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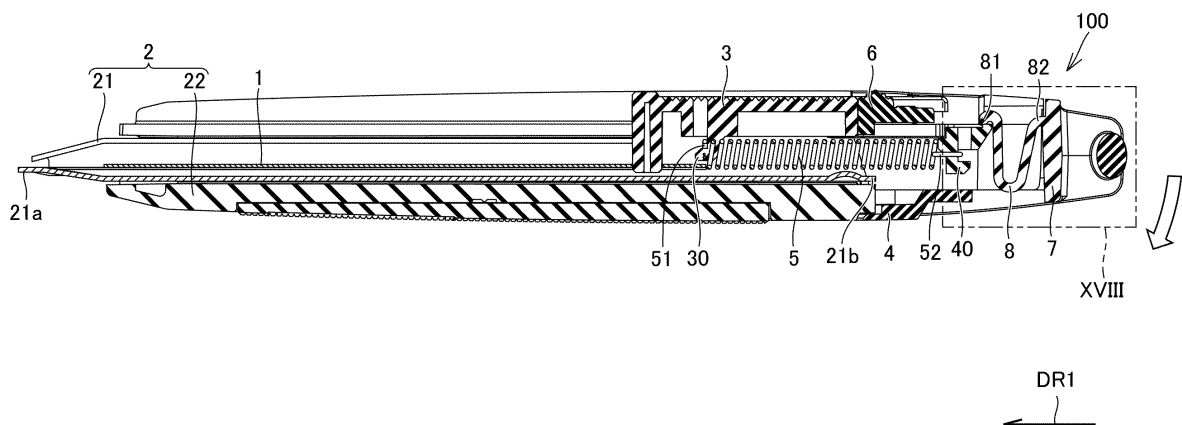
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(54) **UTILITY KNIFE**

(57) A cutter knife (100) includes a body (2), a slider (3), a cap (4), and an elastic body (5). The slider (3) is movable in inside of the body (2) between a protruding position and a storage position, the protruding position being a position for causing the blade (1) to protrude from a front end portion (21a), the storage position being a position for storing the blade (1) between the front end portion (21a) and a rear end portion (21b). The cap (4)

is fixed to the rear end portion (21b) in each of a use state and a non-use state, the use state being a state in which the slider (3) is disposed at the protruding position, the non-use state being a state in which the slider (3) is disposed at the storage position. The elastic body (5) biases the slider (3) toward the cap (4) in each of the use state and the non-use state. The slider (3) reaches the rear end portion (21b) in the non-use state.

FIG.3



Description

TECHNICAL FIELD

[0001] The present invention relates to a cutter knife.

BACKGROUND ART

[0002] Conventionally, there is a cutter knife called a safety cutter. The safety cutter includes a body, a slider, and an elastic body. The slider is connected to a blade inside the body. The blade is biased rearward by the elastic body. The safety cutter is switchable between a use state and a non-use state by movement of the blade, the use state being a state in which the slider causes the blade to protrude from the body, the non-use state being a state in which the slider causes the blade to be stored into the body. The slider in the non-use state is disposed rearward with respect to the slider in the use state. When the slider is moved rearward due to the biasing of the elastic body, the safety cutter is switched from the use state to the non-use state.

[0003] For example, a quick-back slider (cutter knife) described in Japanese Patent No. 3325524 (PTL 1) includes a holder (body), a main sliding body, a retention mechanism, an auxiliary sliding body, an elastic body, and a coupling mechanism. The main sliding body is movable in a frontward/rearward direction with respect to the holder. The retention mechanism is configured to retain the main sliding body with respect to the holder. The auxiliary sliding body and a tool body (blade) are disposed frontward with respect to the main sliding body. The auxiliary sliding body is movable in the frontward/rearward direction with respect to the main sliding body. The tool body is coupled to the auxiliary sliding body. The elastic body biases the auxiliary sliding body rearward with respect to the main sliding body. The coupling mechanism couples the main sliding body and the auxiliary sliding body.

CITATION LIST

PATENT LITERATURE

[0004] PTL 1: Japanese Patent No. 3325524

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0005] In the quick-back slider described in the above publication, the main sliding body is disposed frontward with respect to the rear end portion of the holder. Since the auxiliary sliding body is disposed frontward with respect to the main sliding body, the auxiliary sliding body does not reach the rear end portion of the holder. Therefore, the tool body may protrude from the front end portion of the holder in the non-use state of the quick-back slider.

[0006] The present invention has been made in view of the above-described problem and has an object to provide a cutter knife in which a blade does not protrude from a front end portion of a body in a non-use state.

SOLUTION TO PROBLEM

[0007] A cutter knife of the present invention includes a body, a slider, a cap, and an elastic body. The body includes a front end portion and a rear end portion. The rear end portion is opposite to the front end portion. The slider holds a blade in inside of the body. The slider is movable in the inside of the body between a protruding position and a storage position, the protruding position being a position for causing the blade to protrude from the front end portion, the storage position being a position for storing the blade between the front end portion and the rear end portion. The cap is fixable to the rear end portion. The elastic body connects the slider to the cap. The cap is fixed to the rear end portion in each of a use state and a non-use state, the use state being a state in which the slider is disposed at the protruding position, the non-use state being a state in which the slider is disposed at the storage position. The elastic body biases the slider toward the cap in each of the use state and the non-use state. The slider reaches the rear end portion in the non-use state.

ADVANTAGEOUS EFFECTS OF INVENTION

[0008] According to the cutter knife of the present invention, the blade does not protrude from the front end portion of the body in the non-use state.

BRIEF DESCRIPTION OF DRAWINGS

[0009]

Fig. 1 is a top view schematically showing a configuration of a cutter knife according to a first embodiment in a state in which a stopper is disposed at a first position.

Fig. 2 is a side view schematically showing the configuration of the cutter knife according to the first embodiment.

Fig. 3 is a cross sectional view along a line III-III of Fig. 1.

Fig. 4 is a cross sectional view schematically showing the configuration of the cutter knife according to the first embodiment in a use state in which a blade protrudes from a body.

Fig. 5 is a top view schematically showing the configuration of the cutter knife according to the first embodiment in a state in which the stopper is disposed at a second position.

Fig. 6 is a top view schematically showing the configuration of the cutter knife according to the first embodiment in a state in which the stopper is disposed

at a third position.

Fig. 7 is a partial perspective view schematically showing the configuration of the cutter knife according to the first embodiment in a movable state in which a lever is disposed at a movable position.

Fig. 8 is a perspective view schematically showing a configuration of a slider of the cutter knife according to the first embodiment.

Fig. 9 is a side view schematically showing the configuration of the slider of the cutter knife according to the first embodiment.

Fig. 10 is a cross sectional view along a line X-X of Fig. 9.

Fig. 11 is a perspective view schematically showing a configuration of a cap of the cutter knife according to the first embodiment.

Fig. 12 is a perspective view schematically showing a configuration of the stopper of the cutter knife according to the first embodiment when viewed from one side.

Fig. 13 is a perspective view schematically showing the configuration of the stopper of the cutter knife according to the first embodiment when viewed from the other side.

Fig. 14 is a perspective view schematically showing configurations of the lever and hinge of the cutter knife according to the first embodiment.

Fig. 15 is a partial cross sectional view schematically showing the configuration of the cutter knife according to the first embodiment in the state in which the stopper is disposed at the first position.

Fig. 16 is a partial cross sectional view schematically showing the configuration of the cutter knife according to the first embodiment in the state in which the stopper is disposed at the second position.

Fig. 17 is a partial cross sectional view schematically showing the configuration of the cutter knife according to the first embodiment in the state in which the stopper is disposed at the third position.

Fig. 18 is a partial cross sectional view schematically showing the configuration of the cutter knife according to the first embodiment in a state in which the hinge and the cap are fitted.

Fig. 19 is a partial cross sectional view schematically showing the configuration of the cutter knife according to the first embodiment in a state in which the fitting between the hinge and the cap is released.

Fig. 20 is a partial cross sectional view schematically showing the configuration of the cutter knife according to the first embodiment in a movable state in which the lever is disposed at the movable position.

Fig. 21 is a partial cross sectional view schematically showing a configuration of a cutter knife according to a second embodiment.

DESCRIPTION OF EMBODIMENTS

[0010] Hereinafter, embodiments will be described

with reference to figures. It should be noted that in the description below, the same or corresponding portions are denoted by the same reference characters and the same explanation will not be described repeatedly.

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First Embodiment.

[0011] A configuration of a cutter knife 100 according to a first embodiment will be described with reference to Figs. 1 to 14.

[0012] As shown in Fig. 1, cutter knife 100 holds a blade 1. A cutting edge is provided at the front end of blade 1. Blade 1 includes a plurality of cutting edge portions 10. The plurality of cutting edge portions 10 are connected to one another. The plurality of cutting edge portions 10 are detachable from one another.

[0013] Cutter knife 100 includes a body 2, a slider 3, a cap 4, and an elastic body 5 (see Fig. 3). Desirably, cutter knife 100 further includes a stopper 6, a lever 7, and a hinge 8 (see Fig. 3). Fig. 1 is a top view schematically showing the configuration of cutter knife 100 in a state in which stopper 6 is disposed at a first position. Stopper 6 is movable to the first position, a second position, and a third position as described later.

[0014] Body 2 includes a holder 21 and a cover 22. Holder 21 accommodates blade 1. Holder 21 is composed of a metal, for example. Holder 21 composed of the metal is a metal body. Cover 22 partially covers holder 21. As shown in Figs. 1 and 2, cover 22 covers a portion of a front surface, a side surface, and a rear surface of holder 21. The front surface of holder 21 is partially exposed from cover 22. Cover 22 may be provided with a slip resistance portion 23. Slip resistance portion 23 is provided with irregularities.

[0015] As shown in Fig. 3, body 2 includes a front end portion 21a and a rear end portion 21b. Fig. 3 is a cross sectional view along a line III-III of Fig. 1. Rear end portion 21b is opposite to front end portion 21a. The size of body 2 in the long-side direction is larger than the size of blade 1 in the long-side direction. That is, the size of body 2 from front end portion 21a to rear end portion 21b is larger than the size of blade 1 in the long-side direction.

[0016] In the present embodiment, a direction from rear end portion 21b toward front end portion 21a is a first direction DR1. First direction DR1 is along the long-side direction of body 2. A side on which front end portion 21a is disposed with respect to rear end portion 21b is a front side in first direction DR1. A side on which rear end portion 21b is disposed with respect to front end portion 21a is a rear side in first direction DR1. A side on which stopper 6 is disposed with respect to blade 1 is one side. A side on which blade 1 is disposed with respect to stopper 6 is the other side.

[0017] Slider 3 holds blade 1 in inside of body 2. Slider 3 is connected to blade 1 between front end portion 21a and rear end portion 21b. A connection position between slider 3 and blade 1 is located between front end portion 21a and rear end portion 21b. Slider 3 includes a first

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holding protuberance portion 30 extending along a direction from one side toward the other side. Elastic body 5 is connected to first holding protuberance portion 30.

[0018] As shown in Figs. 3 and 4, slider 3 is movable along first direction DR1. Fig. 4 is a cross sectional view showing the configuration of cutter knife 100 in a use state. Slider 3 is movable in the inside of body 2 between a protruding position (see Fig. 4) for causing blade 1 to protrude from front end portion 21a and a storage position (see Fig. 3) for storing blade 1 between front end portion 21a and rear end portion 21b.

[0019] Slider 3 includes a first extension region extending along body 2. The first extension region is in the form of a straight line. Body 2 includes a second extension region extending along slider 3. The second extension region is in the form of a straight line. Since each of the first extension region and the second extension region is in the form of a straight line, slider 3 can be moved continuously in the inside of body 2. Therefore, a protruding length of slider 3 from body 2 can be continuously adjusted. The protruding length of slider 3 from body 2 can be adjusted more readily than in the case where slider 3 and body 2 are fixed by, for example, irregularities. Further, the protruding length of slider 3 from body 2 can be adjusted to protrude substantially the entire length of blade 1 from body 2.

[0020] As shown in Fig. 3, slider 3 reaches rear end portion 21b in a non-use state in which slider 3 is disposed at the storage position. Slider 3 overlaps with rear end portion 21b in the non-use state. Slider 3 protrudes rearward with respect to body 2 in the non-use state. Slider 3 extends over body 2 and cap 4 along first direction DR1 in the non-use state.

[0021] Cap 4 is fixable to rear end portion 21b. Cap 4 is fixable to rear end portion 21b by partially inserting cap 4 into body 2 through rear end portion 21b. Cap 4 has a portion facing rear end portion 21b. The portion of cap 4 facing rear end portion 21b is configured to come into contact with rear end portion 21b.

[0022] Cap 4 is fixed to rear end portion 21b in each of the use state (see Fig. 4) in which slider 3 is disposed at the protruding position and the non-use state (see Fig. 3) in which slider 3 is disposed at the storage position. Cap 4 is unmovable with respect to rear end portion 21b in each of the use state (see Fig. 4) and the non-use state (see Fig. 3). Cap 4 is not moved relative to rear end portion 21b in each of the use state (see Fig. 4) and the non-use state (see Fig. 3). Cap 4 is in contact with rear end portion 21b in each of the use state (see Fig. 4) and the non-use state (see Fig. 3).

[0023] Cap 4 includes a second holding protuberance portion 40 extending along the direction from one side toward the other side. Elastic body 5 is connected to second holding protuberance portion 40. Cap 4 is formed separately from body 2. As described later, cap 4 is detachable from body 2. Cap 4 as well as blade 1, slider 3, and elastic body 5 are collectively detachable from body 2.

[0024] Elastic body 5 connects slider 3 to cap 4. Elastic body 5 includes a front-side end portion 51 and a rear-side end portion 52. Front-side end portion 51 is disposed frontward with respect to rear-side end portion 52. Front-side end portion 51 is connected to first holding protuberance portion 30. Rear-side end portion 52 is connected to second holding protuberance portion 40. Elastic body 5 connects first holding protuberance portion 30 to second holding protuberance portion 40, thereby connecting slider 3 to cap 4.

[0025] Elastic body 5 biases slider 3 toward cap 4 in each of the use state (see Fig. 4) and the non-use state (see Fig. 3). Elastic body 5 biases slider 3 rearward. Elastic body 5 biases cap 4 frontward. Thus, elastic body 5 presses cap 4 against body 2.

[0026] Elastic body 5 is expandable and contractible along first direction DR1. Elastic body 5 is, for example, a spring. Elastic body 5 is, for example, a tension spring. Elastic body 5 is not limited to the spring and may be appropriately determined.

[0027] Stopper 6 is attached to slider 3 so as to be movable with respect to slider 3. Stopper 6 is movable with respect to slider 3 along first direction DR1. As shown in Figs. 1 and 5, stopper 6 is movable between the first position and the second position. Fig. 5 is a top view showing the configuration of cutter knife 100 in a state in which stopper 6 of cutter knife 100 is disposed at the second position. As shown in Fig. 6, desirably, stopper 6 is movable to the third position. Fig. 6 is a top view showing the configuration of cutter knife 100 in a state in which stopper 6 of cutter knife 100 is disposed at the third position. Stopper 6 is movable among the first position, the second position, and the third position. That is, slider 3 is movable in three stages. The first position, the second position, and the third position are arranged in this order from the front side. The first position is disposed frontward with respect to the second position. The second position is disposed frontward with respect to the third position.

[0028] When stopper 6 is disposed at the first position, slider 3 is not fixed to cap 4. That is, when stopper 6 is disposed at the first position, slider 3 is movable with respect to cap 4. When stopper 6 is disposed at the first position, slider 3 can be disposed at the protruding position as shown in Fig. 4.

[0029] When stopper 6 is disposed at the second position, slider 3 is fixed to cap 4. When stopper 6 is disposed at the second position, slider 3 is fixed to the storage position.

[0030] When stopper 6 is disposed at the third position, slider 3 is fixed to cap 4. As shown in Fig. 7, when stopper 6 is disposed at the third position (see Fig. 6), slider 3 is movable rearward with respect to rear end portion 21b. Slider 3 is configured to be pulled out from body 2 together with cap 4 and stopper 6.

[0031] As shown in Figs. 3 and 7, lever 7 is attached to body 2 so as to be rotatable with respect to body 2. Lever 7 is rotatable between a fixation position and a movable position.

[0032] As shown in Fig. 3, when lever 7 is disposed at the fixation position, cap 4 is fixed to body 2. When lever 7 is disposed at the fixation position, cap 4 is fixed to body 2 by sandwiching cap 4 between lever 7 and body 2. When lever 7 is disposed at the fixation position, lever 7 is disposed straightly with respect to body 2. When lever 7 is disposed at the fixation position, lever 7 is rotatable such that the rotation direction of lever 7 becomes orthogonal to first direction DR1. When lever 7 is disposed at the fixation position, lever 7 is not moved in parallel with first direction DR1. In Fig. 3, the rotation direction of lever 7 is indicated by an open arrow.

[0033] As shown in Fig. 7, when lever 7 is disposed at the movable position, cap 4 is not fixed to body 2. When lever 7 is disposed at the movable position, cap 4 is movable relative to body 2. When lever 7 is disposed at the movable position, cap 4 is not sandwiched between lever 7 and body 2. When lever 7 is disposed at the movable position, lever 7 is disposed on the other side of cap 4. When lever 7 is disposed at the movable position, lever 7 does not block cap 4 from being separated from body 2.

[0034] As shown in Fig. 3, hinge 8 is attached to lever 7. In the present embodiment, hinge 8 is formed in one piece with lever 7. As described later, hinge 8 may be formed separately from lever 7. Hinge 8 is deformable. Hinge 8 is deformable to be contracted along first direction DR1. Hinge 8 is deformable to move a first end portion 81 of hinge 8 rearward.

[0035] Hinge 8 can be fitted to cap 4 in the state in which lever 7 is disposed at the fixation position. Hinge 8 is fitted to cap 4 when stopper 6 is disposed at the first position or the second position. Specifically, hinge 8 is fitted to cap 4 by disposing first end portion 81 of hinge 8 to come into contact with cap 4. Lever 7 is fixed to the fixation position by fitting hinge 8 to cap 4. That is, by fitting hinge 8 to cap 4, lever 7 is not rotated with respect to cap 4.

[0036] As shown in Fig. 6, stopper 6 is movable to the third position at which stopper 6 is in contact with hinge 8 (see Fig. 3). Lever 7 is rotatable from the fixation position to the movable position by moving stopper 6 from the first position or the second position to the third position. When stopper 6 is disposed at the third position to come into contact with hinge 8 (see Fig. 3), hinge 8 (see Fig. 3) is deformed by the contact with stopper 6, thereby releasing the fitting thereof to cap 4. Specifically, hinge 8 (see Fig. 3) is deformed to push out first end portion 81 (see Fig. 3) of hinge 8 (see Fig. 3) from cap 4, thereby releasing the fitting thereof to cap 4.

<Detailed Configuration of Slider 3>

[0037] Next, a detailed configuration of slider 3 will be described with reference to Figs. 8 to 10.

[0038] As shown in Figs. 8 and 9, slider 3 includes a first portion 31, a second portion 32, and a third portion 33. First portion 31, second portion 32, and third portion 33 are connected in this order. First portion 31 is provided

with a first slip resistance portion 311. First slip resistance portion 311 is provided with irregularities.

[0039] As shown in Fig. 10, second portion 32 is provided with a front-side first projecting portion 32a1, a front-side second projecting portion 32a2, a rear-side first projecting portion 32b1, a rear-side second projecting portion 32b2, a first straight portion 32c1, and a second straight portion 32c2. Front-side first projecting portion 32a1 faces front-side second projecting portion 32a2. Rear-side first projecting portion 32b1 faces rear-side second projecting portion 32b2. First straight portion 32c1 faces second straight portion 32c2.

[0040] Front-side first projecting portion 32a1 and rear-side first projecting portion 32b1 are connected by first straight portion 32c1. Each of front-side first projecting portion 32a1 and rear-side first projecting portion 32b1 bulges from first straight portion 32c1 toward a side opposite to each of front-side second projecting portion 32a2 and rear-side second projecting portion 32b2. Front-side second projecting portion 32a2 and rear-side second projecting portion 32b2 are connected by second straight portion 32c2. Each of front-side second projecting portion 32a2 and rear-side second projecting portion 32b2 bulges from second straight portion 32c2 toward a side opposite to each of front-side first projecting portion 32a1 and rear-side first projecting portion 32b1.

[0041] Slider 3 includes a root portion 33a, a first protruding portion 33b 1, a second protruding portion 33b2, a first engagement protuberance portion 33c1, a second engagement protuberance portion 33c2, an intermediate first projecting portion 33d1, and an intermediate second projecting portion 33d2. In the present embodiment, root portion 33a, first protruding portion 33b 1, second protruding portion 33b2, first engagement protuberance portion 33c1, second engagement protuberance portion 33c2, intermediate first projecting portion 33d1, and intermediate second projecting portion 33d2 are provided in third portion 33. First protruding portion 33b 1 and second protruding portion 33b2 protrude rearward from root portion 33a. First protruding portion 33b1 and second protruding portion 33b2 are disposed with a space being interposed therebetween. First engagement protuberance portion 33c1 is connected to the tip of first protruding portion 33b1. First engagement protuberance portion 33c1 extends from first protruding portion 33b1 toward second protruding portion 33b2. Second engagement protuberance portion 33c2 is connected to the tip of second protruding portion 33b2. Second engagement protuberance portion 33c2 extends from second protruding portion 33b2 toward first protruding portion 33b1. Intermediate first projecting portion 33d1 is connected to first protruding portion 33b1. Intermediate first projecting portion 33d1 extends from first protruding portion 33b1 toward a side opposite to second protruding portion 33b2. Intermediate second projecting portion 33d2 is connected to second protruding portion 33b2. Intermediate second projecting portion 33d2 extends from second protruding portion 33b2 toward a side opposite to first pro-

truding portion 33b 1.

<Detailed Configuration of Cap 4>

[0042] Next, a detailed configuration of cap 4 will be described with reference to Fig. 11.

[0043] As shown in Fig. 11, cap 4 includes a main body portion 41 and an insertion portion 44. Main body portion 41 is configured to face body 2 (see Fig. 3). Insertion portion 44 is insertable into body 2 (see Fig. 3). By inserting insertion portion 44 into body 2 (see Fig. 3), cap 4 is suppressed from being moved relative to body 2 (see Fig. 3).

[0044] Cap 4 is provided with a groove 49. Groove 49 includes a first side wall portion 43b1, a second side wall portion 43b2, a first recess portion 43c1, and a second recess portion 43c2. In the present embodiment, groove 49 includes a first groove portion 42 and a second groove portion 43. Second groove portion 43 is provided in the bottom of first groove portion 42. That is, groove 49 is formed in two levels. Second groove portion 43 includes a bottom portion 43a, first side wall portion 43b1, second side wall portion 43b2, third side wall portion 43b3, first recess portion 43c1, and second recess portion 43c2. First side wall portion 43b1, second side wall portion 43b2, third side wall portion 43b3, first recess portion 43c1, and second recess portion 43c2 rise from bottom portion 43a. Second side wall portion 43b2 faces first side wall portion 43b1 with a space being interposed between second side wall portion 43b2 and first side wall portion 43b1. Third side wall portion 43b3 connects first side wall portion 43b1 to second side wall portion 43b2. First recess portion 43c1 is provided to be recessed from first side wall portion 43b1 toward a side opposite to second side wall portion 43b2. Second recess portion 43c2 is provided to be recessed from second side wall portion 43b2 toward a side opposite to first side wall portion 43b1.

<Detailed Configuration of Stopper 6>

[0045] Next, a detailed configuration of stopper 6 will be described with reference to Figs. 12 and 13.

[0046] As shown in Figs. 12 and 13, stopper 6 includes a base portion 61, a one-side protruding portion 62, an other-side protruding portion 63, a front-side first protruding portion 64a1, a front-side second protruding portion 64a2, a first fixation protuberance portion 64b1, a second fixation protuberance portion 64b2, and a rear-side protuberance portion 65. One-side protruding portion 62 protrudes from base portion 61 toward one side. Other-side protruding portion 63 protrudes from base portion 61 toward the other side. Front-side first protruding portion 64a1 and front-side second protruding portion 64a2 protrude frontward from base portion 61. Front-side first protruding portion 64a1 and front-side second protruding portion 64a2 are disposed with a space being interposed therebetween. First fixation protuberance portion 64b1 extends from the tip of front-side first protruding portion

64a1 toward front-side second protruding portion 64a2. Second fixation protuberance portion 64b2 extends from the tip of front-side second protruding portion 64a2 toward front-side first protruding portion 64a1. First fixation protuberance portion 64b1 and second fixation protuberance portion 64b2 face each other with a space being interposed therebetween. Rear-side protuberance portion 65 protrudes rearward from the base.

10 <Detailed Configuration of Lever 7>

[0047] Next, a detailed configuration of lever 7 will be described with reference to Figs. 2 and 14.

[0048] As shown in Fig. 14, lever 7 includes a trunk portion 71, a first arm portion 72a, and a second arm portion 72b. Trunk portion 71 connects first arm portion 72a and second arm portion 72b. Hinge 8 is connected to trunk portion 71. First arm portion 72a and second arm portion 72b extend frontward from trunk portion 71. First arm portion 72a is attached so as to be rotatable with respect to the body. Second arm portion 72b is attached at a side opposite to first arm portion 72a with respect to the body, so as to be rotatable with respect to the body. First arm portion 72a is provided with a first through hole 73a. Second arm portion 72b is provided with a second through hole 73b. Each of first through hole 73a and second through hole 73b is provided to intersect with first direction DR1.

[0049] As shown in Fig. 2, a first stem portion 23a of body 2 is inserted into first through hole 73a. Although not shown, a second stem portion of body 2 is inserted into second through hole 73b. Therefore, lever 7 can be rotated with respect to body 2 with each of first stem portion 23a and second stem portion of body 2 being centered.

<Configuration of Cutter Knife 100 When Stopper 6 Is Disposed at First Position>

[0050] Next, the configuration of cutter knife 100 when stopper 6 is disposed at the first position will be described in detail with reference to Fig. 15. Fig. 15 is a partial cross sectional view showing the configuration of cutter knife 100 in the state in which stopper 6 of cutter knife 100 is disposed at the first position. For convenience of explanation, Fig. 15 does not show first portion 31 (see Fig. 8) of slider 3 and base portion 61 (see Fig. 12) of stopper 6.

[0051] Slider 3 causes the blade to protrude from body 2 when stopper 6 is disposed at the first position. Therefore, when stopper 6 is disposed at the first position, cutter knife 100 is in the use state. Slider 3 can be detached from cap 4 when stopper 6 is disposed at the first position. Stopper 6 is not engaged with slider 3 when stopper 6 is disposed at the first position.

[0052] As shown in Fig. 15, when stopper 6 is disposed at the first position, front-side first protruding portion 64a1 and front-side second protruding portion 64a2 of stopper 6 are not engaged with front-side first projecting portion

32a1 and front-side second projecting portion 32a2. Specifically, when stopper 6 is disposed at the first position, front-side first protruding portion 64a1 and front-side second protruding portion 64a2 are disposed frontward with respect to front-side first projecting portion 32a1 and front-side second projecting portion 32a2.

[0053] First protruding portion 33b1 protrudes from root portion 33a to groove 49 along first side wall portion 43b1. Second protruding portion 33b2 protrudes from root portion 33a to groove 49 along second side wall portion 43b2. Intermediate first projecting portion 33d1 is engaged with first recess portion 43c1. Intermediate second projecting portion 33d2 is engaged with second recess portion 43c2. Other-side protruding portion 63 protrudes from base portion 61 (see Fig. 13) toward between first protruding portion 33b1 and second protruding portion 33b2.

[0054] When stopper 6 is disposed at the first position, other-side protruding portion 63 is disposed on the root portion 33a side with respect to each of intermediate first projecting portion 33d1 and intermediate second projecting portion 33d2, with the result that the engagement between intermediate first projecting portion 33d1 and first recess portion 43c1 and the engagement between intermediate second projecting portion 33d2 and second recess portion 43c2 can be released. When stopper 6 is disposed at the first position, slider 3 is deformable to detach intermediate first projecting portion 33d1 from first recess portion 43c1. When stopper 6 is disposed at the first position, slider 3 is deformable to detach intermediate second projecting portion 33d2 from second recess portion 43c2. Specifically, when stopper 6 is disposed at the first position, first protruding portion 33b1 and second protruding portion 33b2 are deformable to come close to each other at the positions of intermediate first projecting portion 33d1 and intermediate second projecting portion 33d2. When stopper 6 is disposed at the first position, other-side protruding portion 63 is disposed frontward with respect to each of intermediate first projecting portion 33d1 and intermediate second projecting portion 33d2.

<Configuration of Cutter Knife 100 When Stopper 6 Is Disposed at Second Position>

[0055] Next, the configuration of cutter knife 100 when stopper 6 is disposed at the second position will be described in detail with reference to Fig. 16. Fig. 16 is a partial cross sectional view showing the configuration of cutter knife 100 in the state in which stopper 6 of cutter knife 100 is disposed at the second position. For convenience of explanation, Fig. 16 does not show first portion 31 (see Fig. 8) of slider 3 and base portion 61 (see Fig. 12) of stopper 6.

[0056] Body 2 accommodates a whole of the blade when stopper 6 is disposed at the second position. Therefore, when stopper 6 is disposed at the second position, cutter knife 100 is in the non-use state. When stopper 6

is disposed at the second position, slider 3 is not detached from cap 4. When stopper 6 is disposed at the second position, stopper 6 is engaged with slider 3.

[0057] As shown in Fig. 16, when stopper 6 is disposed at the second position, front-side first protruding portion 64a1 of stopper 6 is engaged with front-side first projecting portion 32a1 and rear-side first projecting portion 32b1. Specifically, when stopper 6 is disposed at the second position, front-side first protruding portion 64a1 is sandwiched between front-side first projecting portion 32a1 and rear-side first projecting portion 32b1 in first direction DR1. Further, when stopper 6 is disposed at the second position, front-side second protruding portion 64a2 of stopper 6 is engaged with front-side second projecting portion 32a2 and rear-side second projecting portion 32b2. Specifically, when stopper 6 is disposed at the second position, front-side second protruding portion 64a2 is sandwiched between front-side second projecting portion 32a2 and rear-side second projecting portion 32b2 in first direction DR1.

[0058] When stopper 6 is disposed at the second position, other-side protruding portion 63 is sandwiched between intermediate first projecting portion 33d1 and intermediate second projecting portion 33d2, with the result that the engagement between intermediate first projecting portion 33d1 and first recess portion 43c1 and the engagement between intermediate second projecting portion 33d2 and second recess portion 43c2 are maintained. When stopper 6 is disposed at the second position, intermediate first projecting portion 33d1 of slider 3 is not detached from first recess portion 43c1. When stopper 6 is disposed at the second position, intermediate second projecting portion 33d2 of slider 3 is not detached from second recess portion 43c2. Specifically, when stopper 6 is disposed at the second position, stopper 6 is configured such that other-side protruding portion 63 is disposed between intermediate first projecting portion 33d1 and intermediate second projecting portion 33d2. Thus, when stopper 6 is disposed at the second position, first protruding portion 33b1 and second protruding portion 33b2 of slider 3 are not deformed to come close to each other at the positions of intermediate first projecting portion 33d1 and intermediate second projecting portion 33d2.

<Configuration of Cutter Knife 100 When Stopper 6 Is Disposed at Third Position>

[0059] Next, the configuration of cutter knife 100 in a state in which stopper 6 is disposed at the third position will be described in detail with reference to Figs. 17 to 20. Fig. 17 is a partial cross sectional view showing the configuration of cutter knife 100 in the state in which stopper 6 of cutter knife 100 is disposed at the third position. For convenience of explanation, Fig. 17 does not show first portion 31 (see Fig. 8) of slider 3 and base portion 61 (see Fig. 12) of stopper 6. Fig. 18 is an enlarged view of a region XVIII in Fig. 3. Fig. 19 shows the configuration

of cutter knife 100 in a state in which the fitting between hinge 8 and cap 4 is released. Fig. 19 is a cross sectional view corresponding to Fig. 18. In Fig. 19, lever 7 is disposed at the fixation position. Fig. 20 shows the configuration of cutter knife 100 in a state in which lever 7 is disposed at the movable position. Fig. 20 is a cross sectional view corresponding to Fig. 18. For convenience of explanation, each of Figs. 18 to 20 does not show elastic body 5 (see Fig. 3).

[0060] As shown in Fig. 17, when stopper 6 is disposed at the third position, front-side first protruding portion 64a1 and front-side second protruding portion 64a2 of stopper 6 are not engaged with slider 3. Specifically, when stopper 6 is disposed at the third position, front-side first protruding portion 64a1 is disposed rearward with respect to rear-side first projecting portion 32b1 in first direction DR1. When stopper 6 is disposed at the third position, front-side second protruding portion 64a2 is disposed rearward with respect to rear-side second projecting portion 32b2 in first direction DR1.

[0061] When stopper 6 is disposed at the third position, other-side protruding portion 63 is disposed on the side opposite to each of intermediate first projecting portion 33d1 and intermediate second projecting portion 33d2 with respect to root portion 33a, with the result that the engagement between intermediate first projecting portion 33d1 and first recess portion 43c1 and the engagement between intermediate second projecting portion 33d2 and second recess portion 43c2 are maintained. When stopper 6 is disposed at the third position, slider 3 is not detached from cap 4. Specifically, when stopper 6 is disposed at the third position, intermediate first projecting portion 33d1 of slider 3 is not deformed to be detached from first recess portion 43c1. When stopper 6 is disposed at the third position, intermediate second projecting portion 33d2 is not deformed to be detached from second recess portion 43c2. More specifically, when stopper 6 is disposed at the third position, first protruding portion 33b1 and second protruding portion 33b2 are not deformed to come close to each other at the positions of intermediate first projecting portion 33d1 and intermediate second projecting portion 33d2. When stopper 6 is disposed at the third position, other-side protruding portion 63 is disposed rearward with respect to intermediate first projecting portion 33d1 and intermediate second projecting portion 33d2.

<Operation of Cutter Knife 100>

[0062] Next, an operation of cutter knife 100 will be described with reference to Figs. 3 to 7 as well as Figs. 15 to 18. Fig. 18 is a partial cross sectional view showing the state in which stopper 6 is disposed at the second position. In Fig. 18, hinge 8 is fitted to cap 4. Fig. 19 is a partial cross sectional view showing the state in which stopper 6 is disposed at the third position. In Fig. 19, the fitting between hinge 8 and cap 4 is released. In each of Figs. 18 and 19, lever 7 is disposed at the fixation position.

Fig. 20 is a partial cross sectional view showing the state in which lever 7 is disposed at the movable position. Each of Figs. 18 to 20 corresponds to region XVIII in Fig. 3.

[0063] As shown in Fig. 4, blade 1 protrudes from body 2 in the use state. Therefore, a user of cutter knife 100 can cut a cutting target object using blade 1.

[0064] Stopper 6 is disposed at the first position in the use state. Therefore, slider 3 is movable with respect to cap 4 in the use state. As shown in Figs. 3 and 4, slider 3 in the use state is disposed frontward with respect to slider 3 in the non-use state. When slider 3 is moved rearward from the protruding position by the biasing of elastic body 5, slider 3 is moved from the protruding position to the storage position. That is, slider 3 is moved rearward by the biasing of elastic body 5, thereby switching cutter knife 100 from the use state to the non-use state. Hence, the user of cutter knife 100 can switch cutter knife 100 from the use state to the non-use state by releasing his/her hand from slider 3 of cutter knife 100 in the use state.

[0065] As shown in Fig. 5, when stopper 6 is disposed at the second position, slider 3 is not moved with respect to cap 4. Therefore, the user of cutter knife 100 cannot move slider 3 frontward with respect to cap 4. Accordingly, the user of cutter knife 100 can maintain the non-use state in which blade 1 is accommodated in body 2. Therefore, the user of cutter knife 100 can safely operate cutter knife 100. For example, the user of cutter knife 100 can safely store cutter knife 100 in a pocket.

[0066] When stopper 6 is disposed at the first position or the second position, lever 7 is disposed at the fixation position. When each of first arm portion 72a and second arm portion 72b is rotated with respect to body 2 to dispose lever 7 at the fixation position, cap 4 is sandwiched between body 2 and trunk portion 71, thereby fixing cap 4 to body 2. When lever 7 is disposed at the fixation position, cap 4 is not moved with respect to body 2.

[0067] As shown in Figs. 6 and 7, when stopper 6 is disposed at the third position, lever 7 can be moved from the fixation position to the movable position. Therefore, the user of cutter knife 100 can move lever 7 to the movable position. When each of first arm portion 72a and second arm portion 72b is rotated with respect to body 2 to dispose lever 7 at the movable position, cap 4 is movable with respect to body 2 because cap 4 is not sandwiched between trunk portion 71 and body 2. When lever 7 is disposed at the movable position, cap 4 is movable with respect to body 2. Therefore, the user of cutter knife 100 can pull out cap 4 from body 2 rearward.

[0068] As shown in Figs. 15 and 16, slider 3 is engaged with stopper 6 by moving stopper 6 from the first position to the second position. Therefore, slider 3 is unmovable with respect to cap 4. As shown in Figs. 16 and 17, when stopper 6 is moved from the second position to the third position, cap 4 is movable with respect to body 2.

[0069] As shown in Figs. 18 and 19, when stopper 6 is moved from the second position to the third position, the fitting between lever 7 and hinge 8 is released. Spe-

cifically, when stopper 6 is moved from the second position to the third position, stopper 6 is brought into contact with hinge 8. Stopper 6 is brought into contact with first end portion 81 of hinge 8. With the contact between stopper 6 and hinge 8, hinge 8 is deformed to move first end portion 81 of hinge 8 rearward. With the movement of hinge 8, first end portion 81 is separated from cap 4. Thus, the fitting between hinge 8 and cap 4 is released. Therefore, as shown in Fig. 20, lever 7 is rotated from the fixation position to the movable position. The user of cutter knife 100 can rotate lever 7 from the fixation position to the movable position. Thus, cap 4 can be moved with respect to body 2.

[0070] As described above, as shown in Fig. 7, when lever 7 is moved to the movable position by moving stopper 6 to the third position, the user of cutter knife 100 can pull out cap 4 from body 2. Cap 4 can be pulled out from body 2 together with blade 1, slider 3, elastic body 5, and stopper 6 collectively. Thus, blade 1 pulled out from body 2 can be replaced with another blade 1.

[0071] Next, functions and effects of the present embodiment will be described.

[0072] According to cutter knife 100 of the first embodiment, as shown in Figs. 3 and 4, cap 4 is fixed to rear end portion 21b in each of the use state (see Fig. 4) in which slider 3 is disposed at the protruding position and the non-use state (see Fig. 3) in which slider 3 is disposed at the storage position. As shown in Fig. 3, slider 3 reaches rear end portion 21b in the non-use state. Therefore, in the non-use state, blade 1 does not protrude from front end portion 21a to the outside of body 2. Therefore, blade 1 does not protrude from body 2 in the non-use state.

[0073] As shown in Fig. 1, when stopper 6 is disposed at the first position, slider 3 is not fixed to cap 4, whereas as shown in Fig. 5, when stopper 6 is disposed at the second position, slider 3 is fixed to cap 4. Therefore, by moving stopper 6 to the first position or the second position, it is possible to switch between the state in which slider 3 is not fixed to cap 4 and the state in which slider 3 is fixed to cap 4. Therefore, when the user of cutter knife 100 uses cutter knife 100, slider 3 can be moved to the first position so as to move slider 3 to the protruding position, with the result that cutter knife 100 can be used. That is, by moving slider 3 to the first position, cutter knife 100 can be brought into the use state. On the other hand, when the user of cutter knife 100 does not use cutter knife 100, slider 3 can be moved to the second position so as to fix slider 3 to the storage position. That is, by moving the slider to the second position, cutter knife 100 can be brought into the non-use state. Therefore, blade 1 can be prevented from unintentionally protruding from body 2. Therefore, for example, when cutter knife 100 is stored in a pocket of the user of cutter knife 100, cutter knife 100 can be safely stored in the pocket.

[0074] As shown in Fig. 15, when stopper 6 is disposed at the first position, the engagement between intermediate first projecting portion 33d1 and first recess portion 43c1 and the engagement between intermediate second

projecting portion 33d2 and second recess portion 43c2 can be released because other-side protruding portion 63 is disposed on the root portion 33a side with respect to each of intermediate first projecting portion 33d1 and intermediate second projecting portion 33d2, whereas as shown in Fig. 16, when stopper 6 is disposed at the second position, the engagement between intermediate first projecting portion 33d1 and first recess portion 43c1 and the engagement between intermediate second projecting portion 33d2 and second recess portion 43c2 are maintained because other-side protruding portion 63 is sandwiched between intermediate first projecting portion 33d1 and intermediate second projecting portion 33d2. Therefore, by the movement of stopper 6, the engagement between slider 3 and cap 4 can be switched to be released or maintained.

[0075] As shown in Fig. 1, when lever 7 is disposed at the fixation position, cap 4 is fixed to body 2, whereas as shown in Fig. 7, when lever 7 is disposed at the movable position, cap 4 is not fixed to body 2. Therefore, by disposing lever 7 at the fixation position or the movable position, it is possible to switch between the state in which cap 4 is fixed to body 2 and the state in which cap 4 is not fixed to body 2. Therefore, when the user of cutter knife 100 uses cutter knife 100, cap 4 can be fixed to body 2 by disposing lever 7 at the fixation position, with the result that cap 4 can be prevented from being detached from body 2. Thus, cap 4 can be prevented from being detached from body 2 in the use state or the non-use state. When the user of cutter knife 100 replaces blade 1 of cutter knife 100, the user can pull out cap 4 from body 2 together with blade 1, slider 3, elastic body 5, and stopper 6 by disposing lever 7 at the movable position. Thus, when cap 4 is detached from body 2, blade 1, slider 3, elastic body 5, and stopper 6 do not come apart and are removed collectively. Therefore, blade 1 can be replaced safely.

[0076] As shown in Fig. 3, when lever 7 is disposed at the fixation position, lever 7 is rotatable such that the rotation direction of lever 7 becomes orthogonal to first direction DR1, and when lever 7 is disposed at the fixation position, lever 7 is not moved in parallel with first direction DR1. Therefore, lever 7 is not rotated when force along first direction DR1 is applied to lever 7. Hence, even when slider 3 is biased by the elastic force of elastic body 5 from front end portion 21a toward rear end portion 21b along first direction DR1 to hit against cap 4, lever 7 is not rotated. Therefore, even when slider 3 hits against cap 4, cap 4 can be suppressed from being pulled out. Further, since cap 4 can be suppressed from being pulled out, blade 1 can be also suppressed from being pulled out from body 2. Thus, blade 1 can be stored safely.

[0077] As shown in Fig. 1, when lever 7 is disposed at the fixation position by rotating each of first arm portion 72a and second arm portion 72b with respect to body 2, cap 4 is fixed to body 2 due to cap 4 being sandwiched between trunk portion 71 and body 2, whereas as shown in Fig. 7, when lever 7 is disposed at the movable position

by rotating each of first arm portion 72a and second arm portion 72b with respect to body 2, cap 4 is movable with respect to body 2 due to cap 4 being not sandwiched between trunk portion 71 and body 2. Therefore, the fixation of cap 4 to the body can be maintained or released by rotating lever 7.

[0078] As shown in Fig. 19, when stopper 6 is disposed at the third position to come into contact with hinge 8, hinge 8 is deformed by the contact with stopper 6 to release the fitting thereof to cap 4. Lever 7 is rotatable from the fixation position to the movable position by moving stopper 6 from the first position or the second position to the third position. Therefore, the fixation of lever 7 can be released by only moving stopper 6. Hence, since the fixation of lever 7 can be readily released, blade 1 can be readily replaced. Further, the fixation of lever 7 is not released unless stopper 6 is moved to the third position. Therefore, the fixation of lever 7 can be prevented from being unintentionally released in the use state or the non-use state, thereby preventing cap 4 from being unintentionally pulled out. Therefore, cutter knife 100 can be used more safely. Blade 1 can be replaced only when stopper 6 is disposed at the third position. When stopper 6 is disposed at the third position, slider 3 is disposed at the storage position. Therefore, blade 1 can be replaced only when slider 3 is disposed at the storage position.

Second Embodiment.

[0079] Next, a configuration of a cutter knife 100 according to a second embodiment will be described with reference to Fig. 21. The second embodiment has the same configurations, functions and effects as those in the first embodiment unless otherwise described particularly. Therefore, the same configurations as those in the first embodiment are denoted by the same reference characters and will not be described repeatedly.

[0080] As shown in Fig. 21, in cutter knife 100 according to the present embodiment, hinge 8 is formed separately from lever 7. Fig. 21 is an enlarged view corresponding to Fig. 18. For convenience of explanation, Fig. 21 does not show elastic body 5 (see Fig. 3). Hinge 8 is composed of, for example, a sheet metal. A second end portion 82 of hinge 8 is fixed to lever 7 so as to be detachable from lever 7. Hinge 8 is fixed to lever 7 by, for example, a screw 83. For example, second end portion 82 of hinge 8 is fixed to lever 7 by screw 83.

[0081] Next, functions and effects of the present embodiment will be described.

[0082] According to cutter knife 100 of the second embodiment, as shown in Fig. 21, hinge 8 is formed separately from lever 7. Hinge 8 is deformed by elastic deformation and is therefore likely to be deteriorated. If hinge 8 is formed in one piece with lever 7, hinge 8 may be broken due to deterioration of a material (for example, a resin) of each of hinge 8 and lever 7, and may be separated from lever 7. In this case, cutter knife 100 cannot be used. On the other hand, according to the present

embodiment, since hinge 8 is formed separately from lever 7, even when hinge 8 is broken, hinge 8 can be replaced with another hinge 8 that is not broken. Thus, by replacing hinge 8, cutter knife 100 can be prevented from being unusable.

[0083] The embodiments invented herein are illustrative and non-restrictive in any respect. The scope of the present invention is defined by the terms of the claims, rather than the embodiments described above, and is intended to include any modifications within the scope and meaning equivalent to the terms of the claims.

REFERENCE SIGNS LIST

- [0084]** 1: blade; 2: body; 3: slider; 4: cap; 5: elastic body; 6: stopper; 7: lever; 8: hinge; 21a: front end portion; 21b: rear end portion; 33a: root portion; 33b 1: first protruding portion; 33b2: second protruding portion; 33d1: intermediate first projecting portion; 33d2: intermediate second projecting portion; 42b1: first side wall portion; 42b2: second side wall portion; 42c1: first recess portion; 42c2: second recess portion; 49: groove; 64: base portion; 63: other-side protruding portion; 71: trunk portion; 72a: first arm portion; 72b: second arm portion; 100: cutter knife; DR1: first direction.

Claims

1. A cutter knife comprising:

a body including a front end portion and a rear end portion opposite to the front end portion;
a slider that holds a blade in inside of the body, the slider being movable in the inside of the body between a protruding position and a storage position, the protruding position being a position for causing the blade to protrude from the front end portion, the storage position being a position for storing the blade between the front end portion and the rear end portion;
a cap fixable to the rear end portion; and
an elastic body that connects the slider to the cap, wherein
the cap is fixed to the rear end portion in each of a use state and a non-use state, the use state being a state in which the slider is disposed at the protruding position, the non-use state being a state in which the slider is disposed at the storage position,
the elastic body biases the slider toward the cap in each of the use state and the non-use state, and
the slider reaches the rear end portion in the non-use state.

2. The cutter knife according to claim 1, further comprising a stopper, wherein

the stopper is attached to the slider so as to be movable with respect to the slider, and is movable between a first position and a second position,
 when the stopper is disposed at the first position, the slider is not fixed to the cap, and
 when the stopper is disposed at the second position, the slider is fixed to the cap.

3. The cutter knife according to claim 2, wherein

the cap is provided with a groove,
 the groove has a first side wall portion, a second side wall portion facing the first side wall portion with a space being interposed between the first side wall portion and the second side wall portion, a first recess portion provided to be recessed from the first side wall portion toward a side opposite to the second side wall portion, and a second recess portion provided to be recessed from the second side wall portion toward a side opposite to the first side wall portion,
 the slider has a root portion, a first protruding portion protruding from the root portion to the groove portion along the first side wall portion, a second protruding portion protruding from the root portion to the groove portion along the second side wall portion, an intermediate first projecting portion connected to the first protruding portion and engaged with the first recess portion, and an intermediate second projecting portion connected to the second protruding portion and engaged with the second recess portion,
 the stopper includes a base portion and an other-side protruding portion protruding from the base portion toward between the first protruding portion and the second protruding portion,
 when the stopper is disposed at the first position, the engagement between the intermediate first projecting portion and the first recess portion and the engagement between the intermediate second projecting portion and the second recess portion are releasable due to the other-side protruding portion being disposed on the root portion side with respect to each of the intermediate first projecting portion and the intermediate second projecting portion, and
 when the stopper is disposed at the second position, the engagement between the intermediate first projecting portion and the first recess portion and the engagement between the intermediate second projecting portion and the second recess portion are maintained due to the other-side protruding portion being sandwiched between the intermediate first projecting portion and the intermediate second projecting portion.

4. The cutter knife according to claim 2 or 3, further

comprising a lever, wherein

the lever is attached to the body so as to be rotatable with respect to the body, and is rotatable between a fixation position and a movable position,
 when the lever is disposed at the fixation position, the cap is fixed to the body,
 when the lever is disposed at the fixation position, the lever is rotatable such that a rotation direction of the lever becomes orthogonal to a first direction from the rear end portion toward the front end portion, and is not moved in parallel with the first direction, and
 when the lever is disposed at the movable position, the cap is not fixed to the body.

5. The cutter knife according to claim 4, wherein

the lever includes a first arm portion attached so as to be rotatable with respect to the body, a second arm portion attached on a side opposite to the first arm portion so as to be rotatable with respect to the body, and a trunk portion connecting the first arm portion and the second arm portion,
 when the lever is disposed at the fixation position by rotating the first arm portion and the second arm portion with respect to the body, the cap is fixed to the body due to the cap being sandwiched between the trunk portion and the body, and
 when the lever is disposed at the movable position by rotating the first arm portion and the second arm portion with respect to the body, the cap is movable with respect to the body due to the cap being not sandwiched between the trunk portion and the body.

6. The cutter knife according to claim 4 or 5, further comprising a hinge, wherein

the hinge is attached to the lever and is deformable, wherein
 the hinge is able to be fitted to the cap in a state in which the lever is disposed at the fixation position,
 the lever is fixed to the fixation position by fitting the hinge to the cap,
 the stopper is movable to a third position at which the stopper is in contact with the hinge,
 the hinge is fitted to the cap when the stopper is disposed at the first position or the second position,
 when the stopper is disposed at the third position to come into contact with the hinge, the hinge is deformed by the contact with the stopper to release the fitting of the hinge to the cap, and

the lever is rotatable from the fixation position to the movable position by moving the stopper from the first position or the second position to the third position.

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FIG.1

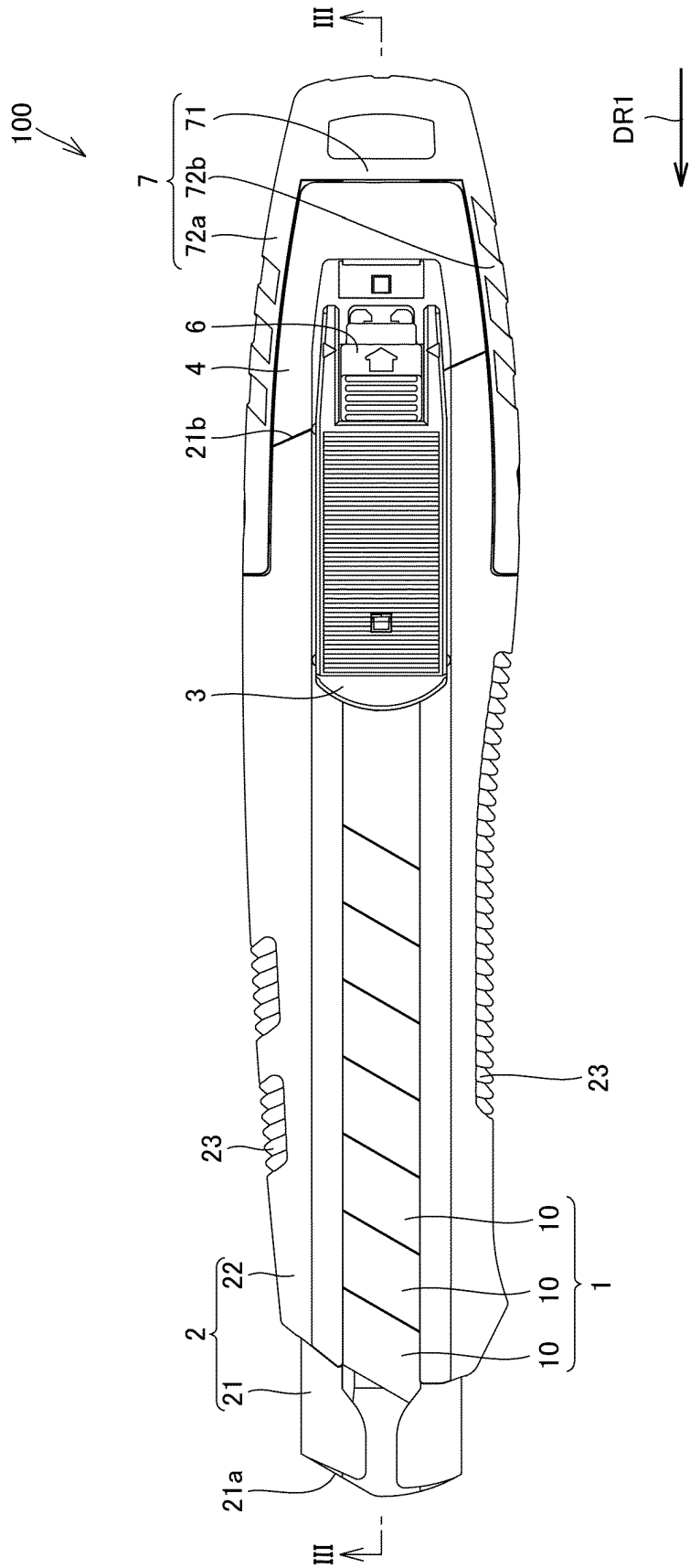


FIG.2

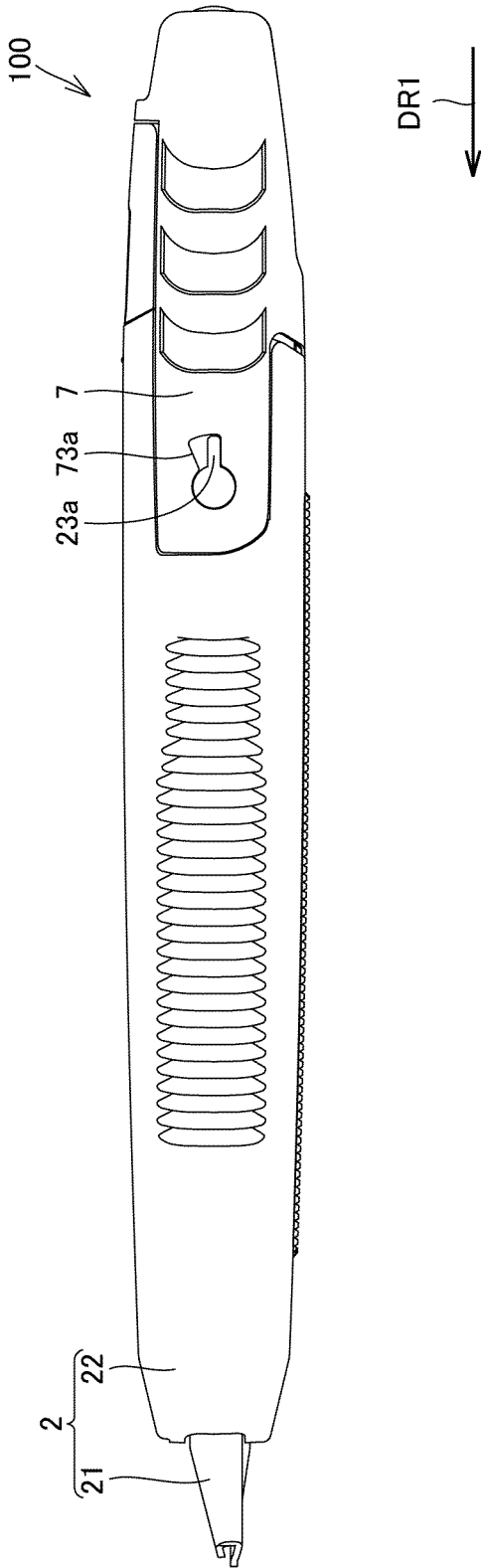


FIG.3

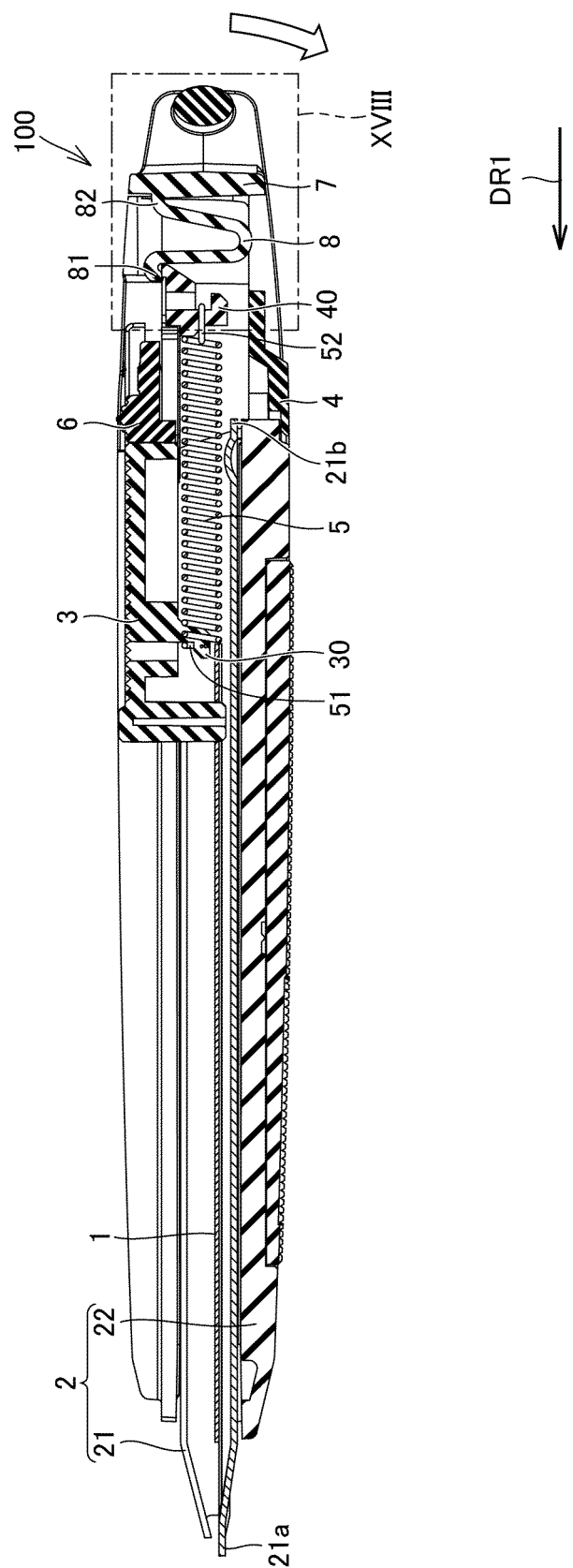


FIG. 4

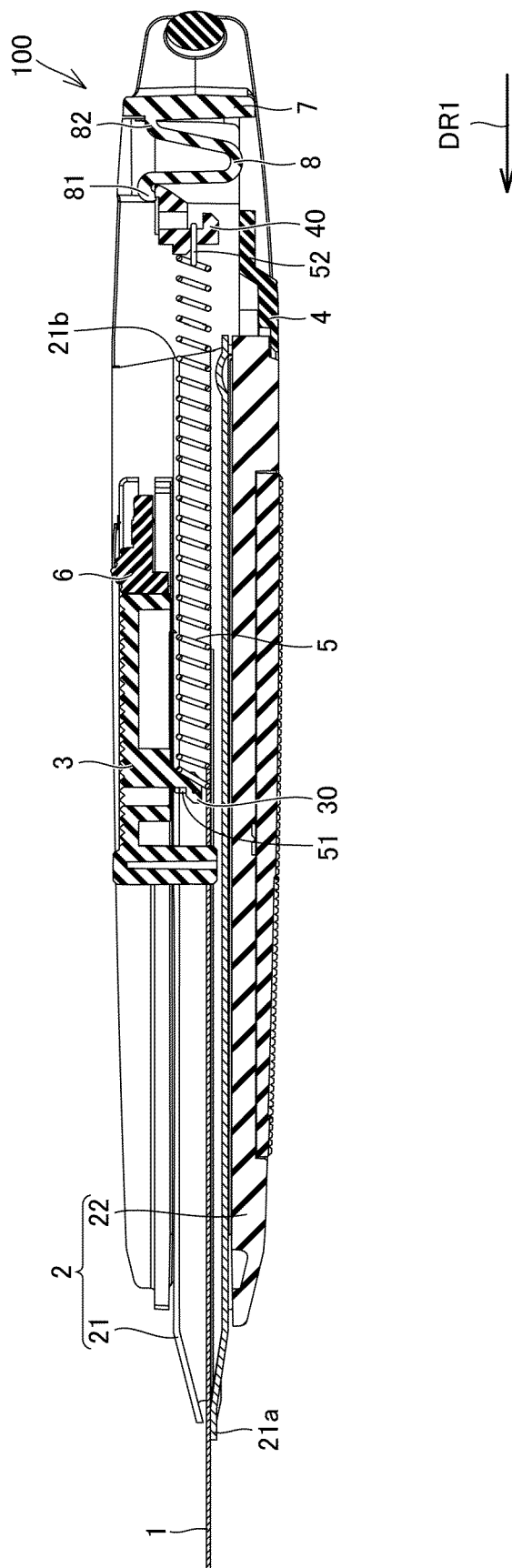


FIG.5

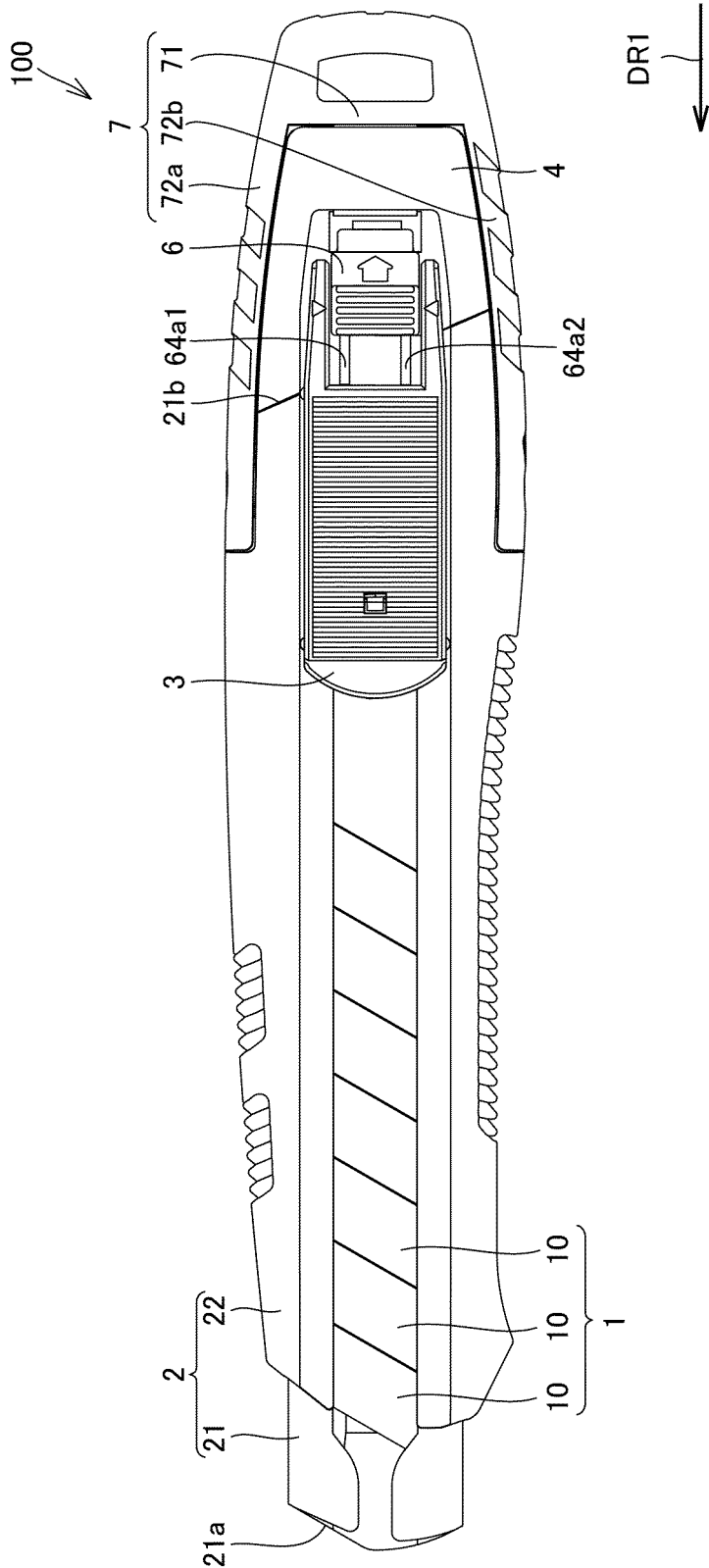


FIG.6

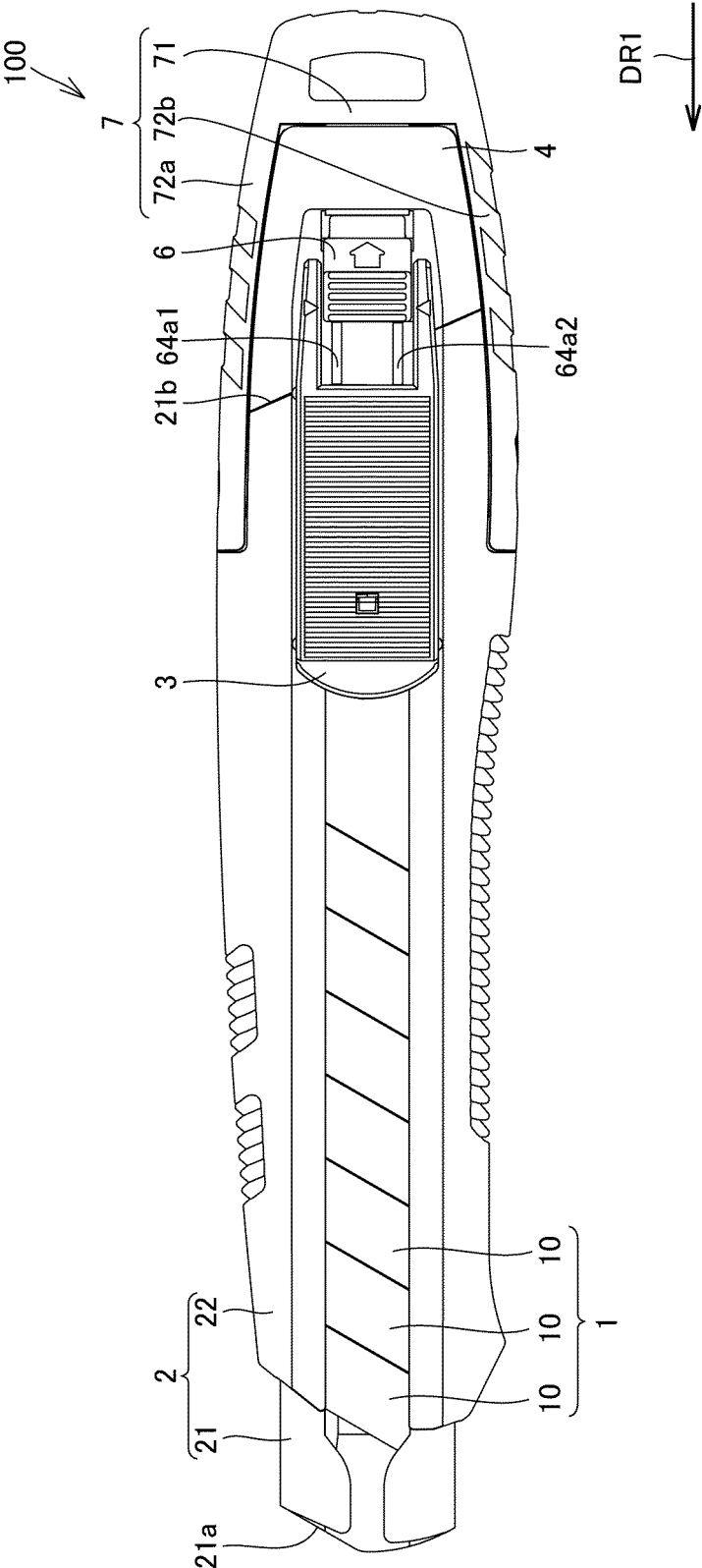


FIG.7

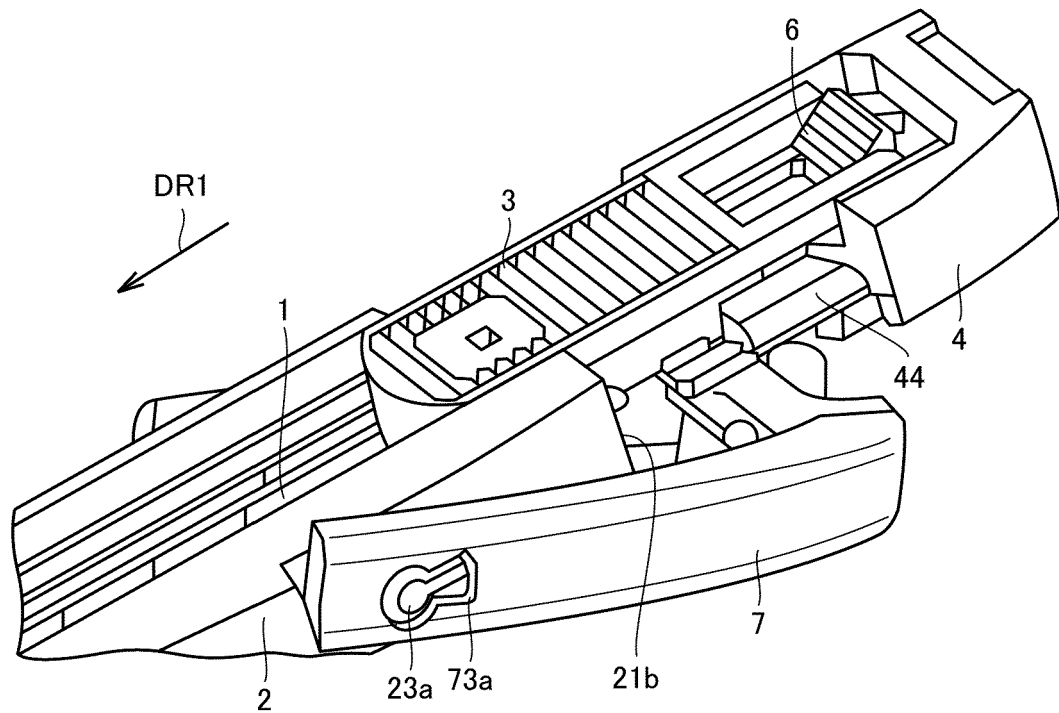


FIG.8

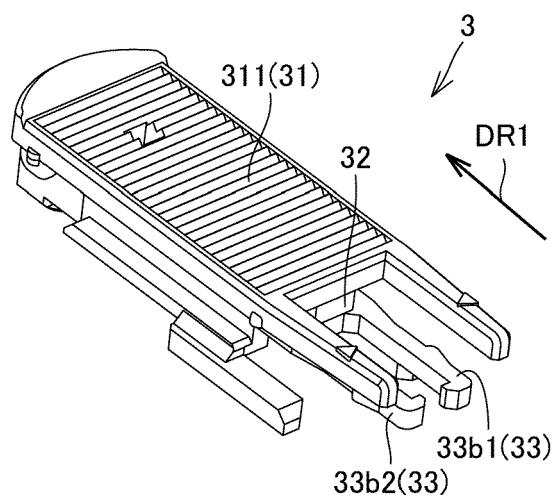


FIG.9

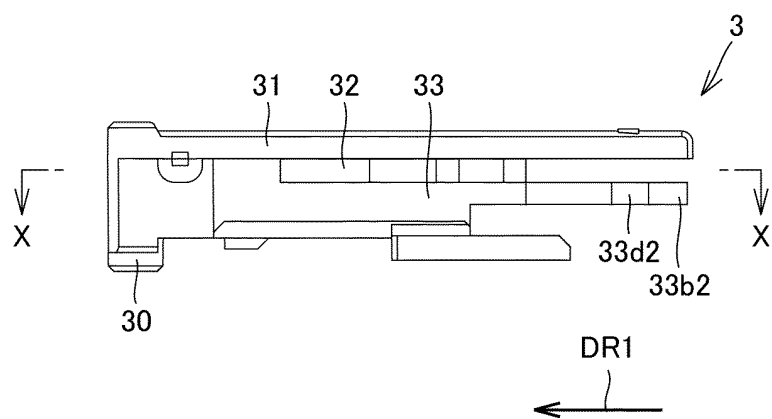


FIG.10

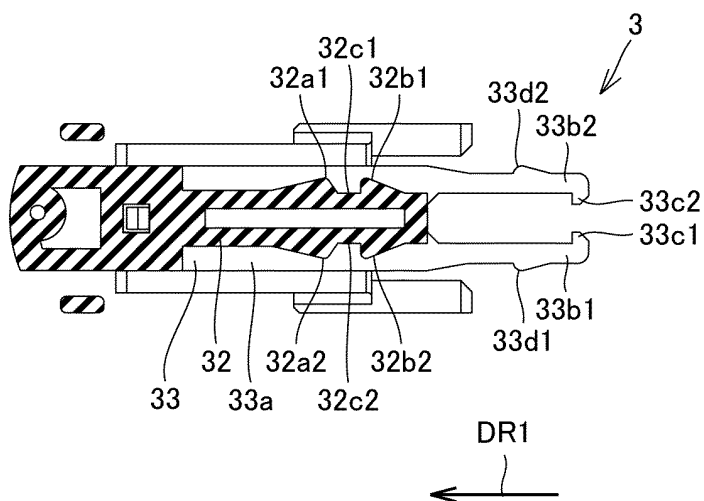


FIG.11

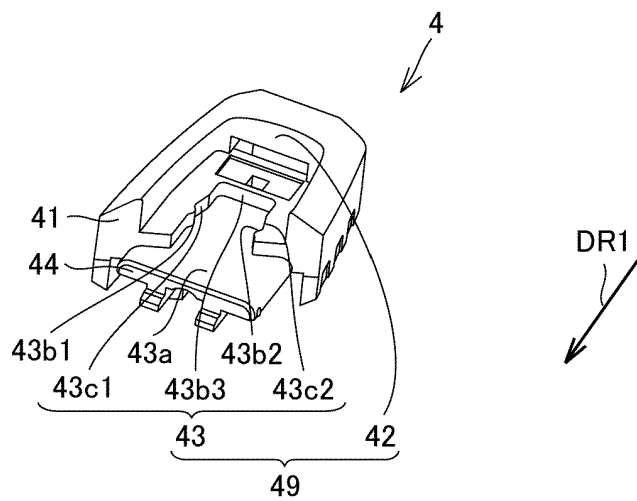


FIG.12

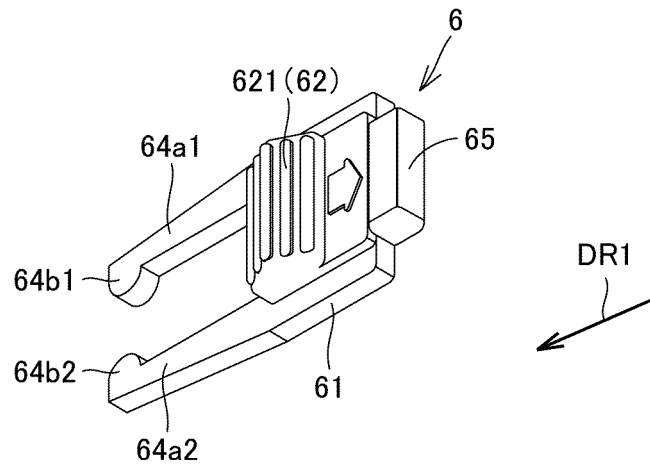


FIG.13

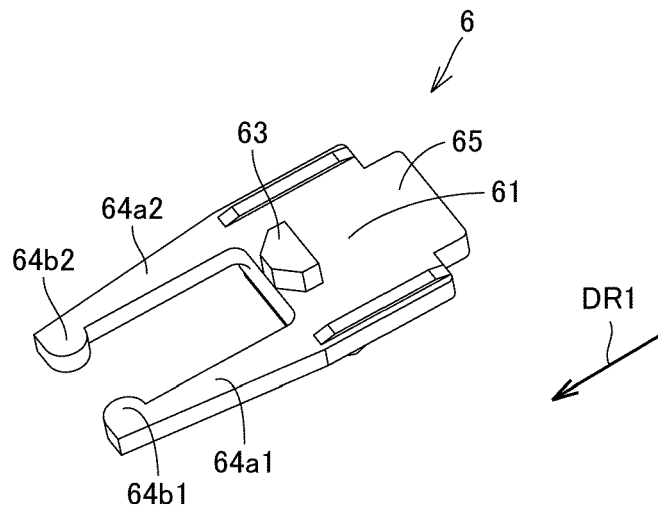


FIG.14

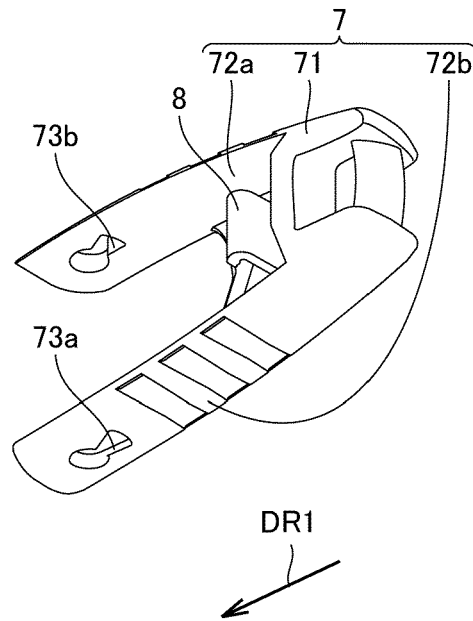


FIG.15

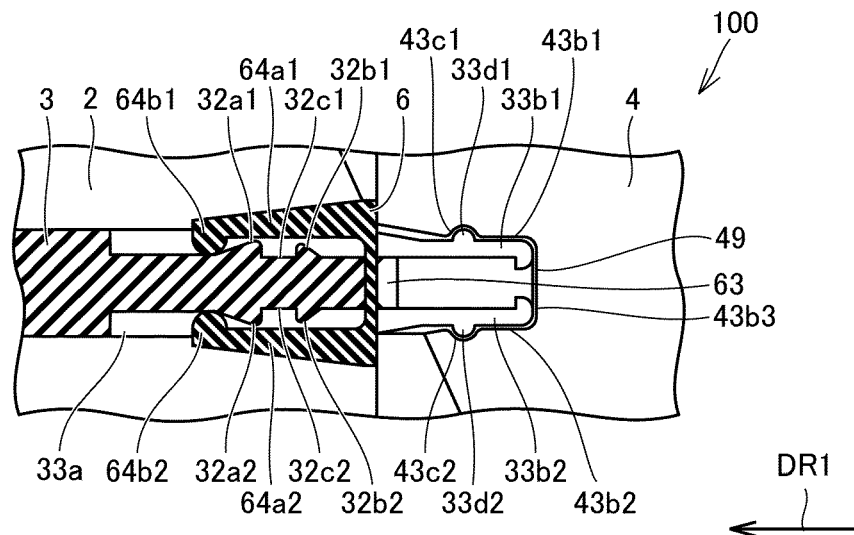


FIG.16

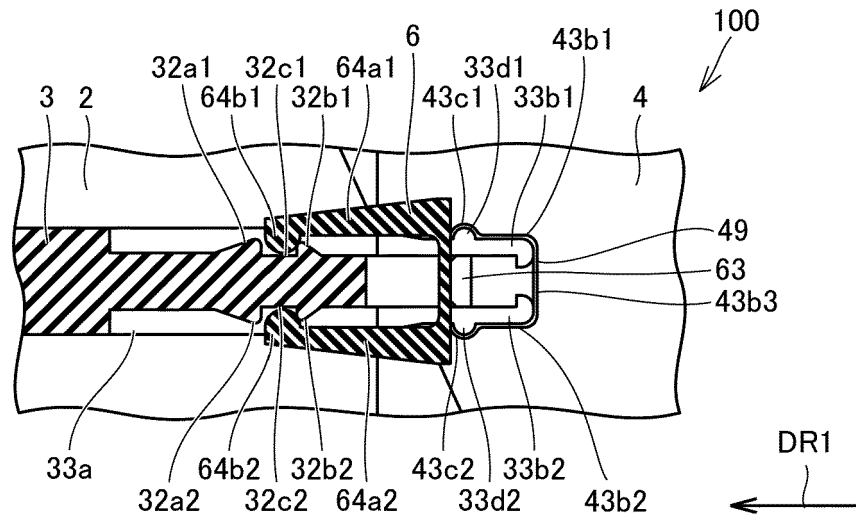


FIG.17

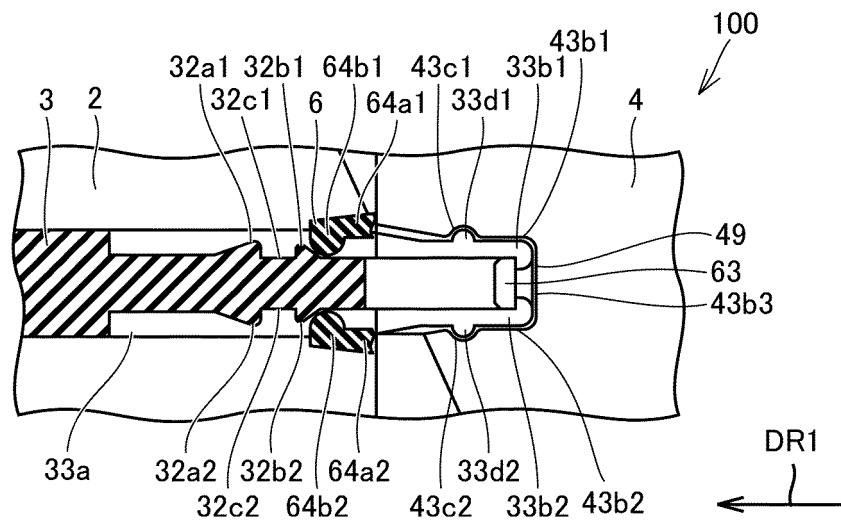


FIG.18

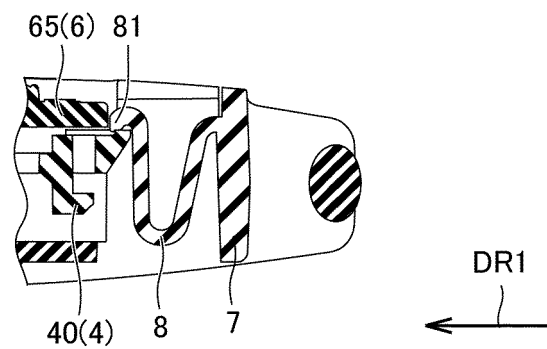


FIG.19

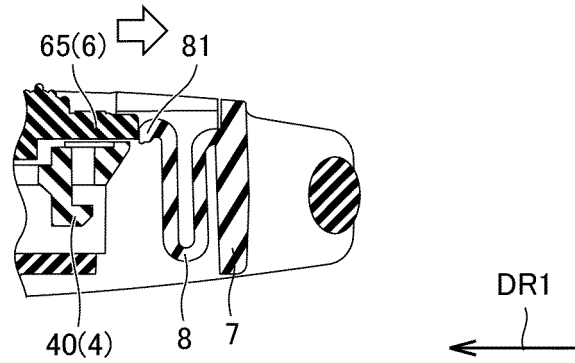


FIG.20

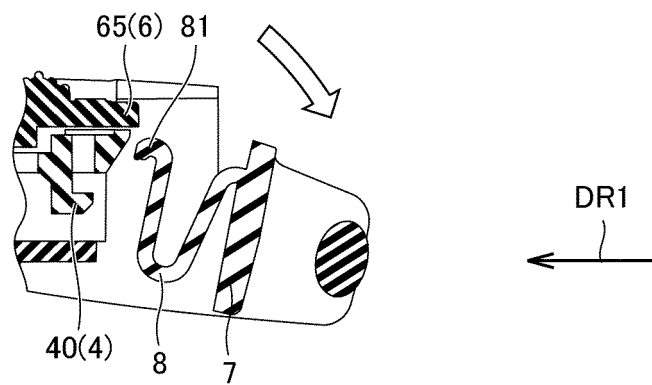
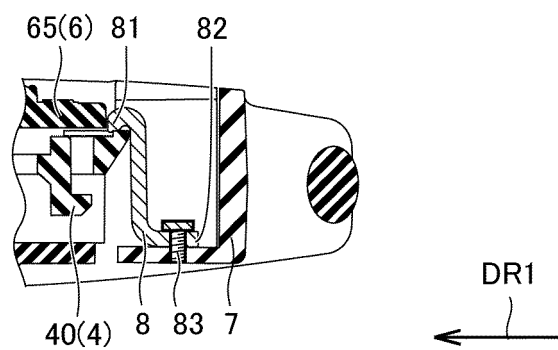


FIG.21



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2022/010269

A. CLASSIFICATION OF SUBJECT MATTER**B26B 1/08**(2006.01)i

FI: B26B1/08 A

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)

B26B1/08

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

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2022

Registered utility model specifications of Japan 1996-2022

Published registered utility model applications of Japan 1994-2022

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2000-237468 A (KDS KK) 05 September 2000 (2000-09-05)	1
A	paragraphs [0011]-[0032], fig. 1-9	2-6
Y	CN 206263994 U (SUO, Zhuoyan) 20 June 2017 (2017-06-20)	1
	paragraphs [0014]-[0016], fig. 1	
Y	CN 212352098 U (CHONGQING BUSINESS VOCATIONAL COLLEGE) 15 January 2021 (2021-01-15)	1
	paragraph [0015], fig. 1-2	
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Date of the actual completion of the international search

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Date of mailing of the international search report

17 May 2022

Name and mailing address of the ISA/JP

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INTERNATIONAL SEARCH REPORT
Information on patent family members

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