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Knife

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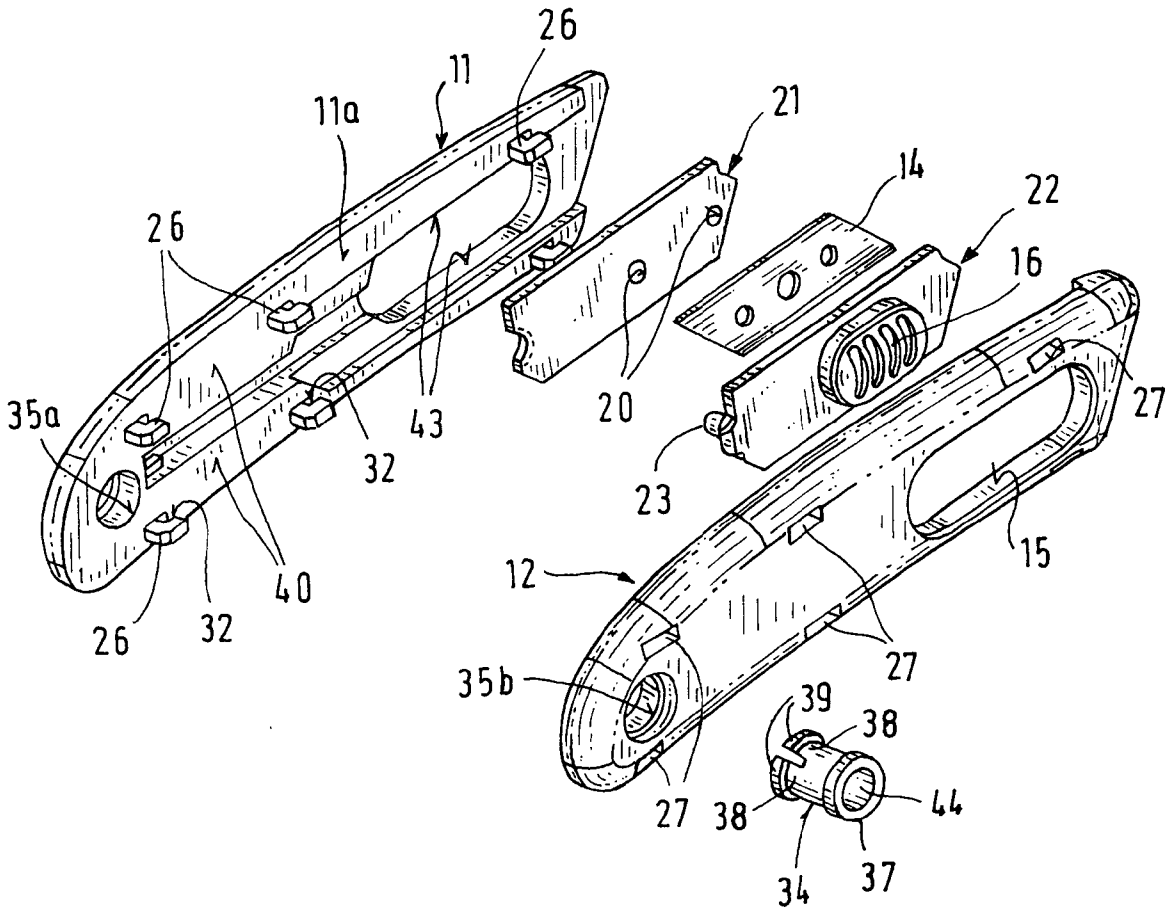
Abstract

A knife (10) has a housing assembled from two housing shells (11, 12) in the shape of a grip (13) with a knife blade (14) held in between. The grip has locking projections (26) in the first housing shell (11) and corresponding locking recesses (27) in the second housing shell (12), said shells fixed relative to one another after they are mated by means of a connecting element (34) that is inserted perpendicular to the longitudinal axis of the housing from the outside into an opening (35a, 35b) in the housing.

A plurality of locking hooks (26) is arranged on the inside (11a) of the first housing shell (11) along its perimeter to act as locking projections, said hooks mating with locking openings (27), which act as locking recesses, in the locked position, said openings provided along the perimeter of the second housing shell (12) and each having an undercut edge, said locking hooks reaching behind the undercut edges of the locking openings (27) after the first housing shell (11) makes a linear motion relative to the second housing shell (12) either in the longitudinal axis of the housing or perpendicular to it. The connecting element (34) can be inserted without a tool into the opening (35) that penetrates the two housing shells (11, 12).

-Fig. 8-

Fig.8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COMPLETE SPECIFICATION

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INVENTION TITLE:

Knife

The following statement is a full description of this invention, including the best method of performing it known to me/us:-

Translation from German of Patent Application DE 103 23 760.7

Knife

Description

The invention pertains to a knife according to the preamble of claim 1. A known knife of this type has been disclosed in US 3,316,635.

In addition to US 3,316,635, other knives in this class are known from DE-GM 1 711 881, DE-GM 94 17 085 U1, US-PS 2,679,100 and EP 0 543 781 B1, the housing halves of which are connected using a slotted screw that is tightened using a screwdriver or a coin, the external threads of said slotted screw mating with internal threads in the other housing shell respectively. Meanwhile, these knives do not have a spring-loaded return slide that holds the knife blade and thus cannot be used as a safety knife.

However, there are other known knives from US-PS 4,139,939 and DE-GM 72 07 013 whose housing shells likewise must be held together using a screw connection, but which have a spring-loaded return slide so that their knife blades can be shifted inside the housing using the slide through an actuating handle that protrudes from the housing, and so that they can be automatically pulled back into the housing by the spring when said handle is released.

All of the prior art knives share the disadvantage in that they are not suitable as one-time-use knives used to open packages in the food industry due to their expensive design as well as the possibility to dismantle their housing shells. This is a disadvantage because in the food industry, blades are rarely replaced for fear that when doing so a used - or even a new - knife blade could inadvertently find its way into the processing line, with the accordingly fatal consequences.

Starting from this nearest state of the art, the object of the invention is to create a knife of the above classification that is suitable for use both as a one-time-use knife for the food industry and as an economical knife whose blade can be replaced. At the same time this knife guarantees a secure locking of the two housing shells together.

This object is accomplished in connection with the features of the preamble of claim 1 and according to its characterizing features by placing a plurality of locking hooks on the inside of the first housing shell along its perimeter to act as locking projections, said hooks mating with locking openings, which act as locking recesses, in the locked position, said openings provided along the perimeter of the second housing shell and each having an undercut edge, said locking hooks reaching behind the undercut edges of the locking openings after the first housing shell makes a linear motion relative to the second housing shell either in the longitudinal axis of the housing or perpendicular to it, and that the connecting element can be inserted without a tool into the opening that penetrates the two housing shells.

The hook-shaped design of the locking projections in connection with the locking openings with their undercut edges along the perimeters of the two housing shells results in an economically manufactured knife with a practically seamless grip and with a knife blade held securely inside it, wherein the connecting element can be located on any area of the housing that does not interfere with the shifting blade, which is possible in this case without a problem at the handle end section of the grip. In an advantageous manner, the connecting element is inserted into the opening that penetrates the two housing shells without the use of a tool. In the process, the locking hooks and the locking openings with their undercut edges can be brought to their locked position both in a direction of shift that is parallel to the housing longitudinal axis as well as one that is perpendicular to it but in any case linear. It is also possible to economically manufacture the two housing shells out of plastic with ease.

According to an advantageous further development of the invention, the locking hooks reach behind the undercut edges of the locking openings with a certain amount of pre-tension by providing inclined, wedge-shaped ramps. This makes it possible for the two housing shells to be joined with practically no seams.

Even without a connecting element, the housing shells can thus remain connected under an appropriate amount of pre-tension by appropriately designing the wedge-shaped ramps on the locking hooks and on the undercut edges.

An advantageous embodiment according to the invention comprises placing the opening that holds the connecting element at the handle end of the grip away from the knife blade. This design makes particular sense when the connecting element is a sleeve component with an axial penetration opening that serves as a hanger opening, according to other inventive features.

The connecting element advantageously comprises an expanding dowel that reaches through the opening in the two housing shells with elastic latching tangs, wherein the opening is a penetration opening that consists of two half openings of the two housing shells that are aligned with one another. This expanding dowel can be placed at any position on the grip; for example in the case of a knife with a slide it is placed at the handle end of the grip.

According to an advantageous further development of the invention, the expanding dowel reaches through the two housing shells at the handle end of the grip in the penetration opening and cannot be removed. This embodiment is suitable as a one-time-use knife, in particular for the food industry, since the blade can only be replaced by destroying it due to the non-removable nature of the inserted expanding dowel, and since a second fitted expanding dowel is not available.

According to an especially advantageous further development of the invention, there are guide surfaces on the inside of the housing shells for a slide that holds the knife blade in it, as well as an actuating element that is held in an oval longitudinal opening of at least

one housing shell and that is permanently fixed to the slide.

The slide advantageously comprises two slide elements designed as mirror images with respect to the longitudinal axis of the housing and that can be snapped together with the help of latching protrusions and recesses, wherein an actuating element is provided on each longitudinal side of the slide, said element being held in an oval longitudinal opening in each housing shell, for a left-handed person and for a right handed person.

In order to design this knife, in the form provided with a slide, as a safety knife as well, in an advantageous further development of the invention one end of a tensioned spring is hinged at the end of the slide that faces the handle-side of the grip, the other end of said spring being fixed to the inside of one of the housing shells at a protruding support pin at the handle end of the grip. Since the spring described above is under pre-tension when the knife blade is pushed out of the grip using the actuating button, the knife blade is automatically pulled into the housing when the thumb of the hand operating the knife slides off of the actuating button. The actuating button is provided advantageously with an ergonomically designed riffled or spherical cup-shaped gripping surface for the thumb of the operating hand. Safety devices of this type are known, for example from DE-GM 72 07 013 cited above.

Advantageously, the knife blade and the return spring under tension are made of steel, as opposed to the

housing shells, the slide and the expanding dowel, which are made of plastic, resulting in an economical design guaranteed for the knife in the form of a one-time-use knife.

An exemplary embodiment of the invention is shown in the drawings. Shown are:

Fig. 1 a longitudinal side view of the knife in its locked position of the two housing shells with the knife blade extended from the housing using a slide and an actuating button,

Fig. 2 the top view in the direction of arrow II in Fig. 1,

Fig. 3 the sectional view along line III-III in Fig. 1,

Fig. 4 the sectional view along line IV-IV of Fig. 1,

Fig. 5 the view of the knife end of the grip in the direction of arrow V of Fig. 1,

Fig. 6 a perspective view of the other longitudinal side of the knife of Fig. 1,

Fig. 7 the perspective view of the longitudinal side of the knife of Fig. 1,

Fig. 8 the exploded view of the knife of Fig. 6 and

Fig. 9 the exploded view of the knife of Fig. 7.

According to Figures 1 through 4, the knife comprises a first housing shell 11 and a second housing shell 12 that form a grip 13 with a knife end 13a and a handle end 13b, wherein the knife blade 14 is held at the knife area 13a of the grip. At the knife end 13a, both of the housing shells 11, 12 are each provided with an oval guide opening 15 for a sliding actuating button 16 inside of it that is connected to a slide 17 in one piece. As can be seen in Fig. 4, the slide 17 comprises two slide elements 21, 22 that are designed as mirror images with respect to the longitudinal axis of the housing 18 and that can be snapped together by means of one or more latching projections 19 and latching recesses 20 that cooperate with them, the knife blade 14 being held between said slide elements at the latching projections 19.

Each of the slide elements 21, 22 is provided with an actuating button 16, one on both longitudinal sides of the knife 10 such that this knife is suitable both for a right handed as well as a left handed person. The outsides of the actuating buttons 16 are provided with a gripping, riffled surface 16a or with a gripping depression for the thumb of the respective hand used to operate the button.

As can be seen most descriptively in Fig. 4, the slide 17 is equipped with a carriage projection 23 on its end that faces the handle end 13b of the grip 13 to which one end 24a of a spring 24 is hinged under tension, the other end 24b of which is fixed to the inside of the first housing shell 11 at a protruding support pin 25 at the handle end 13b of the grip. This allows the knife 10 to be used as a

safety knife as well by the fact that the knife blade 14 is always automatically pulled into the interior of the grip 13 under the effect of said spring 24 when the actuating buttons 16 are not actuated.

As can be seen most clearly in Fig. 3, there is a plurality of locking hooks 26 on the perimeter of the inside 11a of the first housing shell 11 in the form of locking projections that are connected in one piece to the inside wall 11a of the first housing shell 11. The perimeter of the second housing shell 12 is provided with locking openings 27 and inside of these with undercut edges 28 in which the locking hooks 26 engage after they mate with the locking opening 27 and after a linear relative shift of the two housing shells 11, 12 is done, the latter then having reached their locked position.

In the exemplary embodiment shown, this linear shift is always made from the loose position into the locked position in a direction of relative shift that is parallel to the longitudinal axis 18; for example, if the first housing shell 11 is fixed, the linear shift is done by the second housing shell 12 in the direction of arrow 29 in Fig. 3. To remove, when holding the first housing shell 11 fixed, the second housing shell 12 is shifted in the direction of arrow 30 in Fig. 3. By providing inclined, wedge-shaped ramps 31 on the undercut edges (see Fig. 3) and 32 on the bottom of the locking hooks 26 (see Fig. 8), the locking hooks 26 reach behind the undercut edges 28 with a certain amount of pre-tension that leads to a practically seamless compression of the two housing shells 11, 12 at their plane of separation 33

(see Fig. 2) that runs parallel to the longitudinal axis of the housing 18.

Basically, both housing shells 11, 12 can be connected together using either a removable or a non-removable connecting element. In order to design the knife in this case as a one-time-use knife 10 with no possibility of replacing the knife blade 14, the housing shells 11, 12 cannot be loosened from their connection without destroying the connection. To accomplish this, the invention provides an expanding dowel 34 as a connecting element (see Figures 8 and 9), which is inserted into an opening 35 provided at the handle end 13b of the grip 13. This opening 35 is provided with recessed circular edges 36 (see Fig. 4) in each of the two housing shells 11, 12 into which the expanding dowel 34 is inserted form-locked to a circular flange 37 on one side, in this case on the side of housing shell 11, whereas the expanding tangs 38 of the expanding dowel 34 elastically snap into the recessed circular edge 36 on the other side of housing shell 12 by means of a partitioned circular flange 39. Due to this precision fit according to Fig. 4, it is clear that the expanding dowel 34 can no longer be removed from the opening 35 without destroying it, since it seats are flush with the outer flanges of the grip shells 11, 12 and thus provide no surface to grip for its removal.

The opening 35 comprises two half openings 35a, 35b of the two grip shells 11, 12. In the mutually locked state of the two grip shells 11, 12, both half openings 35a, 35b are aligned with one another congruently.

In Figures 5 through 7, parts that are identical to Figures 1 through 4 are provided with the same reference numbers. From Fig. 1 in connection with Figures 5, 6, and 7, it is seen that the locking hooks 26 are located along the perimeter 40 of the first housing shell 11 and congruent to this the locking openings 27 together with their undercut edges 28 are located along the perimeter 41 of the second housing shell 12 (see Figures 6 and 7).

In the exploded views of Figures 8 and 9 it is illustrated that the first housing shell 11 is provided with a total of six locking hooks 26 that are evenly distributed on its inside 11a along the perimeter 40.

It is also clear that six locking openings 27 are provided in the second housing shell 12 (see Fig. 9) together with their undercut edges 28 along the perimeter 41. The return spring 24 of Fig. 4, which can be provided, but does not actually have to be there, is missing in the exploded view of Figures 8 and 9. If the slide 17 with its two slide elements 21, 22 that snap together should be dispensable as well if there is no need for a sliding knife blade 14, the oval longitudinal opening 15 can also be removed and in its place can be a depressed grip surface, either riffled - as shown - or a spherical cup-shaped recess. In this case, it shall be understood that the opening 35 with the inserted expanding dowel 34 can be located at other positions, for example in the centre of the knife 10, since the slide and the free space provided for it are not needed.

It is also clear from Figures 8 and 9 that the slide elements 21, 22 with their respective housing shells 11,

12 facing them are provided at corresponding guide surfaces 42 in housing section 12 for slide element 22 (see Fig. 9) and at guide surfaces 43 on the inside surface 11a of the first housing shell 11 (see Fig. 8) for slide element 21.

It shall be understood that the above knife 10 with the expanding dowel 34 described can be used as a one-time-use knife, for example in the food industry.

If, however, it is to be designed as a knife 10 in which the knife blade 14 can be replaced, the expanding dowel 34 only needs to be replaced by a removable screw element of known type as a screw with opposing threading, or together with a nut.

By manufacturing the knife blade 14 and the return spring 24 that is under tension from steel, whereas the housing shells 11, 12, the slide 17, 21, 22 and the expanding dowel 34 are manufactured from plastic, a knife 10 can be created that is economical for all uses.

It is to be understood that the locking hooks 26 do not necessarily have to be provided in the first housing shell 11, but can also be placed in the second housing shell 12; vice versa, the locking openings 27 of the second housing shell 12 can alternate to the first housing shell 11. Also, a mixed simultaneous arrangement of locking hooks 26 and locking openings 27 is possible in both housing shells 11 or 12.

Furthermore, the locking hooks 26 and the locking openings 27 can also be arranged such that a linear

relative shift perpendicular to the longitudinal axis 18 of the housing locks the housing shells 11, 12 together.

And finally, the expanding dowel 34 or an equivalent connecting element to it is not necessary if the undercut edges 28 and the locking hooks 26 are provided with a snap-on latch connection at the end of their ramps 31, 32 in the form of a latching strip on one ramp and latching recesses in the other ramp 31 or 32.

A unique feature of the knife 10 according to the invention is lastly due to the fact that the connecting element 34 is a sleeve component with an axial penetration opening 44 that serves as a hanger opening.

Claims

1. A knife (10) with a housing assembled from two housing shells (11, 12) in the shape of a grip (13) with a knife blade (14) held in between, and with locking projections (26) in the first housing shell (11) and corresponding locking recesses (27) in the second housing shell (12), said shells fixed relative to one another after they are mated by means of a connecting element (34) that is inserted perpendicular to the longitudinal axis of the housing (18) from the outside into an opening (35) in the housing (13), characterised in that a plurality of locking hooks (26) is arranged on the inside (11a) of the first housing shell (11) along its perimeter to act as locking projections, said hooks mating with locking openings (27), which act as locking recesses, in the locked position, said openings provided along the perimeter of the second housing shell (12) and each having an undercut edge (28), said locking hooks reaching behind the undercut edges (28) of the locking openings (27) after the first housing shell (11) makes a linear motion relative to the second housing shell (12) either in the longitudinal axis of the housing (18) or perpendicular to it, and that the connecting element (34) can be inserted without a tool into the opening (35) that penetrates the two housing shells (11, 12).

2. A knife according to claim 1, characterised in that the locking hooks (26) reach behind the undercut edges (2) of the locking openings (27) with a certain amount of pre-tension by providing inclined, wedge-shaped ramps (31, 32).

3. A knife according to claim or according to claim 2, characterised in that the opening (35) to hold the connecting element (34) is located at the handle end (13b) of the grip (13) facing away from the knife blade (14).

4. A knife according to claim 3, characterised in that the connecting element (34) is a sleeve component with an axial penetration opening (44) acting as a hanger opening.

5. A knife according to one of claims 1 to 4, characterised in that the connecting element comprises an expanding dowel (34) that reaches through the opening (35) in the two housing shells (11, 12) with elastic latching tangs (38), wherein the opening (35) is a penetration opening that consists of two half openings (35a, 35b) of the two housing shells (11, 12) that are aligned congruently with one another.

6. A knife according to claim 5, characterised in that the expanding dowel (34) is fixed permanently to recesses (36) in the penetration opening (35) of the two housing shells (11, 12).

7. A knife according to one of claims 1 to 6, characterised in that guide surfaces are provided on the inside (11a, 12a) of the housing shells (11, 12) for a slide (17) that holds the knife blade (14) in it, as well as an actuating element (16) that is held in an oval longitudinal opening (15) of at least one housing shell (11, 12) and that is permanently fixed to the slide (17).

8. A knife according to claim 7, characterised in that the slide (17) comprises two slide elements (21, 22) designed as mirror images with respect to the longitudinal axis (18) of the housing and that can be snapped together with the help of latching protrusions and recesses (19, 20), wherein an actuating element (16) is provided on each longitudinal side of the slide (17), said element held in an oval longitudinal opening (15) in each housing shell (11, 12), for a left-handed person and for a right handed person.

9. A knife according to claims 1 to 8, characterised in that one end (24a) of a tensioned spring (24) is hinged at the end of the slide (17) that faces the handle (13b) of the grip (13), the other end (24b) of said spring being fixed to the inside (11a, 12a) of one of the housing shells (11, 12) at a protruding support pin (25) at the handle end (13b) of the grip (13).

10. A knife according to one of claims 1 to 9, characterised in that the knife blade (14) and the return spring (24) under tension are made of steel, as opposed to the housing shells (11, 12), the slide (17, 21, 22) and the expanding dowel (34), which are made of plastic.

Fig. 3

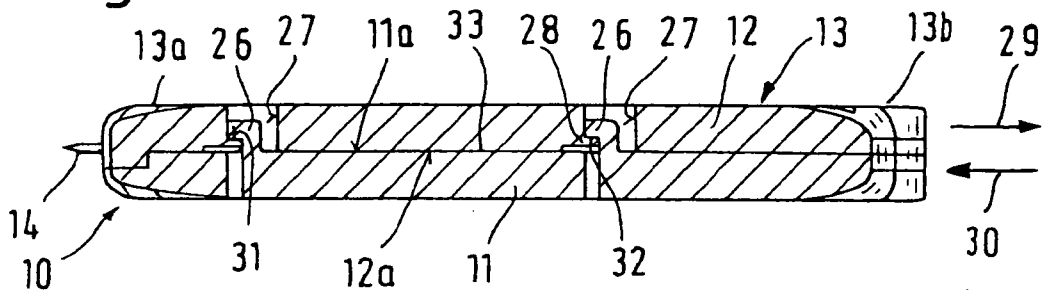


Fig. 1

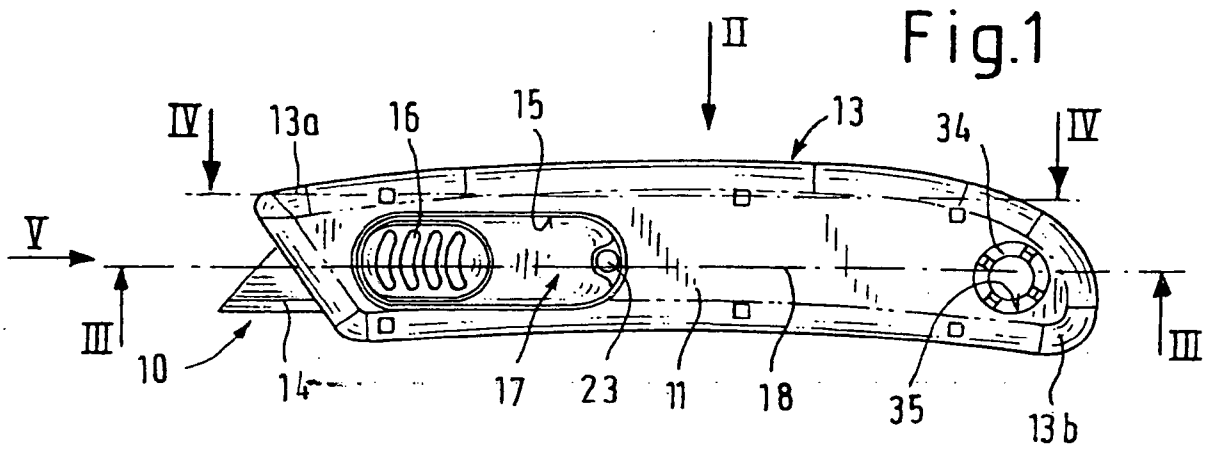


Fig. 4

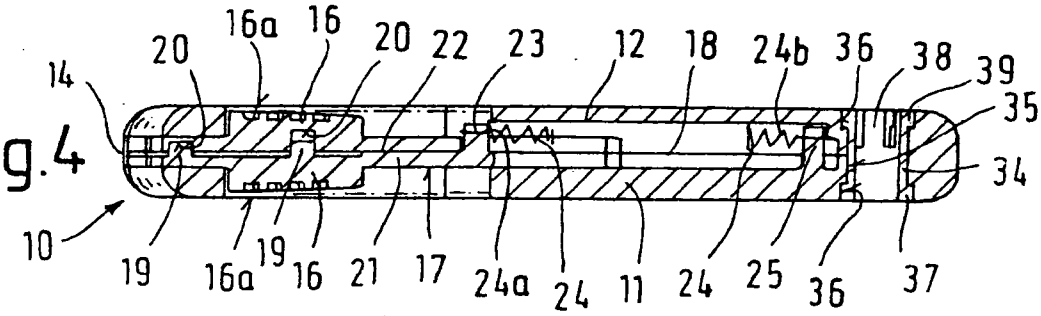


Fig. 2

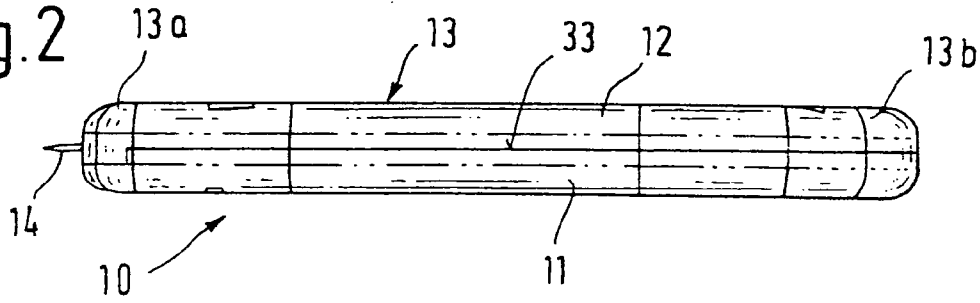


Fig.5

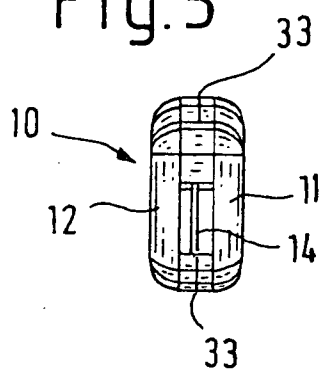
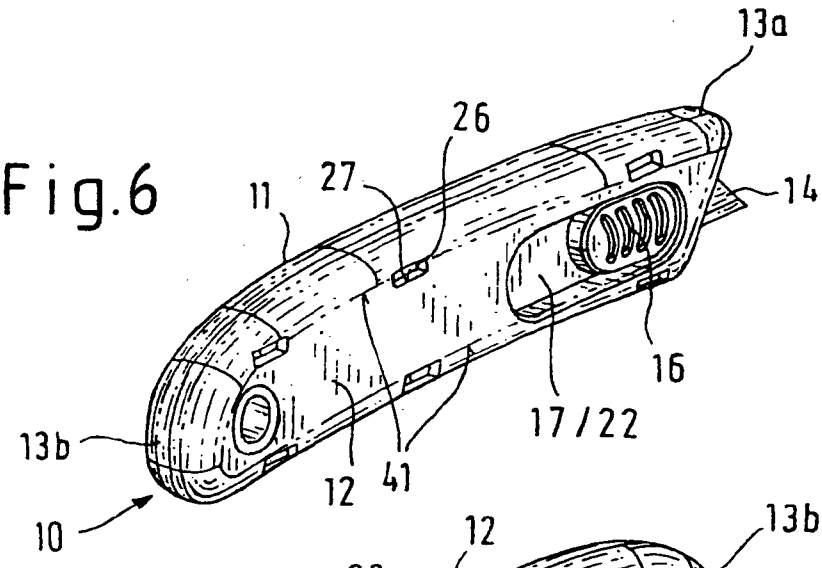


Fig.6



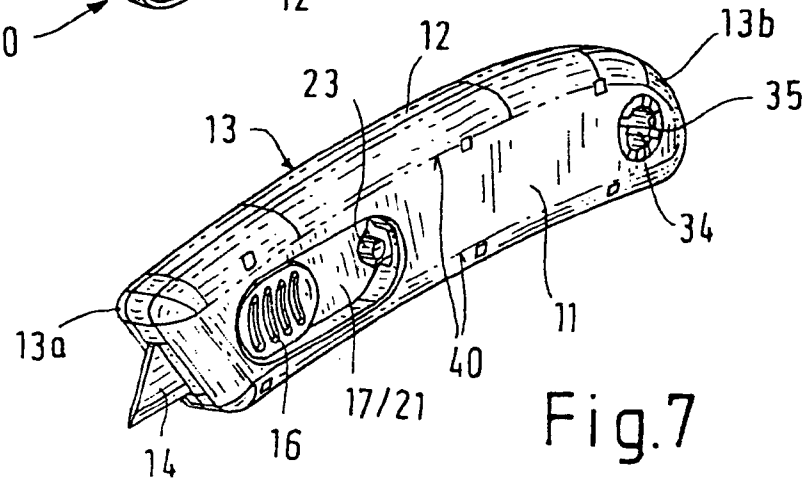


Fig.7

Fig.8

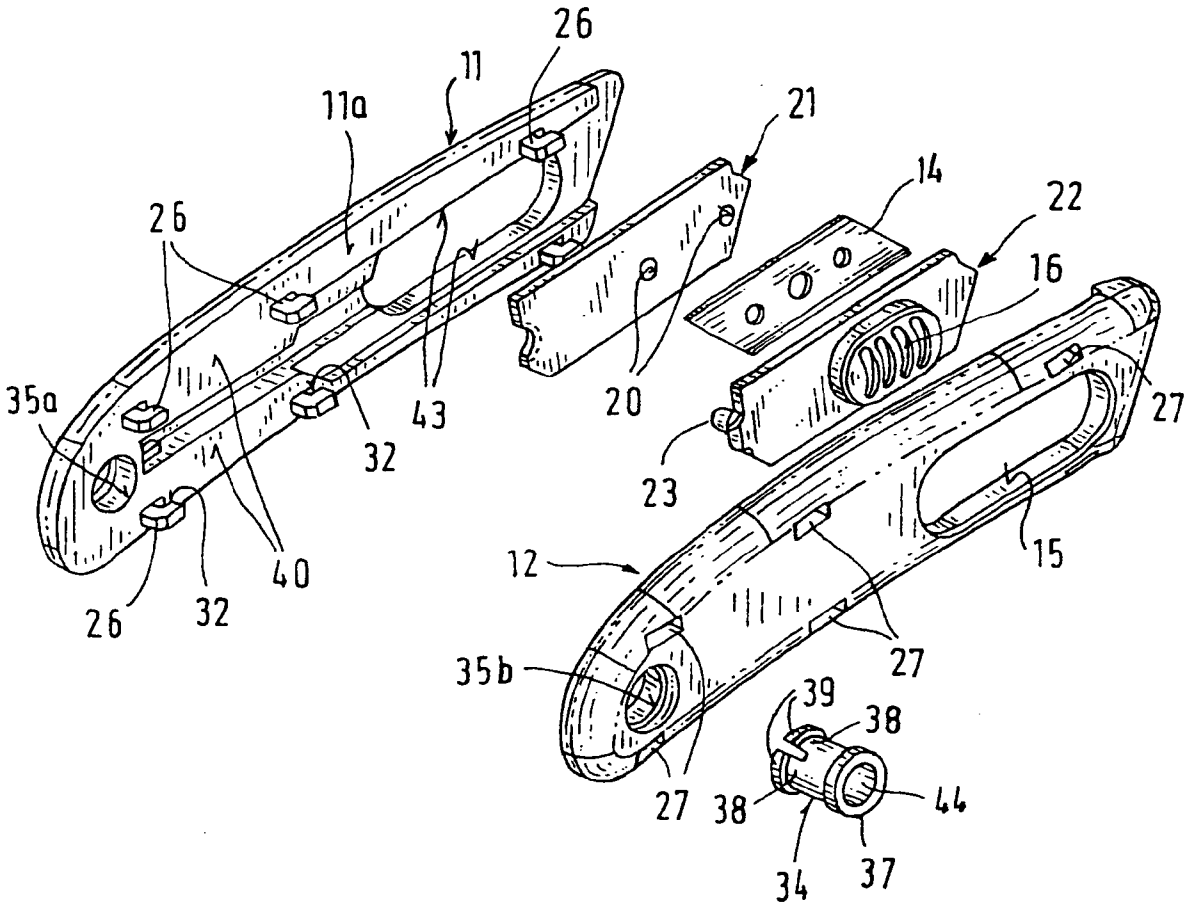

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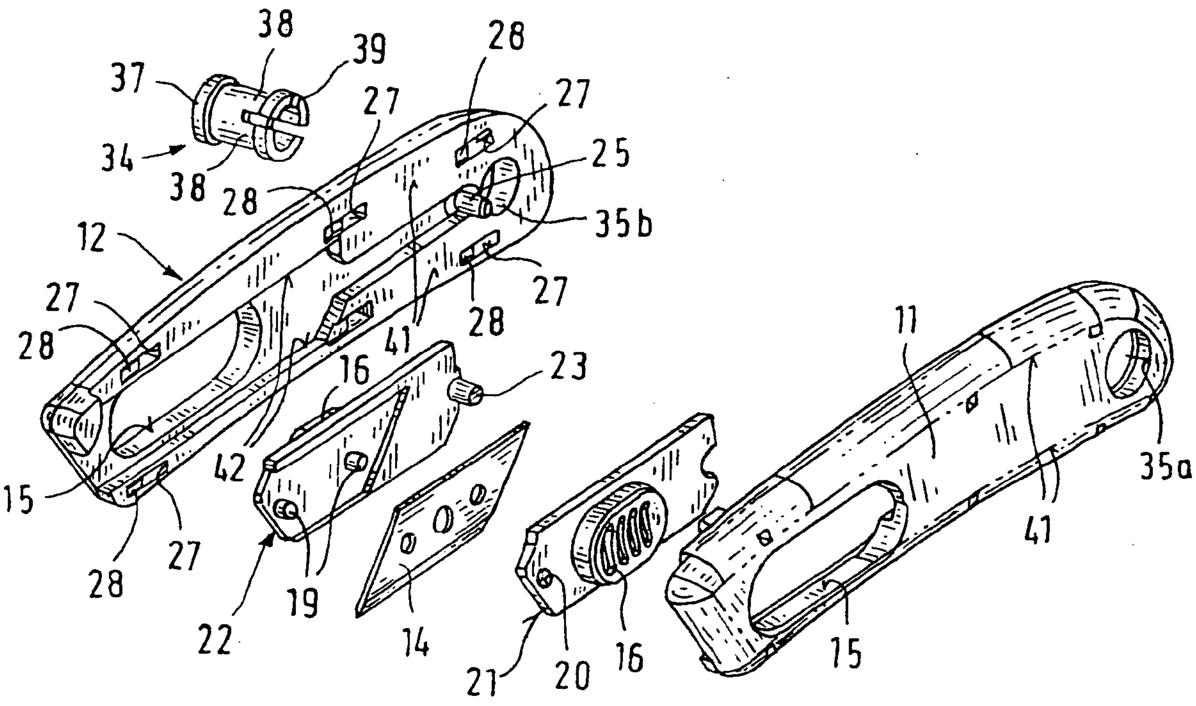
Fig.9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