



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
24.12.2014 Bulletin 2014/52

(51) Int Cl.:
B26B 19/10 (2006.01) B26B 19/38 (2006.01)

(21) Application number: **14165714.8**

(22) Date of filing: **24.04.2014**

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

(30) Priority: **31.05.2013 JP 2013116322**

(71) Applicant: **Panasonic Corporation**
Kadoma-shi
Osaka 571-8501 (JP)

(72) Inventors:
• **Matsuoka, Yasuhide**
Chuo-ku, Osaka 540-6207 (JP)
• **Yamasaki, Masanobu**
Chuo-ku, Osaka 540-6207 (JP)
• **Shigeta, Hiroshi**
Chuo-ku, Osaka 540-6207 (JP)
• **Suzuki, Ryo**
Chuo-ku, Osaka 540-6207 (JP)

(74) Representative: **Grünecker, Kinkeldey, Stockmair & Schwanhäusser**
Leopoldstrasse 4
80802 München (DE)

(54) **Slide switch device and electric shaver**

(57) A slide switch device (40) includes a support (100), a sliding unit (50), a fastener (110), and a pivot position restoration unit (64). The sliding unit (50) includes a first slider (60) and a second slider (70). The first slider (60) includes a first slider body (61;161) and a slider hook (62). The slider hook (62) is continuous with the first slider body (61;161) and projects from the first slider body (61;161) toward the fastener (110). The second slider (70) supports a pivot support (80A) which pivotally supports the first slider (60). The fastener (110) is adapted to apply force to the first slider (60) in a first pivot direction (RA). The pivot position restoration unit (64) is adapted to apply force to the first slider (60) in a second pivot direction (RB).

Fig.3

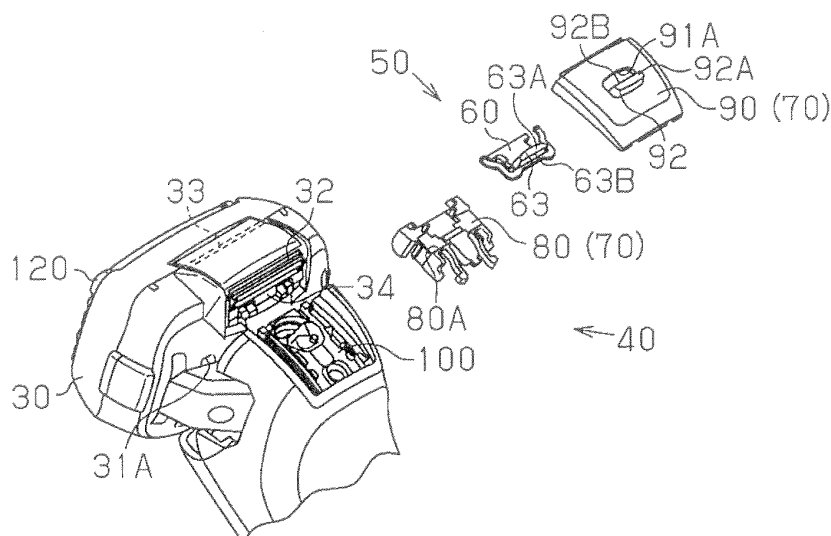


Fig.7

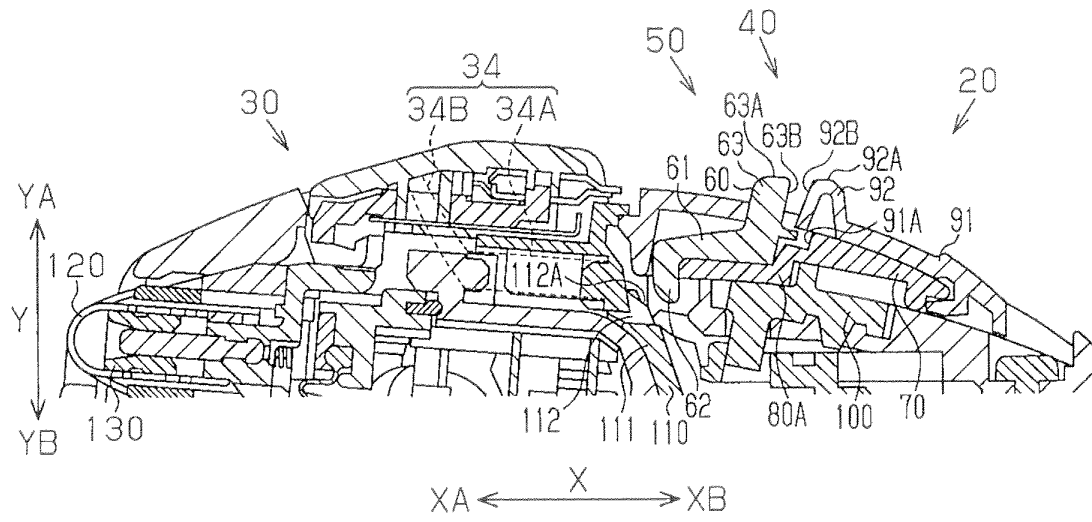
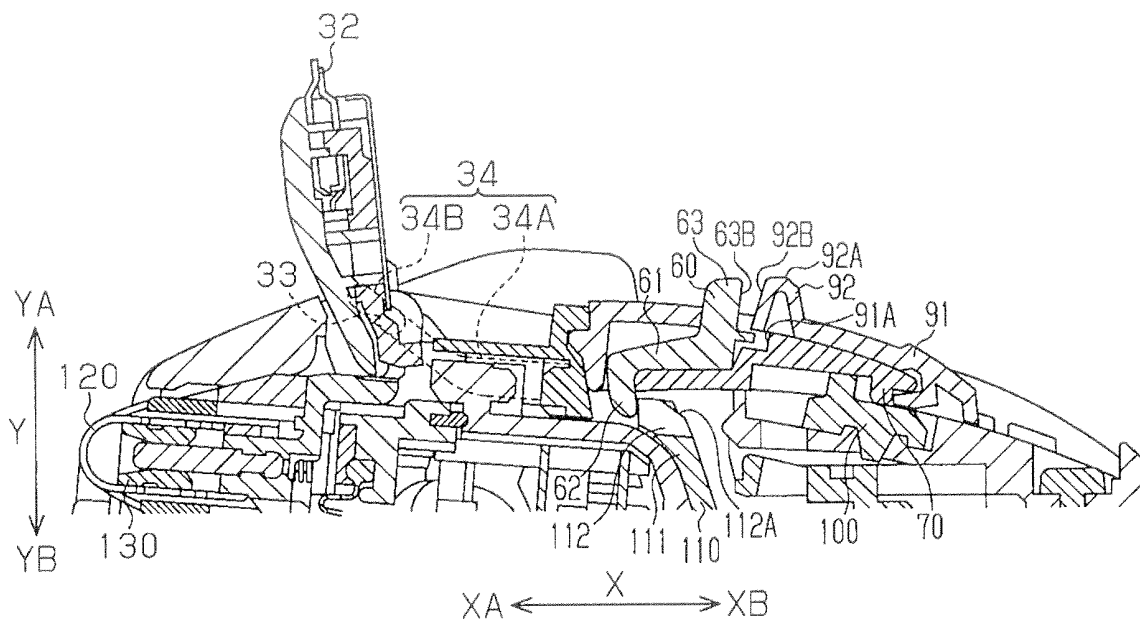


Fig.9



Description

[0001] The present invention relates to a slide switch device and an electric shaver provided with the slide switch device

[0002] Japanese Laid-Open Patent Publication No 62-139032 describes one example of a slide switch device Fig 11 illustrates an electric shaver 300 with a slide switch device 200 described in the publication

[0003] The slide switch device 200 includes a fastener 210, a lock piece 220, and a slider 230 The slide switch device 200 turns the power of the electric shaver 300 on and off

[0004] The fastener 210 is fixed to the body 310 of the electric shaver 300 The lock piece 220 includes a lock button 221 and a fastening end 222 The lock button 221 projects from the surface of the slider 230 The fastening end 222 is engageable with the fastener 210.

[0005] The slider 230 is coupled to the shaver body 310 and movable in the longitudinal direction of the shaver body 310. When the lock button 221 is projected from the surface of the slider 230 and the fastening end 222 is engaged with the fastener 210, the slider 230 is locked When the slider 230 is locked, the movement of the slider 230 is restricted

[0006] Referring to Fig 12A, when the user pushes the lock button 221 into the slider 230, the fastening end 222 is disengaged from the fastener 210, that is, the slide switch device 200 is unlocked Referring to Fig 12B, this allows the slider 230 to move in the longitudinal direction of the shaver body 310.

[0007] The slide switch device 200 needs the lock button 221 to be pushed into the slider 230 to move the slider 230 in the longitudinal direction of the shaver body 310. As a result, the operation of the slide switch device 200 is complicated

[0008] It is an object of the present invention to provide a slide switch device that is easy to operate

[0009] In one embodiment, a slide switch device includes a support, a fastener, a sliding unit, and a pivot position restoration unit The sliding unit is supported by the support to be movable in a sliding direction between a base position, a contact position, and a lock position The sliding unit is adapted to be separated from the fastener at the base position, contact the fastener at the contact position, and be engaged with the fastener at the lock position where the fastener restricts movement of the sliding unit The sliding unit includes a first slider and a second slider The first slider includes a first slider body and a slider hook, which is continuous with the first slider body and which projects from the first slider body toward the fastener The second slider includes a pivot support located between the first slider and the support The pivot support is configured to pivotally support the first slider The fastener includes a fastener hook engaged with the slider hook when the sliding unit reaches the lock position The fastener hook includes a hook slope from which the slider hook moves off when the sliding unit moves from

the contact position to the lock position The hook slope is shaped to apply force to the first slider so as to pivot the first slider supported by the pivot support in a first pivot direction to partially separate the first slider from the second slider The pivot position restoration unit is adapted to apply force to the first slider so as to pivot the first slider in a second pivot direction opposite to the first pivot direction when the sliding unit moves from the contact position to the lock position and when the sliding unit moves from the lock position to the contact position

[0010] In the slide switch device, the sliding unit moves from the base position to the lock position in the following manner

[0011] When the sliding unit is located at the base position, the application of force to the sliding unit directed toward the fastener moves the sliding unit from the base position to the contact position The slider hook contacts the hook slope of fastener at the contact position

[0012] When the sliding unit is located at the contact position, the application of force to the sliding unit toward the fastener moves the sliding unit from the contact position to the lock position

[0013] When the sliding unit moves from the contact position to the lock position, the slider hook moves onto the hook slope Here, the slider hook receives reaction force from the hook slope The hook slope applies force to the first slider so as to pivot the first slider supported by the pivot support in the first pivot direction to partially separate the first slider from the second slider

[0014] In addition, when the sliding unit moves from the contact position to the lock position, the pivot position restoration unit applies force to the first slider so as to pivot the first slider in the second pivot direction Thus, when the slider hook moves off the hook slope, the first slider is pivoted in the second pivot direction by the force received from the pivot position restoration unit As a result, the slider hook is engaged with the fastener hook This restricts movement of the sliding unit away from the fastener

[0015] In the slide switch device, the sliding unit moves from the lock position to the base position in the following manner

[0016] When the sliding unit is located at the lock position, the slider hook is engaged with the fastener hook The application of force in the first pivot direction to the sliding unit at the lock position disengages the slider hook from the fastener hook This allows the sliding unit to move away from the fastener

[0017] When the sliding unit moves from the lock position to the contact position, the slider hook moves down the hook slope As the slider hook moves down the hook slope, the pivot position restoration unit applies force to the sliding unit to pivot the sliding unit in the second pivot direction This pivots the sliding unit in the second pivot direction and moves the sliding unit to the contact position

[0018] Further application of force directed away from the fastener to the sliding unit that is located at the contact position moves the sliding unit from the contact position

to the base position

[0019] The slide switch device moves the sliding unit solely in the sliding direction. As a result, the sliding unit may be easily moved from the base position to the lock position. Further, the sliding unit may be easily moved from the lock position to the base position.

[0020] Another embodiment is an electric shaver provided with the slide switch device described above.

[0021] Other embodiments and advantages of the present invention will become apparent from the following description, taken in conjunction with the accompanying drawings, illustrating by way of example the principles of the invention.

[0022] The invention, together with objects and advantages thereof, may best be understood by reference to the following description of the presently preferred embodiments together with the accompanying drawings in which

Fig 1 is a front view of an electric shaver,

Fig 2 is a rear view of a head of the electric shaver illustrated in Fig 1,

Fig 3 is an exploded perspective view of the head and the slide switch device,

Fig 4 is a perspective view of a first slider

Fig 5 is a cross-sectional view taken along line D5-D5 in Fig 2 when the electric shaver is in a head-free state,

Fig 6 is a cross-sectional view taken along line D6-D6 in Fig 2 when the electric shaver is in a head-locked state,

Fig 7 is a cross-sectional view taken along line D5-D5 in Fig. 2 when the electric shaver is in a head-locked state,

Fig 8 is a cross-sectional view taken when shifting the electric shaver from the head-locked state to a trimmer blade-raised state,

Fig. 9 is a cross-sectional view taken along line D5-D5 in Fig 2 when the electric shaver is in the trimmer blade-raised state,

Fig 10 is a cross-sectional view of a further example of the first slider,

Fig 11 is a partial cross-sectional view of a conventional slide switch device,

Fig. 12A is a partial cross-sectional view of a slider illustrated in Fig 11 in an unlocked state, and

Fig 12B is a partial cross-sectional view illustrating the slider of Fig. 11 moved from the position illustrated in Fig 12A

[0023] The structure of an electric shaver 1 to which the slide switch device 40 is applied will now be described with reference to Fig 1

[0024] The electric shaver 1 includes a shaver body 10, the slide switch device 40 (Fig 5), outer blades 120, and inner blades 130 (Fig. 5). The slide switch device 40 switches the electric shaver 1 between a head-free state (Fig. 5), a head-locked state (Figs 6 and 7), and a trimmer

blade-raised state (Fig. 9).

[0025] In the head-free state, a head 30 is permitted to freely move relative to a grip 20. In the head-locked state, movement of the head 30 relative to the grip 20 is restricted. In the trimmer blade-raised state, a trimmer blade 32 (Fig. 2) is raised from a head case 31 while the electric shaver 1 is in the head-locked state. In the present embodiment, the electric shaver 1 is of a reciprocation type that moves the inner blades 130 back and forth relative to the outer blades 120.

[0026] The shaver body 10 includes a front surface 10A, a right surface 10B, and a left surface 10C. The direction orthogonal to the longitudinal direction of the shaver body 10 when viewing the shaver body 10 from the front will hereafter be referred to as the widthwise direction.

[0027] The electric shaver 1 is used with the front surface 10A facing toward the user. When the front surface 10A is facing toward the user, the right surface 10B is located at the right side in the widthwise direction, and the left surface 10C is located at the left side in the widthwise direction.

[0028] The shaver body 10 includes the grip 20 and the head 30. The user holds the grip 20, which includes a grip body 21, a power switch 22, a front panel 23, and a head lock piece 24 (refer to Fig. 6).

[0029] The grip body 21 includes two cases that are joined together. The power switch 22 is located at the longitudinally middle section of the grip body 21. The power switch 22 turns the power of the electric shaver 1 on and off.

[0030] The front panel 23 shows, for example, the state of charge of the electric shaver 1. The front panel 23 and the grip body 21 extend in the longitudinal direction to a location partially overlapped with the head 30. The front panel 23 and the grip body 21 are arranged so that the head 30 gives the user an impression as being small. The head lock piece 24 fastens the head 30 to the grip 20. The grip body 21 accommodates the head lock piece 24 in the head-free state. The head lock piece 24 projects from the grip body 21 in the head-locked state and the trimmer blade-raised state.

[0031] The head 30 is coupled to the grip 20. The outer blades 120 are attached to the head 30. The outer blades 120 include a plurality of outer blade holes 120A. The outer blades 120 guide the whiskers of the user into the head 30 through the outer blade holes 120A.

[0032] As illustrated in Fig. 5, the head 30 accommodates the inner blades 130. The inner blades 130 are connected to a linear motor (not illustrated). The inner blades 130 reciprocate relative to the outer blades 120 and cooperate with the outer blades 120 to cut whiskers. The whiskers guided through the outer blade holes 120A are held and cut between the inner blades 130 and the outer blades 120. The grip 20 accommodates the linear motor.

[0033] The structure of the head 30 will now be described with reference to Fig 2. The head 30 includes the

head case 31, the trimmer blade 32, a trimmer blade pivot shaft 33, and a trimmer blade pivot unit 34. A transparent head cover (not illustrated) covers the head 30 when the electric shaver 1 is not in use.

[0034] The head case 31 supports the outer blades 120. The head case 31 includes a head lock groove 31A and a trimmer blade accommodation groove 31B. The head lock piece 24 (Fig. 6) is fitted into the head lock groove 31A in the head-locked state and the trimmer blade-raised state. The trimmer blade accommodation groove 31B accommodates the trimmer blade 32 in the head-free state and the head-locked state. The trimmer blade accommodation groove 31B is formed in the rear surface of the head 30.

[0035] The trimmer blade 32 cuts relatively short hair such as sideburns. The trimmer blade 32 pivots about the trimmer blade pivot shaft 33. An urging spring (not illustrated) urges the trimmer blade 32 into the trimmer blade accommodation groove 31B. The trimmer blade pivot shaft 33 is fixed to the trimmer blade accommodation groove 31B.

[0036] The trimmer blade pivot unit 34 is movable in the longitudinal direction. The trimmer blade pivot unit 34 includes a pivot unit body 34A and a trimmer blade contact portion 34B. The pivot unit body 34A is formed integrally with the trimmer blade contact portion 34B. The trimmer blade contact portion 34B moves together with the pivot unit body 34A in the longitudinal direction of the electric shaver 1. This pivots the trimmer blade 32 about the trimmer blade pivot shaft 33.

[0037] The structure of the slide switch device 40 will now be described with reference to Figs 3 to 5.

[0038] The slide switch device 40 moves in the longitudinal direction of the electric shaver 1 to switch the electric shaver 1 to the head-free state, the head-locked state, and the trimmer blade-raised state. The slide switch device 40 includes a sliding unit 50, a support 100 and a fastener 110.

[0039] The sliding unit 50 is movable in the sliding direction X, which is the longitudinal direction of the electric shaver 1. The direction in which the sliding unit 50 becomes closer to the fastener 110 in the sliding direction X is referred to as the approaching direction XA. The direction in which the sliding unit 50 becomes farther from the fastener 110 in the sliding direction X is referred to as the separating direction XB.

[0040] The direction orthogonal to the sliding direction X when viewing the electric shaver 1 from beside (Fig. 5) is referred to as the sliding unit height direction Y. The direction from the support 100 toward a first slider 60 in the sliding unit height direction Y is referred to as the upper direction YA. The direction from the first slider 60 toward the support 100 in the sliding unit height direction Y is referred to as the lower direction YB.

[0041] The sliding unit 50 is spaced apart from the fastener 110 in the sliding direction X. The sliding unit 50 is movable in the sliding direction X between a base position, a contact position, and a lock position.

[0042] The sliding unit 50 is spaced apart from the fastener 110 at the base position and in contact with the fastener 110 at the contact position. At the lock position, the sliding unit 50 is in contact with the fastener 110, and movement of the sliding unit 50 in the separating direction XB is restricted.

[0043] When the electric shaver 1 is in the head-free state, the sliding unit 50 is located at the base position. When the electric shaver 1 is in the head-locked state, the sliding unit 50 is located at an intermediate position between the base position and the contact portion. When the electric shaver 1 is shifting from the head-locked state to the trimmer blade-raised state, the sliding unit 50 is located at the contact position. When the electric shaver 1 is in the trimmer blade-raised state, the sliding unit 50 is located at the lock position.

[0044] Referring to Fig. 5, the sliding unit 50 includes the first slider 60 and a second slider 70. The first slider 60 is coupled to the second slider 70. The first slider 60 cooperates with the second slider 70 to move relative to the support 100 in the sliding direction X. The first slider 60 includes a first slider body 61, a slider hook 62, a first wall 63, and resilient legs 64 (Fig. 4).

[0045] The first slider body 61, the slider hook 62 and the first wall 63 are formed integrally from the same material. The first slider body 61 extends in the sliding direction X. The first slider body 61 includes a basal end, which is connected to the first wall 63, and a distal end, which is opposite to the basal end. Further, the first slider body 61 has a first body length LA from the basal end to the distal end in the sliding direction X.

[0046] The slider hook 62 extends in the approaching direction XA from the first slider body 61. Further, the slider hook 62 is engageable with a fastener hook 112 (Fig. 7) of the fastener 110.

[0047] The user moves the first wall 63 when switching the electric shaver 1 from the trimmer blade-raised state to the head-locked state. The user also moves the first wall 63 when switching the electric shaver 1 from the head-locked state to the head-free state.

[0048] The first wall 63 projects in the upper direction YA from the basal end of the first slider body 61. The first wall 63 has a first wall length LC from the basal end of the first slider body 61 to the first wall distal end 63A. The first wall length LC is less than the first body length LA. The first wall distal end 63A is the upper end of the first wall 63.

[0049] Referring to Fig. 2, the first wall 63 has a first wall width ZA1 in the widthwise direction of the shaver body 10.

[0050] Referring to Fig. 4, the resilient legs 64 are continuous with the first slider body 61. The resilient legs 64 apply force in the lower direction YB to the first slider body 61, the slider hook 62, and the first wall 63. The resilient legs 64 form one example of a pivot position restoration unit.

[0051] Referring to Fig. 3, the second slider 70 includes a second slider body 80 and a cover 90. The grip body

21 accommodates the second slider body 80. The second slider body 80 includes a pivot support 80A. Referring to Fig. 5, the pivot support 80A supports the first slider body 61.

[0052] The cover 90 includes a cover body 91 and a second wall 92. The cover body 91 is coupled to the first slider 60 and the second slider body 80. The cover body 91 includes a wall insertion hole 91 A that receives the first wall 63.

[0053] The second wall 92 projects in the upper direction YA from the cover body 91. The second wall 92 faces toward the first wall 63 in the sliding direction X. The second wall 92 and the first wall 63 are spaced apart by an inter-wall length LB. The inter-wall length LB corresponds to the distance between the inner surface 92B of the second wall 92 and the inner surface 63B of the first wall 63. The inter-wall length LB is less than the first main body length LA. Referring to Fig. 2, the second wall 92 has a second wall width ZA2 in the widthwise direction of the shaver body 10. The second operation width ZA2 is greater than the first wall width ZA1. The second wall 92 includes a second wall distal end 92A. The second wall distal end 92A is the upper end of the second wall 92. The second wall distal end 92A is located in the upper direction YA from the first wall distal end 63A.

[0054] The support 100 supports the sliding unit 50. The support 100 is fixed to the inner side of the grip body 21.

[0055] The fastener 110 is fixed to the inner side of the head 30. The fastener 110 includes a fastening portion body 111 and the fastener hook 112.

[0056] The fastening portion body 111 is formed integrally with the fastener hook 112 from the same material. The fastening portion body 111 extends in the upper direction YA and toward the approaching direction XA.

[0057] The slider hook 62 is engaged with the fastener hook 112 when the electric shaver 1 is in the trimmer blade-raised state. The fastener hook 112 includes a hook slope 112A. The hook slope 112A is inclined relative to the upper direction YA and toward the approaching direction XA.

[0058] The shifting of the electric shaver 1 from the head-free state to the head-locked state will now be described with reference to Figs 5 and 6.

[0059] In the head-free state illustrated in Fig 5, when the user applies force in the approaching direction XA to the second wall 92, the cover 90 and the second slider body 80 move relative to the support 100 in the approaching direction XA. This moves the first slider 60 relative to the support 100 in the approaching direction XA.

[0060] Referring to Fig 6 when the sliding unit 50 is moved in the approaching direction XA and the head lock piece 24 is fitted into the head lock groove 31A, the head 30 is fixed to the grip 20. This maintains the electric shaver 1 in the head-locked state.

[0061] The shifting of the electric shaver 1 from the head-locked state to the trimmer blade-raised state will now be described with reference to Figs 7 to 9

[0062] When the electric shaver 1 is in the head-locked state as illustrated in Fig 7, the sliding unit 50 is separated from the fastener 110. In the head-locked state, the sliding unit 50 is located at the intermediate position between the base position and the contact portion

[0063] When the user moves the second wall distal end 92A of the second wall 92 and applies force in the approaching direction XA to the sliding unit 50, the sliding unit 50 moves from the intermediate position to the contact position. The slider hook 62 contacts the hook slope 112A of the fastener 110 at the contact position.

[0064] When the user further applies force to the sliding unit 50 in the approaching direction XA, the sliding unit 50 moves from the contact position to the lock position.

[0065] Referring to Fig 8, when the sliding unit 50 moves from the contact position to the lock position, the slider hook 62 moves off the hook slope 112A. When the slider hook 62 moves off the hook slope 112A, the slider hook 62 receives reaction force from the hook slope 112A. This pivots the first slider 60 in the first pivot direction RA about the basal end of the first slider body 61 supported by a pivot support 80A. In other words, the hook slope 112A is shaped to apply the reaction force to the first slider 60 so as to pivot the first slider 60 in the first pivot direction RA to partially separate the first slider 60 from the second slider 70.

[0066] When the first slider 60 pivots in the first pivot direction RA, the first wall 63 contacts the second wall 92. This restricts pivoting of the first slider 60 in the first pivot direction RA.

[0067] When the sliding unit 50 moves from the contact position to the lock position, the resilient legs 64 apply force to the first slider 60 in the second pivot direction RB. That is, when the slider hook 62 moves off the hook slope 112A, the resilient force received from the resilient legs 64 pivots the first slider 60 in the second pivot direction RB. Consequently, as illustrated in Fig 9 the slider hook 62 is engaged with the fastener hook 112. This restricts movement of the sliding unit 50 from the fastener 110 in the separating direction XB.

[0068] When the first slider 60 moves from the intermediate position to the lock position, the second slider 70 also moves in the approaching direction XA. When the second slider 70 moves in the approaching direction XA, the second slider body 80 moves the trimmer blade pivot unit 34 in the approaching direction XA and pivots the trimmer blade pivot unit 34.

[0069] Referring to Fig 9, when the trimmer blade pivot unit 34 is pivoted in the approaching direction XA, the trimmer blade 32 shifts to the trimmer blade-raised state.

[0070] In the trimmer blade-raised state, the sliding unit 50 is located at the lock position. Thus, movement of the sliding unit 50 in the separating direction XB is restricted. In other words, movement of the second slider 70 in the separating direction XB is restricted. Further, the trimmer blade pivot unit 34 contacts the second slider body 80 and maintains the head case 31 in the raised state.

[0071] The shifting of the electric shaver 1 from the

trimmer blade-raised state to the head-locked state will now be described

[0072] Referring to Fig 9, when the electric shaver 1 is in the head-locked state, the sliding unit 50 is located at the lock position

[0073] When the sliding unit 50 is located at the lock position, the slider hook 62 is engaged with the fastener hook 112. When the user moves the first wall distal end 63A of the first wall 63 and applies force to the sliding unit 50 in the first pivot direction RA, force acts on the first slider 60 in the first pivot direction RA. This disengages the slider hook 62 from the fastener hook 112. Thus, movement of the sliding unit 50 is permitted in the separating direction XB from the fastener 110.

[0074] When the first slider 60 is pivoted in the first pivot direction RA, the first wall 63 contacts the second wall 92. This restricts pivoting of the first slider 60 in the first pivot direction RA. Thus, the first slider 60 and the second slider 70 move from the fastener 110 in the separating direction XB.

[0075] When the sliding unit 50 moves in the separating direction XB with the first wall 63 and the second wall 92 left in contact with each other, the slider hook 62 moves down along the hook slope 112A. When the slider hook 62 moves down along the hook slope 112A, the resilient legs 64 apply force to the slider hook 62 (that is, first slider 60) in the second pivot direction RB. Thus, as the slider hook 62 pivots in the second pivot direction RB, the sliding unit 50 moves to the contact position.

[0076] After the sliding unit 50 reaches the contact position, when the user further applies force to the sliding unit 50 in the separating direction XB, the sliding unit 50 moves from the contact position via the intermediate position to the base position.

[0077] The electric shaver 1 and the slide switch device 40 have the advantages described below.

(1) The application of force to the sliding unit 50 in the approaching direction XA moves the sliding unit 50 from the base position to the lock position. Further, the application of force to the sliding unit 50 in the separating direction XB moves the sliding unit 50 from the lock position to the base position. In this manner, when force acts on the sliding unit 50 in the sliding direction X, the sliding unit 50 may be easily shifted to the base position, the contact position, and the lock position.

(2) When the sliding unit 50 is located at the lock position, movement of the trimmer blade pivot unit 34 in the separating direction XB is restricted. This limits pivoting of the trimmer blade 32 into the trimmer blade accommodation groove 31 B when the sliding unit 50 is located at the lock position.

(3) The second wall 92 is spaced apart from the opposing first wall 63 at the lock position. Thus, when the sliding unit 50 moves from the lock position to

the base position, the second wall 92 restricts pivoting of the first wall 63 in the first pivot direction RA. In other words, the first slider 60 is able to be pivoted in the first pivot direction RA within a predetermined pivot range. Thus, the sliding unit 50 may easily be moved from the lock position to the base position.

(4) The inter-wall length LB between the first wall 63 and the second wall 92 is less than the first body length LA of the first slider body 61. This allows the pivot amount of the first wall 63 in the first pivot direction RA to be decreased in comparison with when the inter-wall length LB is greater than the first body length LA. Thus, the sliding unit 50 may easily be moved from the lock position to the base position.

(5) When the sliding unit 50 moves from the contact position to the lock position, it is preferable that there be no force acting on the first slider 60 to hinder pivoting in the first pivot direction RA. Thus, when the sliding unit 50 moves from the contact position to the lock position, it is preferable that the second wall 92 be operated by the user.

The first wall distal end 63A of the first wall 63 is located toward the lower direction YB from the second wall distal end 92A of the second wall 92. In other words, the first wall distal end 63A is located closer to the support 100 than the second wall distal end 92A. Thus, when the user moves the sliding unit 50 from the contact position to the lock position, direct operation of the first wall 63 by the user is limited.

(6) The first wall width ZA1 is less than the second wall width ZA2. Thus, when the user moves the sliding unit 50 from the contact position to the lock position, direct operation of the first wall 63 by the user is limited.

(7) The first wall length LC is less than the first body length LA. This decreases the amount the first wall 63 is pivoted in the first pivot direction RA until the first wall 63 contacts the second wall 92 compared to when the first wall length LC is greater than the first body length LA.

[0078] It should be apparent to those skilled in the art that the present invention may be embodied in many other specific forms without departing from the spirit or scope of the invention. Also, the components disclosed in the embodiments may be assembled in any combination for embodying the present invention. For example, some of the components may be omitted from all components disclosed in the embodiments. Further, components in different embodiments may be appropriately combined. Particularly, it should be understood that the present invention may be embodied in the following forms.

[0079] In the second slider 70 of the above embodiment, the second slider body 80 and the cover 90 are

discrete components. Instead, a modified second slider may include a second slider body and a cover that are formed integrally with each other

[0080] In the above embodiment, the sliding unit 50 includes the first wall 63 and the second wall 92. However, the sliding unit 50 may be modified to include only one of the first wall 63 and the second wall 92.

[0081] In the first slider 60 of the above embodiment, the first slider body 61, the slider hook 62, and the first wall 63 are formed integrally with one another from the same material. However, referring to Fig. 10, in a modification, a first slider 160 may include a first slider body 161 formed from a resilient material. In this structure, when the sliding unit 50 (first slider body 161) moves from the contact position to the lock position, the slider hook 62 moves onto the hook slope 112A as the slider body 161 resiliently deforms. Thus, the slider hook 62 easily pivots in the first pivot direction RA. Accordingly, the slider hook 62 engages more easily with the fastener hook 112 as compared to when the slider body 161 does not resiliently deform.

[0082] The first slider 60 of the above embodiment includes the resilient legs 64. However, the resilient legs 64 may be omitted in a modified first slider. In such a modification, a component discrete from the first slider applies force to the first slider in the second pivot direction RB

[0083] The slide switch device 40 of the above embodiment is applied to an electric shaver. However, the subject to which the slide switch device 40 is applied is not limited to an electric shaver. A modified slide switch device may be applied to any of a variety of devices such as a power switch for an electric toothbrush or a power switch for a microphone.

[0084] The electric shaver 1 of the above embodiment shifts from the head-free state to the head-locked state before shifting to the trimmer blade-raised state. Instead, a modified electric shaver may be directly shifted from the head-free state to the trimmer blade-raised state without shifting to the head-locked state.

[0085] The electric shaver 1 of the above embodiment is of a reciprocation type electric shaver. Instead, an electric shaver may be of a rotary type in which the inner blades rotate relative to the outer blades

[0086] The electric shaver 1 of the above embodiment cuts whiskers. However, the hair cut by the electric shaver 1 is not limited to whiskers and may be any type of hair including whiskers.

[0087] The electric shaver 1 of the above embodiment includes five outer blades 120. However, the number of the outer blades 120 is not limited to five. A modified electric shaver may include one to four or six or more outer blades 120.

Claims

1. A slide switch device (40) characterized by com-

prising:

a support (100),
a fastener (110),
a sliding unit (50) supported by the support (100) to be movable in a sliding direction (X) between a base position, a contact position, and a lock position, wherein the sliding unit (50) is adapted to be separated from the fastener (110) at the base position, contact the fastener (110) at the contact position, and be engaged with the fastener (110) at the lock position where the fastener (110) restricts movement of the sliding unit (50), and
a pivot position restoration unit (64), wherein the sliding unit (50) includes a first slider (60,160) and a second slider (70),
the first slider (60,160) includes a first slider body (61;161) and a slider hook (62), which is continuous with the first slider body (61;161) and which projects from the first slider body (61,161) toward the fastener (110);
the second slider (70) includes a pivot support (80A) located between the first slider (60,160) and the support (100), wherein the pivot support (80A) is adapted to pivotally support the first slider (60;160);
the fastener (110) includes a fastener hook (112) engaged with the slider hook (62) when the sliding unit (50) reaches the lock position,
the fastener hook (112) includes a hook slope (112A) from which the slider hook (62) moves off when the sliding unit (50) moves from the contact position to the lock position
the hook slope (112A) is shaped to apply force to the first slider (60,160) so as to pivot the first slider (60,160) supported by the pivot support (80A) in a first pivot direction (RA) to partially separate the first slider (60,160) from the second slider (70), and
the pivot position restoration unit (64) is adapted to apply force to the first slider (60,160) so as to pivot the first slider (60,160) in a second pivot direction (RB) opposite to the first pivot direction (RA) when the sliding unit (50) moves from the contact position to the lock position and when the sliding unit (50) moves from the lock position to the contact position

2. The slide switch device (40) according to claim 1, wherein:

the first slider (60,160) includes a first wall (63) that projects from the first slider body (61;161);
the second slider (70) includes a second slider body (80), arranged to support the first slider body (61,161), and a second wall (92) coupled to the second slider body (80), and

when the sliding unit (50) is located at the base position, at the contact position, and at the lock position, the second wall (92) is opposed to the first wall (63), spaced apart by a distance (LB) from the first wall (63), and located further away from the fastener (110) than the first wall (63) in the sliding direction (X). 5

3. The slide switch device (40) according to claim 2, wherein the distance (LB) between the first wall (63) and the second wall (92) is less than a length (LA) of the first slider body (61;161) in the sliding direction (X). 10
4. The slide switch device (40) according to claim 2 or 3, wherein the first wall (63) includes a distal end (63A) located closer to the support (100) than a distal end (92A) of the second wall (92) 15
5. The slide switch device (40) according to any one of claims 2 to 4, wherein 20

the first wall (63) and the second wall (92) extend in a widthwise direction that is orthogonal to the sliding direction (X) as viewed from above, and

the first wall (63) has a length (ZA1) in the widthwise direction that is less than a length (ZA2) of the second wall (92) in the widthwise direction. 25
6. The slide switch device (40) according to any one of claims 2 to 5, wherein 30

the first slider body (61;161) includes a basal end, connected to the first wall, and a distal end located opposite to the basal end,

the pivot support (80A) pivotally supports the first slider (60,160) about the basal end of the first slider body (61;161); 35

the first wall (63) includes a basal end, connected to the first slider body (61;161), and a distal end located opposite to the basal end of the first wall (63), and a length (LC) from the basal end of the first wall (63) to the distal end of the first wall (63) is less than a length (LA) from the basal end of the first slider body (61,161) to the distal end of the first slider body (61;161) 40

45
7. The slide switch device (40) according to any one of claims 1 to 6, wherein the first slider body (61;161) includes resilient material
8. An electric shaver (1) provided with a slide switch device (40) according to any one of claims 1-7 50

55

Fig.1

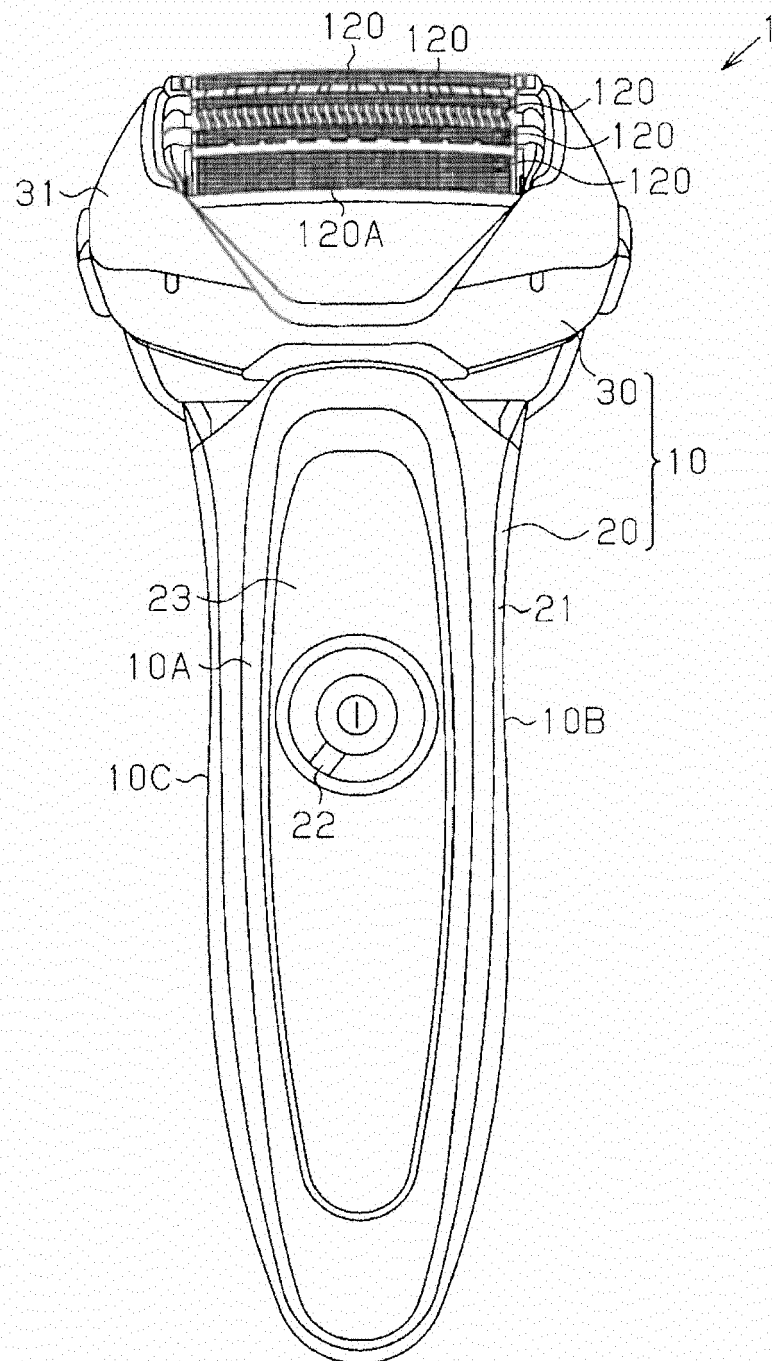


Fig.2

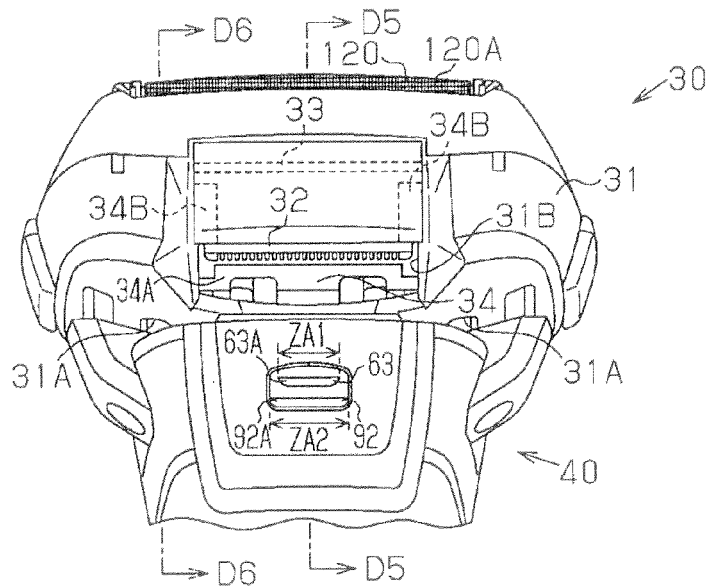


Fig.3

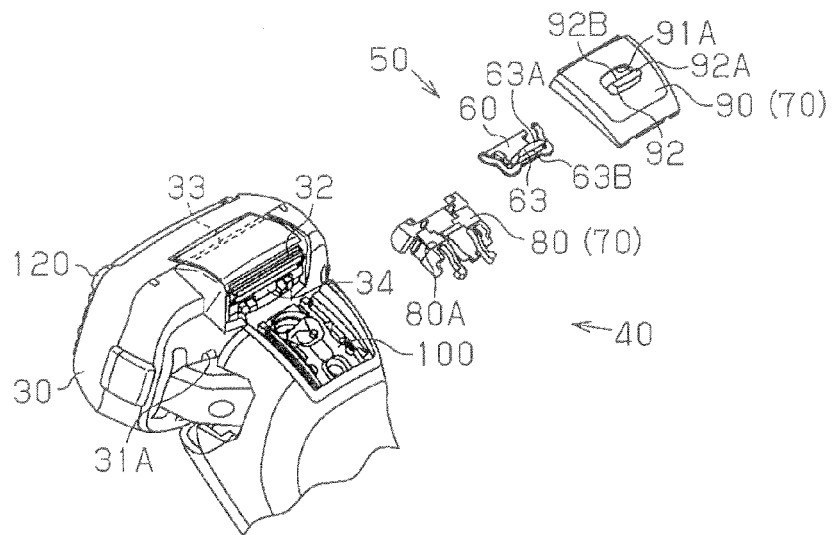
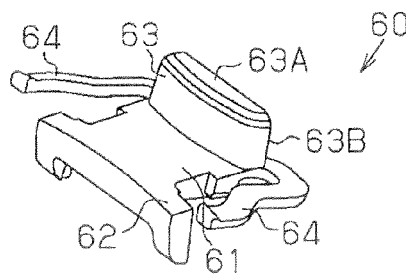


Fig.4



5. 5. 1.

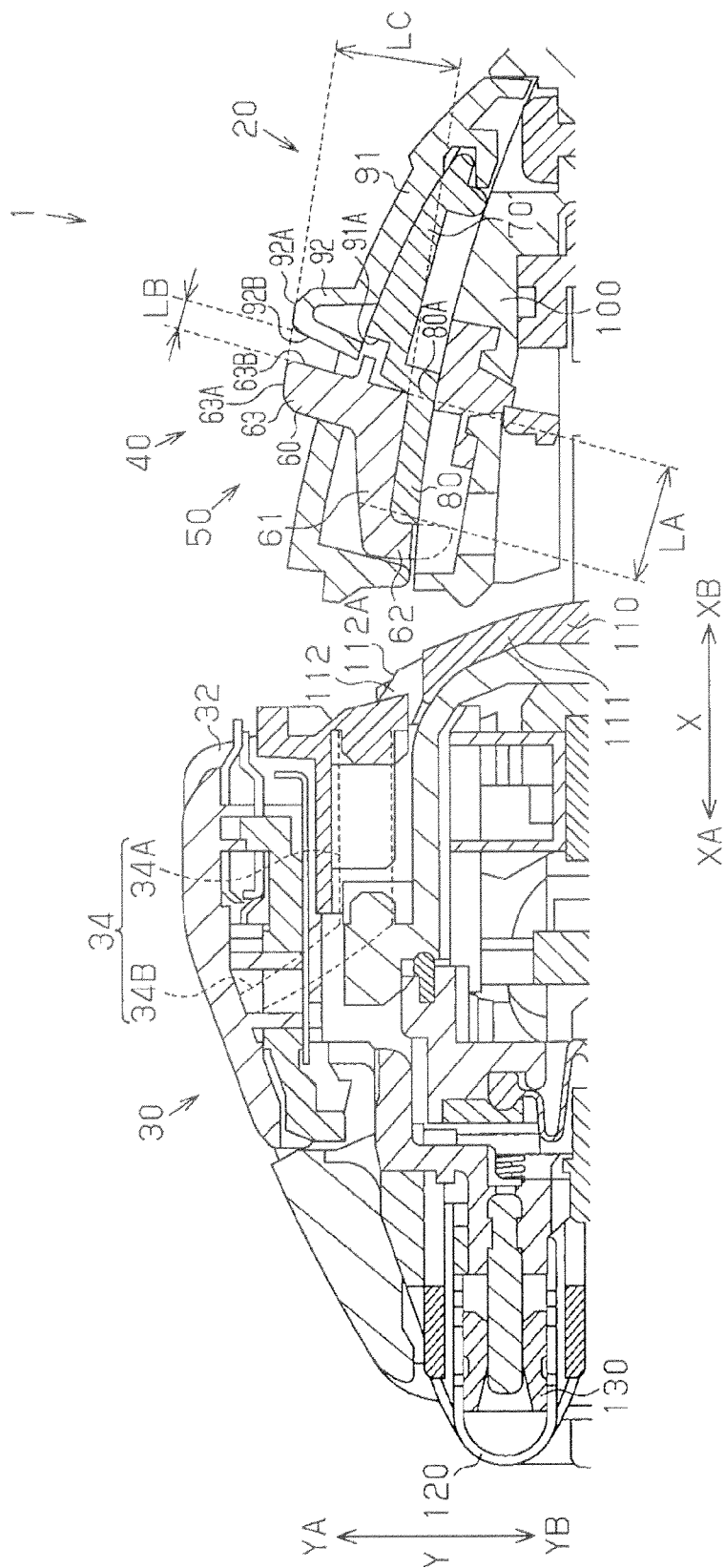


Fig. 6

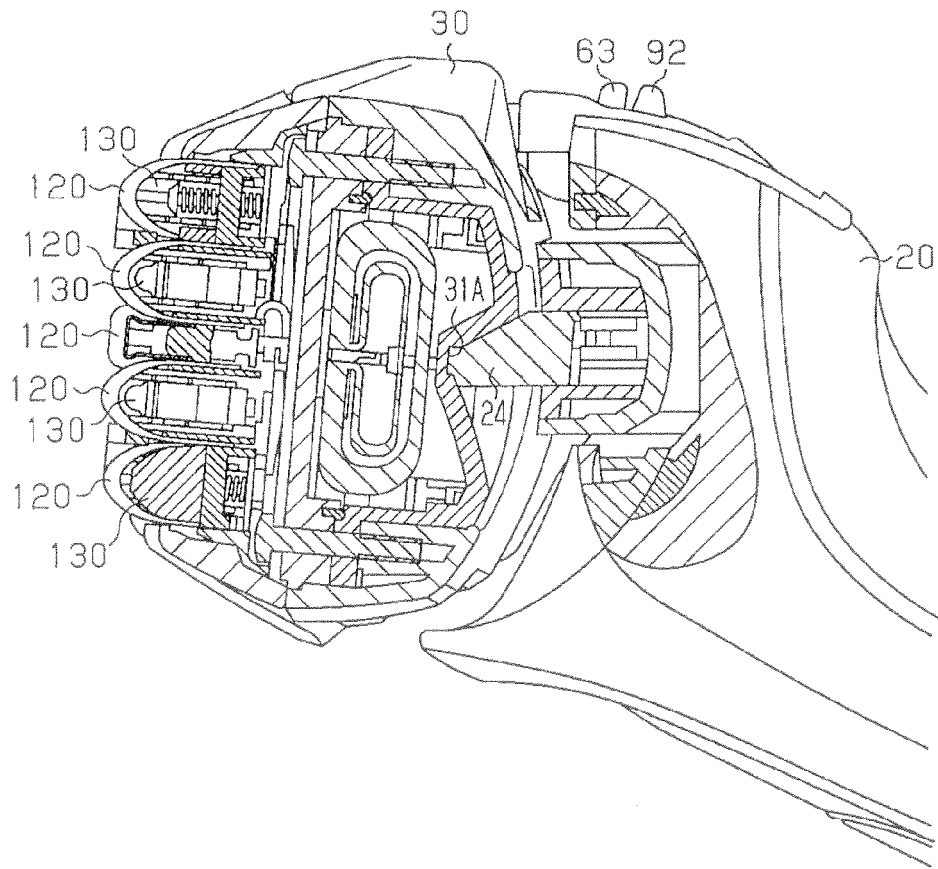


Fig. 7

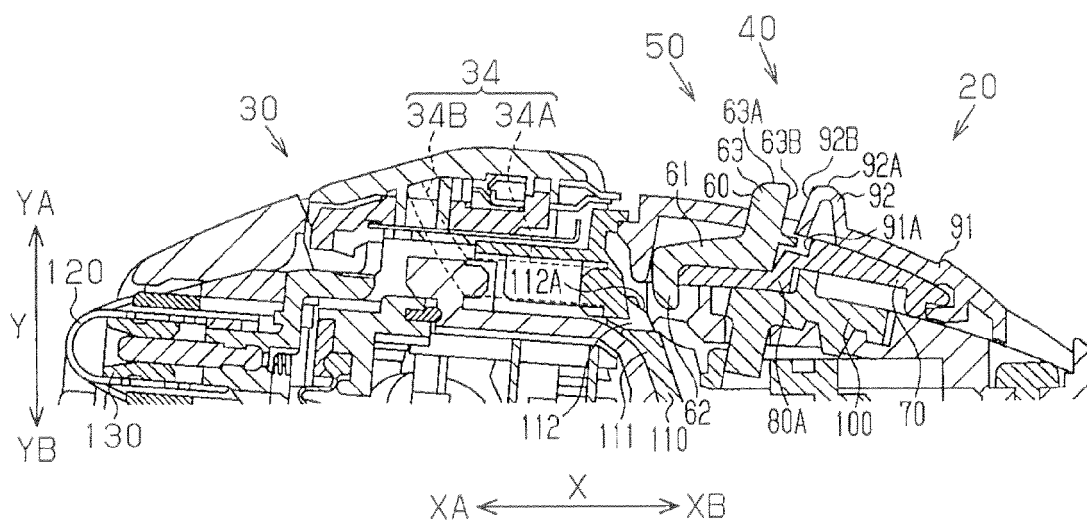


Fig.8

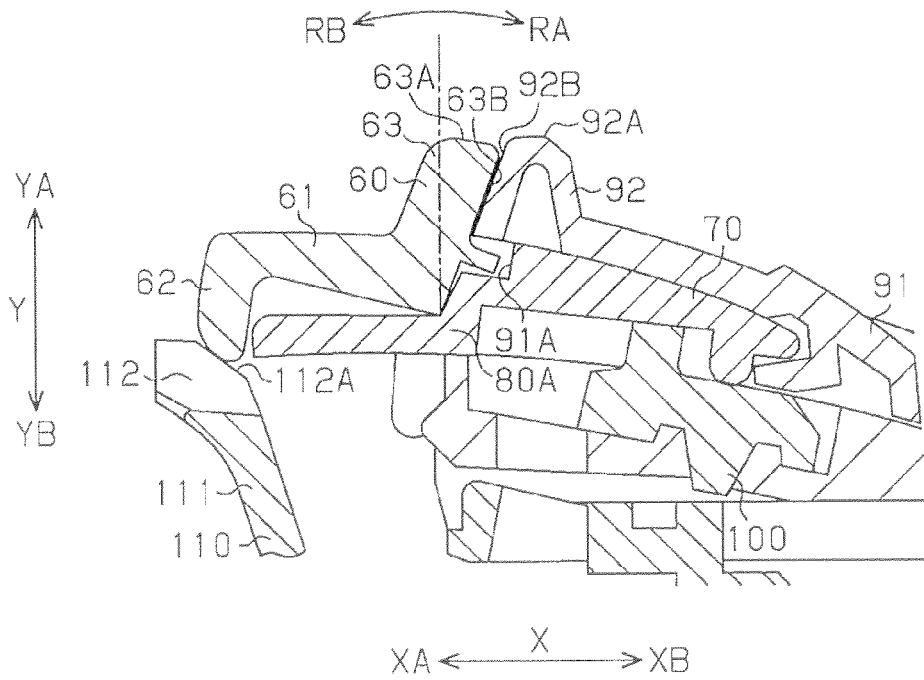


Fig.9

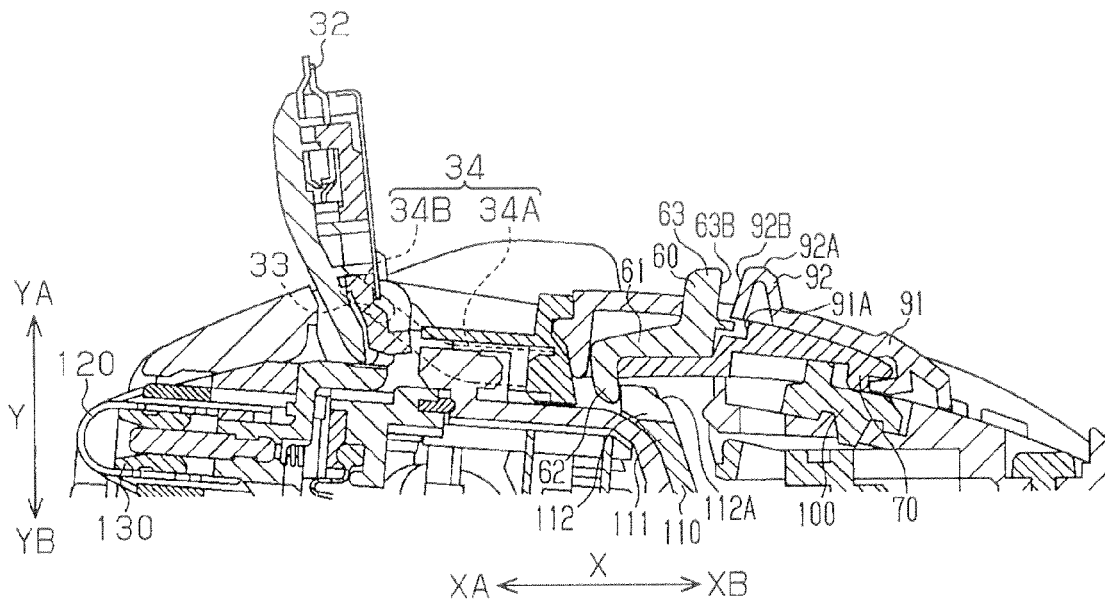


Fig.10

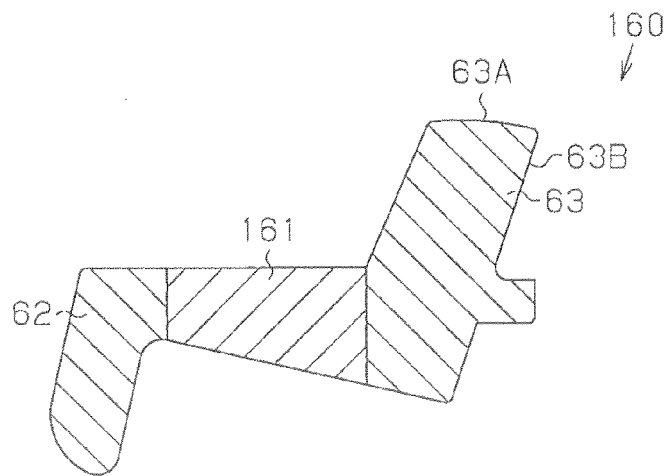


Fig.11

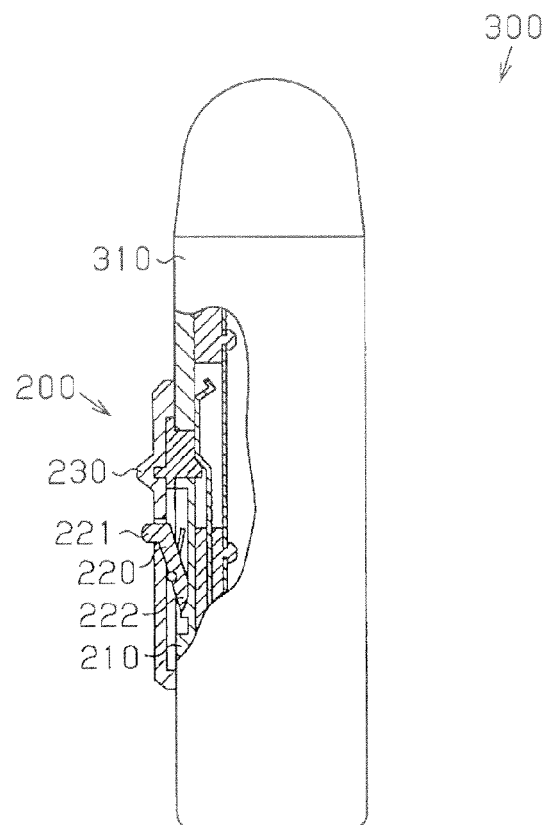


Fig.12A

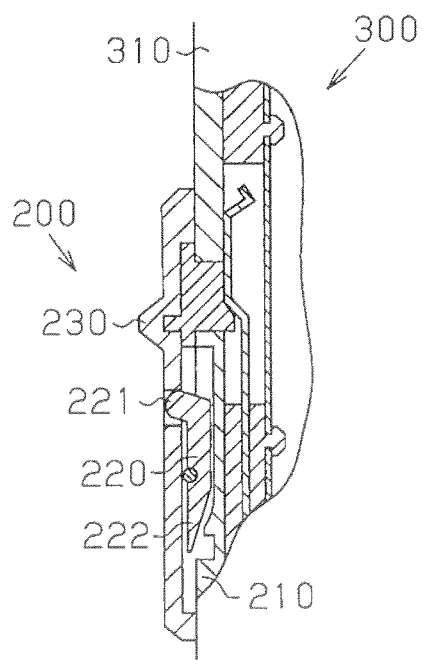
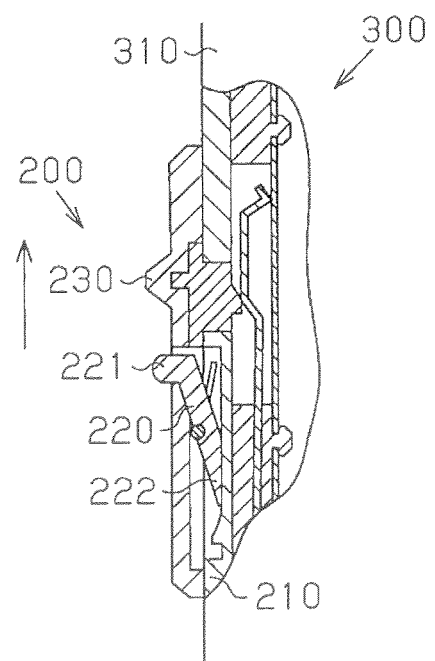


Fig.12B





EUROPEAN SEARCH REPORT

Application Number
EP 14 16 5714

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 2 208 587 A1 (PANASONIC ELEC WORKS CO LTD [JP] PANASONIC CORP [JP]) 21 July 2010 (2010-07-21) * paragraphs [0016] - [0028]; figures 2-5, 9-14 *	1-8	INV. B26B19/10 B26B19/38
A	EP 0 529 479 A1 (BRAUN AG [DE]) 3 March 1993 (1993-03-03) * column 8, line 4 - column 11, line 35; figures 1-9 *	1-8	
			TECHNICAL FIELDS SEARCHED (IPC)
			B26B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 27 October 2014	Examiner Rattenberger, B
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 (03.02) (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 16 5714

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

27-10-2014

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
EP 2208587	A1	21-07-2010	CN	101797759 A		11-08-2010
			EP	2208587 A1		21-07-2010
			JP	5009940 B2		29-08-2012
			JP	2010162145 A		29-07-2010
			US	2010175260 A1		15-07-2010

EP 0529479	A1	03-03-1993	AT	129454 T		15-11-1995
			DE	4128217 A1		04-03-1993
			EP	0529479 A1		03-03-1993
			ES	2078615 T3		16-12-1995
			HK	92596 A		07-06-1996
			JP	3293888 B2		17-06-2002
			JP	H07178265 A		18-07-1995
			US	5289636 A		01-03-1994

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 62139032 A [0002]