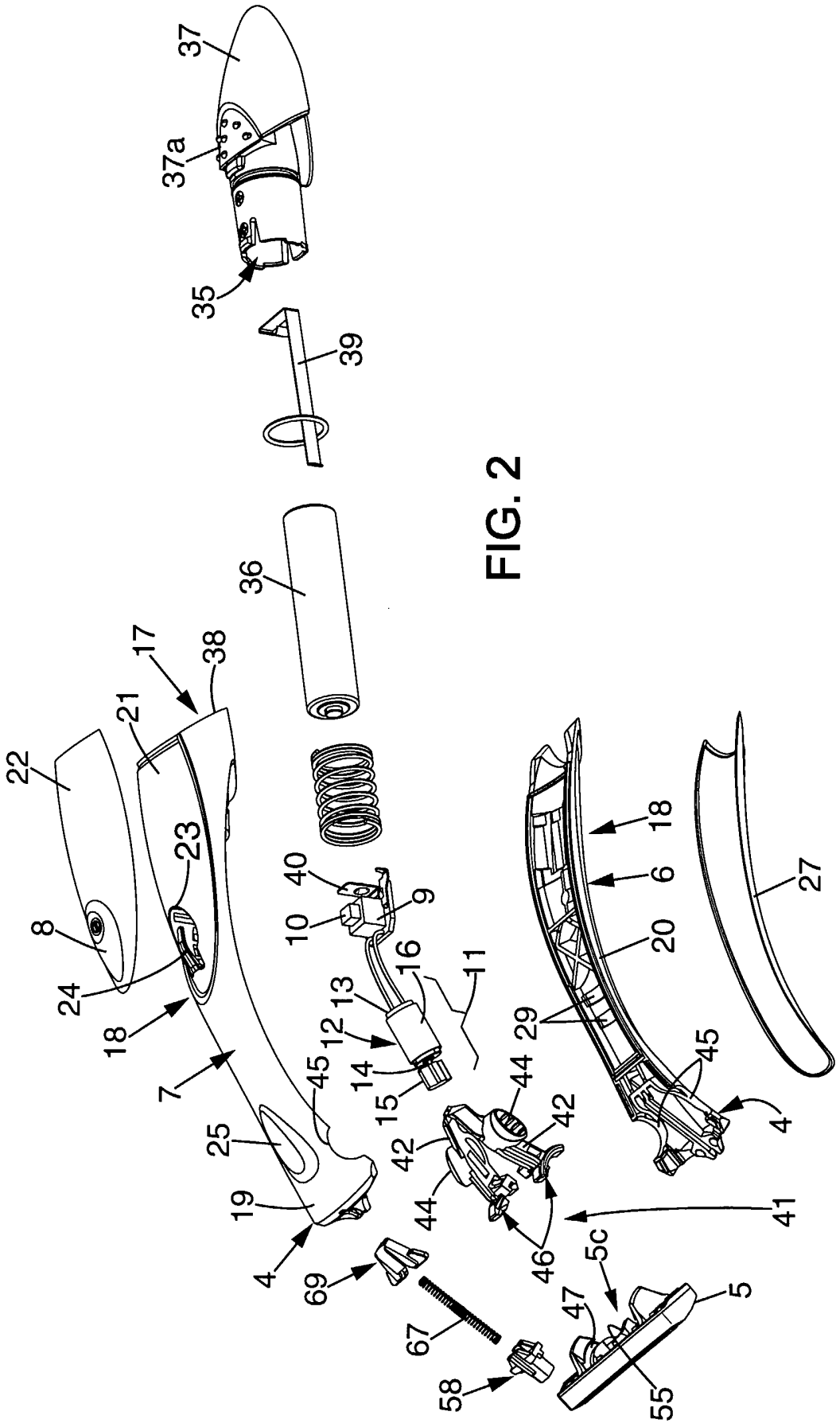

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FIG. 2

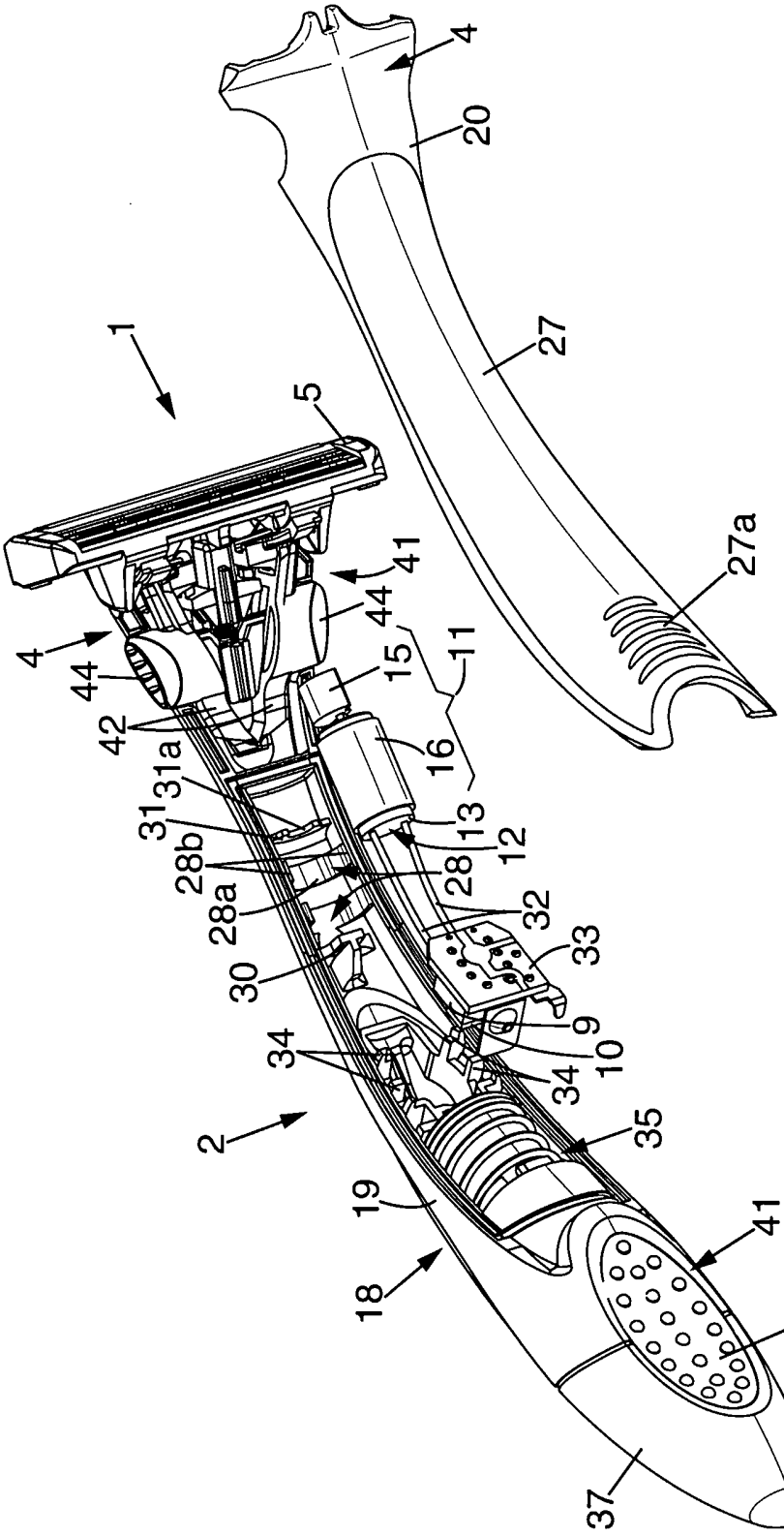

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FIG. 3

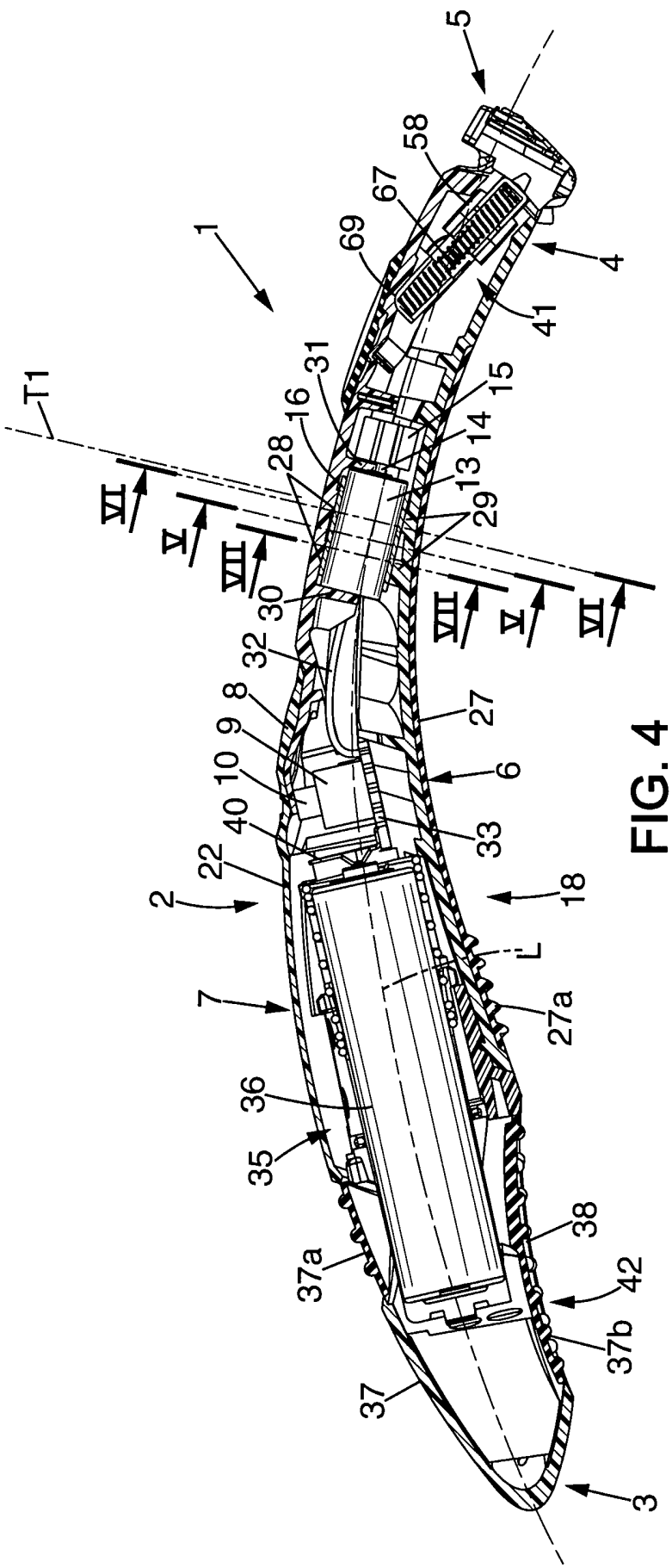

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FIG. 4

FIG. 5

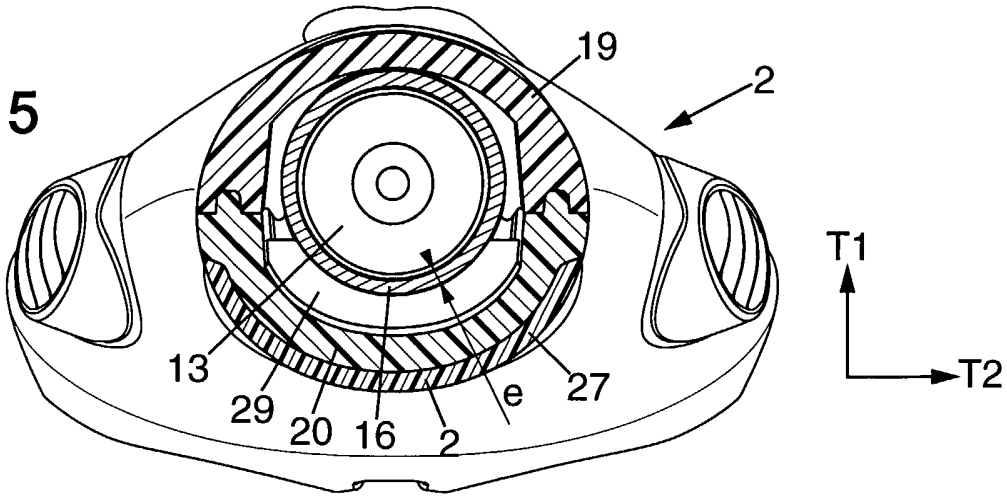


FIG. 6

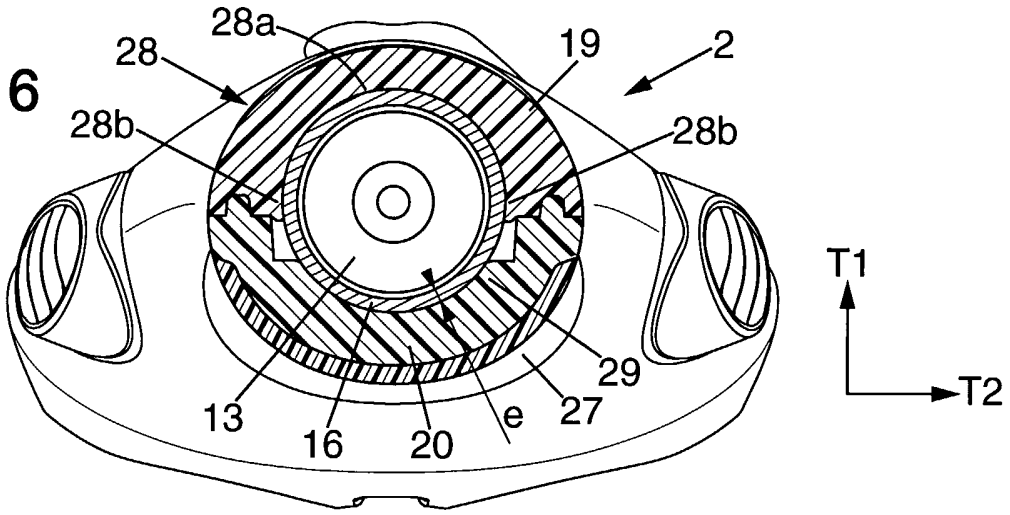
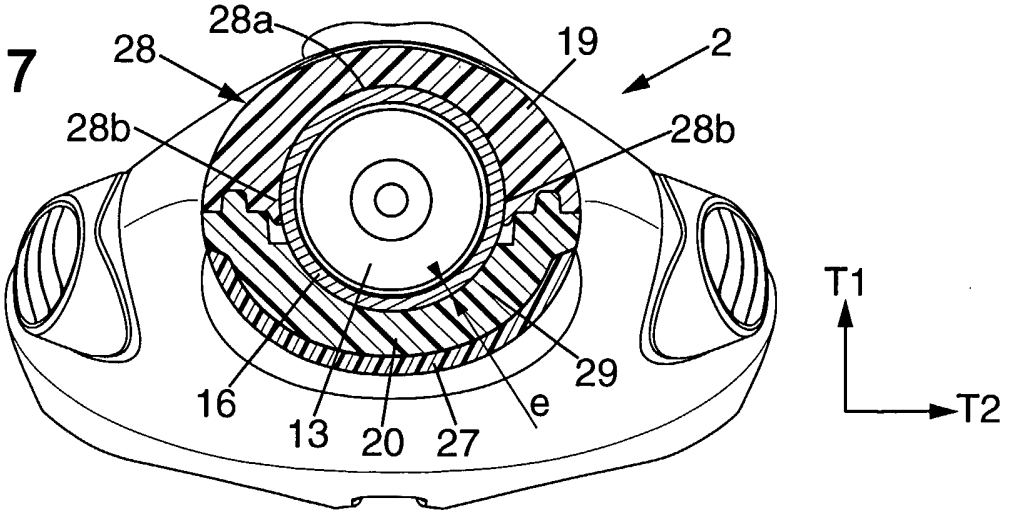


FIG. 7



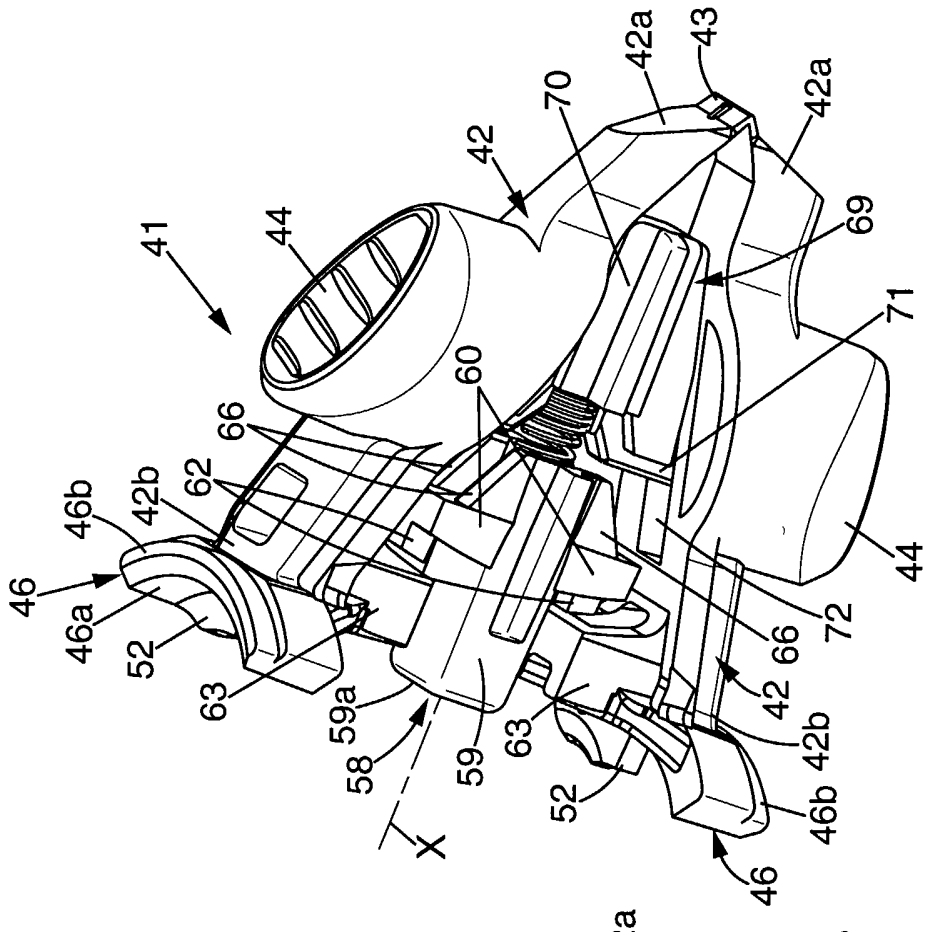

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FIG. 8b

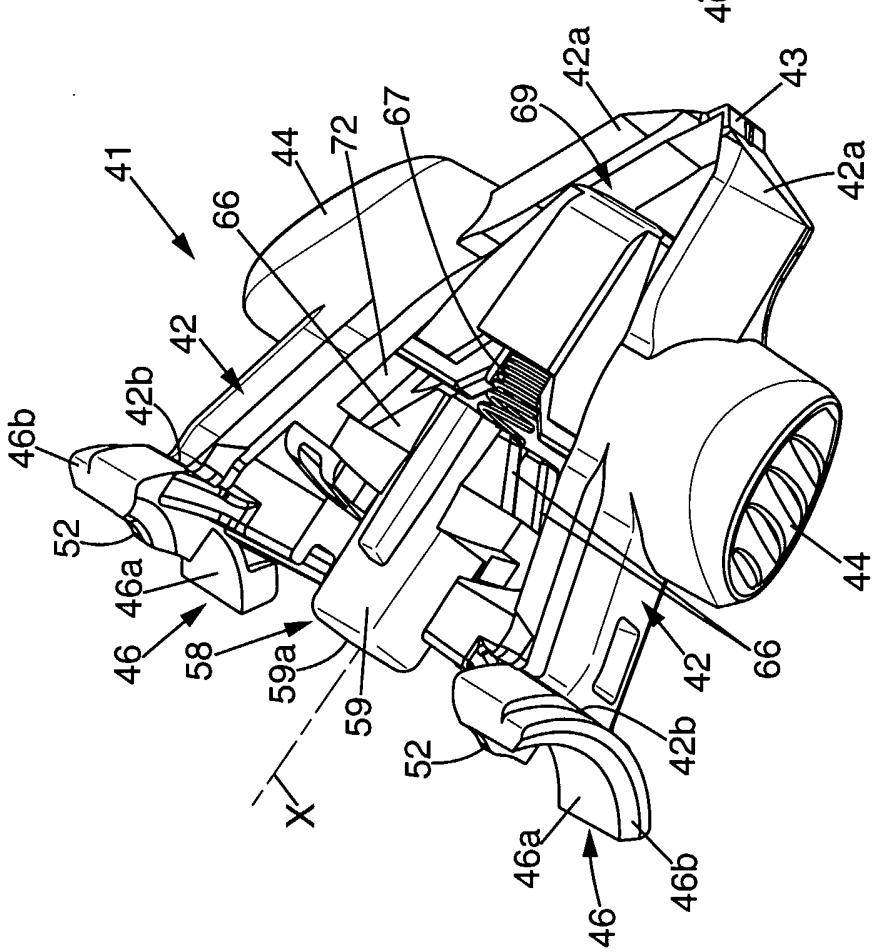

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FIG. 8a

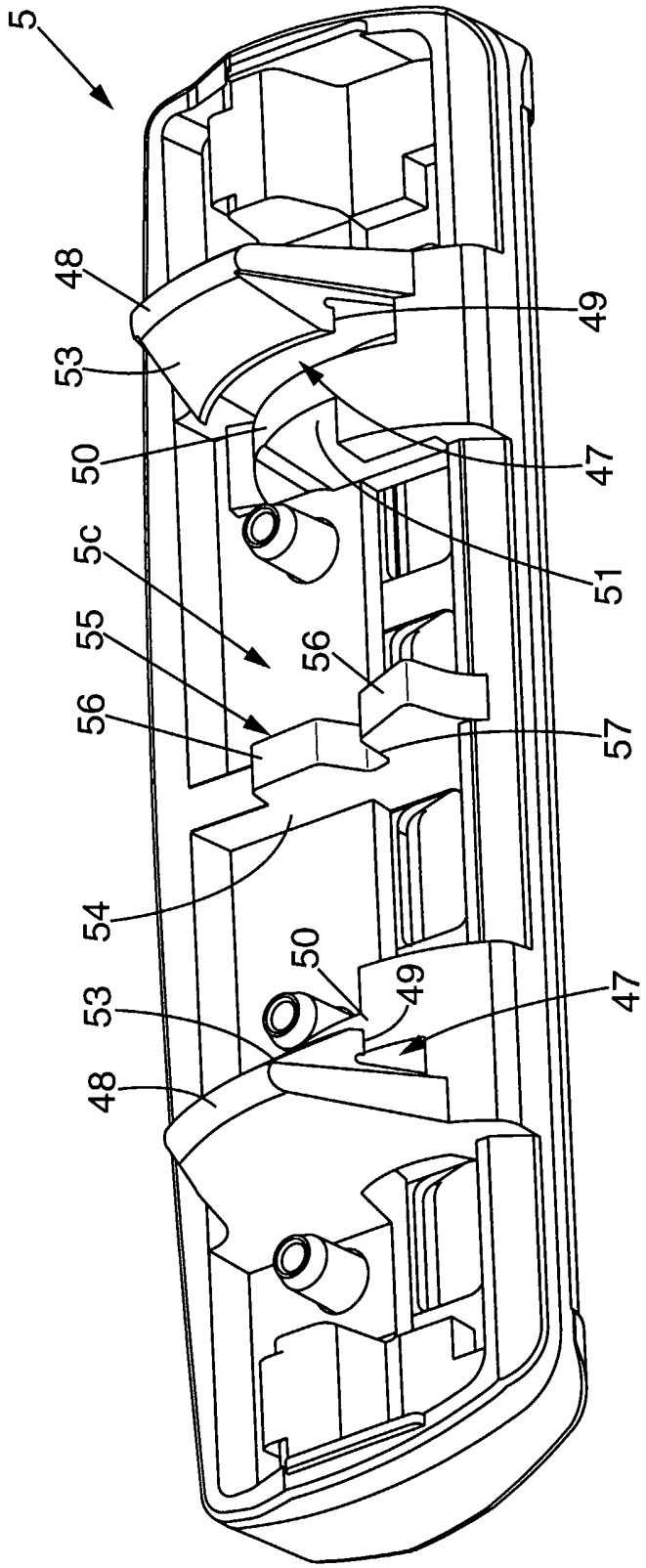


FIG. 9

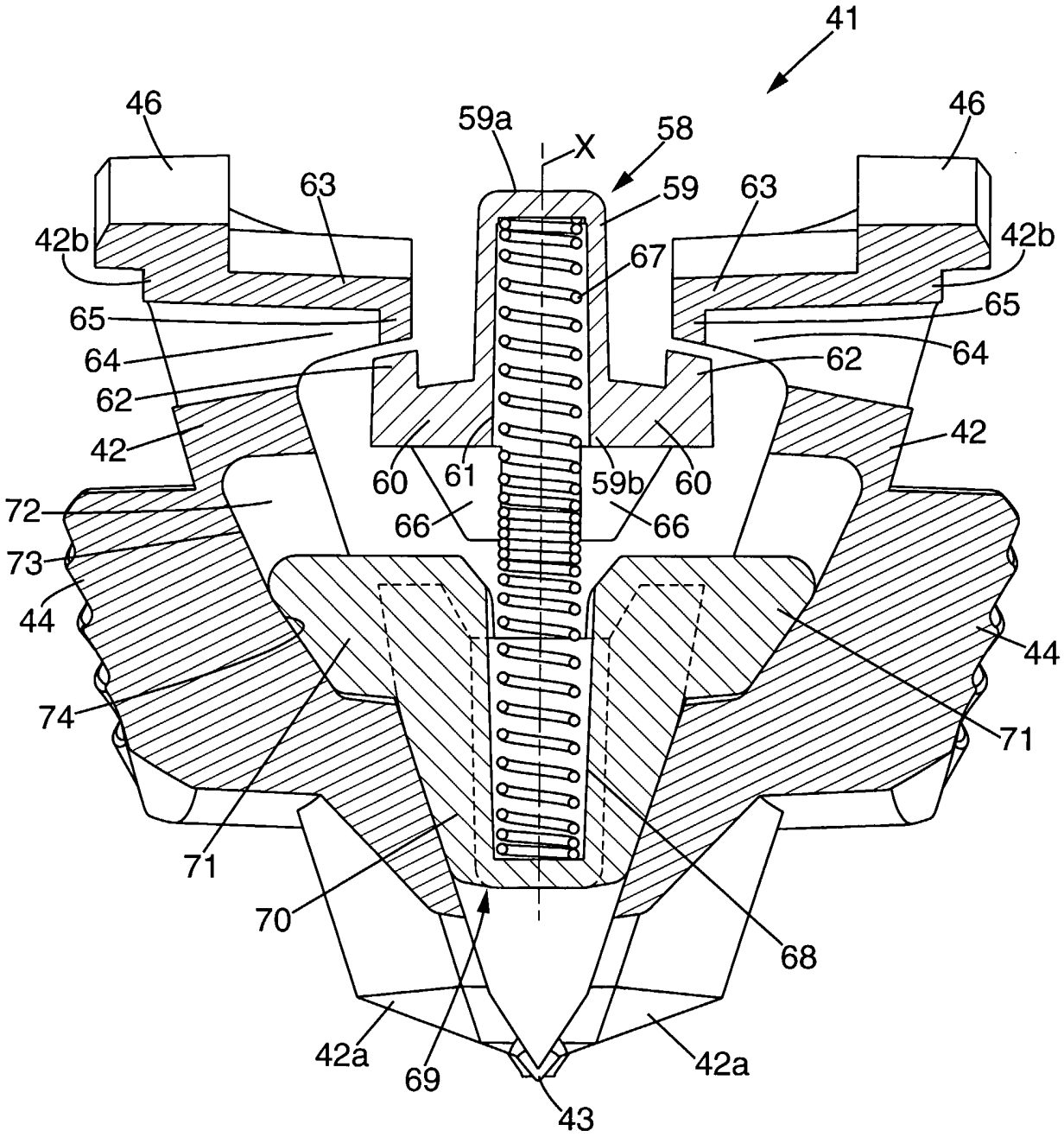

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FIG. 10

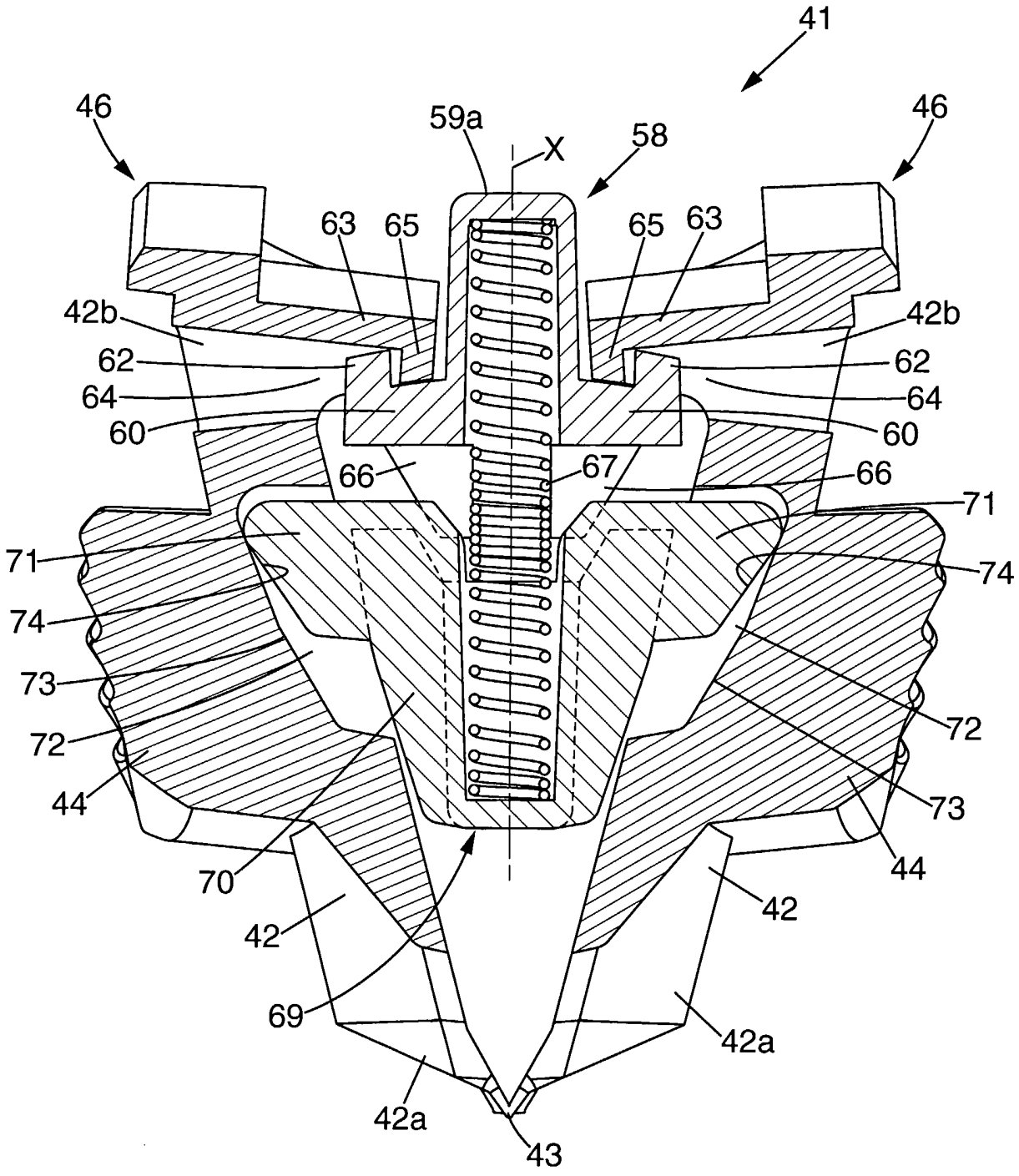

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FIG. 11

INTERNATIONAL SEARCH REPORT

Inte il Application No
PCT/EP2004/010772

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B26B21/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B26B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 2 577 842 A (LEROUX JACQUES) 29 August 1986 (1986-08-29) page 15, line 25 - page 16, line 2; figures 1,2	1
A	US 5 299 354 A (METCALF ET AL) 5 April 1994 (1994-04-05) cited in the application column 4, lines 14-17; figure 2	1
A	US 4 744 144 A (LOWERY, SR. ET AL) 17 May 1988 (1988-05-17) column 5, line 58 - column 6, line 7; figure 7	1
A	US 5 046 249 A (KAWARA ET AL) 10 September 1991 (1991-09-10) column 4, lines 37-42; figures 3,4	1

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
6 May 2005	02/06/2005

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

Inter ıl Application No
PCT/EP2004/010772

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter | Application No
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