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(54) **Retractable utility knife**

(57) A utility knife 100 has a handle 102 and a blade holder 104 that holds a utility blade 106 for selective removal and replacement of the utility blade. The blade

holder is pivotally carried by the handle for pivotal movement in an arcuate path relative to the handle between a retracted position and an extended position.

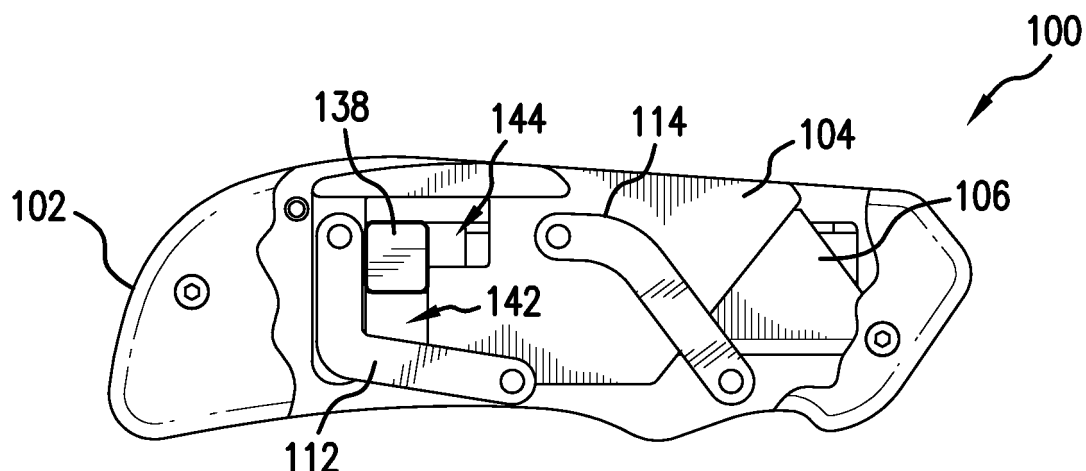


FIG.3A

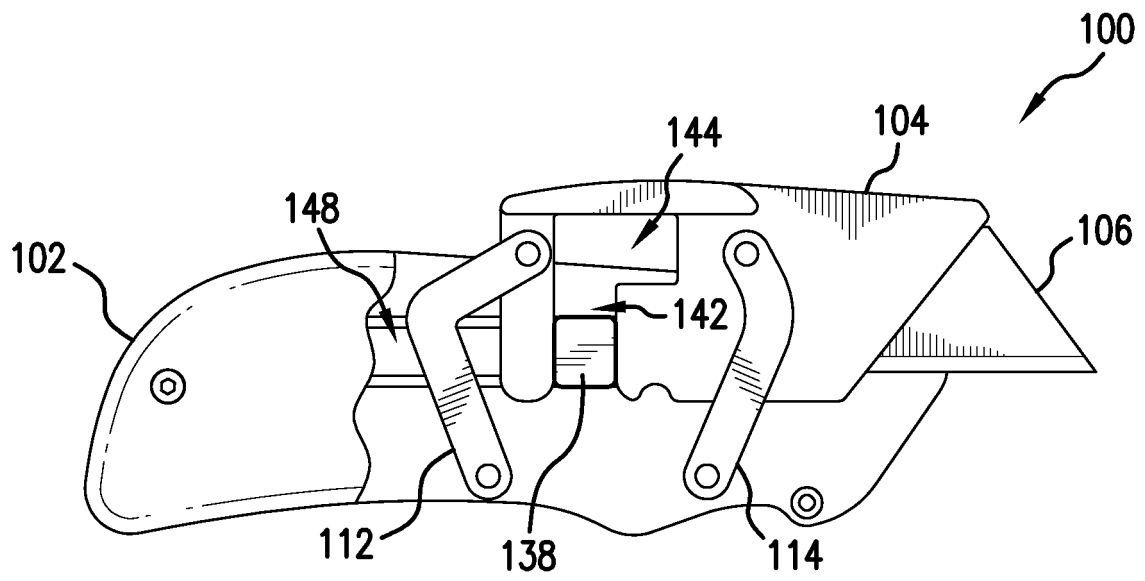


FIG. 3B

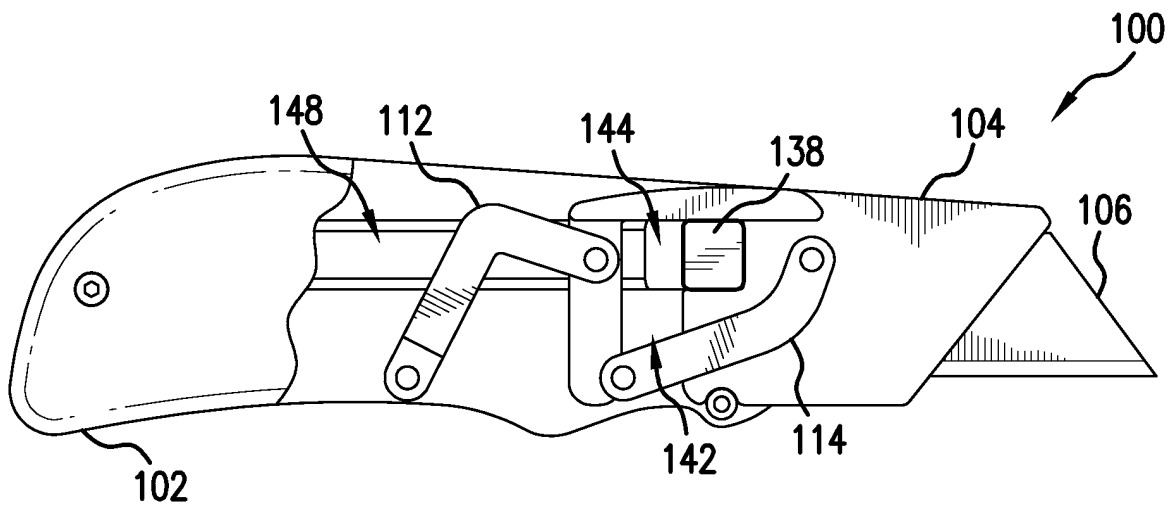


FIG. 3C

Description

[0001] The entirety of all applications of which priority is claimed are incorporated by reference herein.

FIELD OF THE INVENTION

[0002] This invention relates to a utility knives and more specifically to utility knives with a retractable blade.

BACKGROUND

[0003] A conventional utility knife includes a long handle with a blade holder slideably disposed within the handle. A trapezoidal utility blade detachably mounts to the blade holder. A standard trapezoidal blade has a cutting edge disposed on its longest edge and one or more mounting notches disposed on an opposite edge. When the blade holder is in a retracted position, the blade is disposed within and protected by the handle. When the blade holder is moved into an extended position, a small portion of the blade becomes exposed. The conventional handle is relatively long so as to provide enough longitudinal space for a user's hand to supply sufficient leverage to the blade during a cutting action or to enable the user to grip the handle without being overly close to the blade's cutting edge. Unfortunately, the length and size of this handle makes the utility knife large and cumbersome when the knife is not being used.

SUMMARY

[0004] A utility knife is disclosed. The utility knife has a handle and a blade holder that holds a utility blade for selective removal and replacement of the utility blade. The blade holder is pivotally carried by the handle for pivotal movement in an arcuate path relative to the handle between a retracted position and an extended position. In the extended position, the blade holder projects from an aperture in a front side of the utility knife. As the blade moves in its arcuate path, the blade holder can project from a second aperture in a top side of the utility knife.

[0005] A first linkage and a second linkage combine the blade holder to the handle, which together create a four-bar mechanism that enables the blade holder to move in its arcuate path between the respective positions. The blade holder can have a slot with a vertical portion and a horizontal portion, which cooperate to provide the blade holder with the ability to move in the arcuate path with respect to the handle by providing a space for a button assembly to travel. The button assembly pushes the blade holder between the retracted position and the extended position and the blade holder moves with respect to the button assembly.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Referring now to the drawings which form a part

of this original disclosure:

FIG. 1 is a left-side perspective view of a utility knife according to an embodiment of this disclosure and showing the blade in an extended position.

FIG. 2 is an exploded view of the utility knife of FIG. 1. FIG. 3a is a left-side cut-away view of the utility knife of FIG. 1 with the blade in a retracted position.

FIG. 3b is a left-side cut-away view of the utility knife of FIG. 1 with the blade in an intermediate position.

FIG. 3c is a left-side cut-away view of the utility knife of FIG. 1 with the blade in a fully extended position.

FIG. 4a is a right-side cut-away view of the utility knife of FIG. 1 with the blade in a retracted position.

FIG. 4b is a right-side cut-away view of the utility knife of FIG. 1 with the blade in an intermediate position.

FIG. 4c is a right-side cut-away view of the utility knife of FIG. 1 with the blade in a fully extended position.

FIG. 5 is a left-side perspective view of the utility knife according to another embodiment of this disclosure and showing the blade in an extended position.

FIG. 6 is an exploded view of the utility knife of FIG. 5. FIG. 7a is a left-side cut-away view of the utility knife of FIG. 5 with the blade in a retracted position.

FIG. 7b is a left-side view cut-away of the utility knife of FIG. 5 with the blade in an intermediate position.

FIG. 7c is a left-side view cut-away of the utility knife of FIG. 5 with the blade in a fully extended position.

FIG. 8a is a right-side view cut-away of the utility knife of FIG. 5 with the blade in a retracted position.

FIG. 8b is a right-side cut-away view of the utility knife of FIG. 5 with the blade in an intermediate position.

FIG. 8c is a right-side cut-away view of the utility knife of FIG. 5 in a fully extended position.

DETAILED DESCRIPTION OF THE DRAWINGS

[0007] FIGS. 1-4 illustrate a compact utility knife 100 constructed in accordance with the principles of the present disclosure. As shown in FIG. 1, knife 100, includes a handle 102, a blade holder 104 pivotally connected to handle 102 to move in an arcuate path between an extended, operative position and a retracted, safety position, a trapezoidal utility blade 106 detachably mounted to the blade holder 104, and a blade lock mechanism 107 for selectively locking the blade 106 onto blade holder 104.

[0008] As shown in FIG. 2, handle 102 comprises left-side handle portion 102a and right-side handle portion 102b that are fastened together with suitable fasteners to hold between them a corresponding left-side plate 103a and right-side plate 103b. One or more spacers 105 positions left-side plate 103a from right-side plate 103b a sufficient distance apart so that blade holder 104 can

extend out apertures in a front face and top side of handle 102. A belt clip 110 may be fastened in any suitable manner to right-side handle portion 102b. While the illustrated handle 102 comprises a variety of components, one or more of these components may be omitted without deviating from the scope of this disclosure.

[0009] Blade holder 104 comprises left and right blade holder portions 104a, 104b that are fastened to each other using rivets or other single fastening mechanisms (e.g., screws, integral formation, glue, welding, etc.). In another contemplated embodiment, blade holder 104 is a single, integrally formed member rather than two members secured together.

[0010] Blade holder 104 includes blade lock mechanism 107 that is received in a slot in the top edge of blade holder 104 to selectively hold blade 106 in blade holder 104. Blade lock assembly 107 includes a blade lock 108 biased by a biasing member to pivot between a blade-lock position and a blade-release position. To hold blade 106 in blade holder 104, tab 109 on blade lock 108 is configured to align with a notch in blade 106.

[0011] Utility blade 106 includes first and second parallel linear edges 106a, 106b, a mounting notch 106c formed in first linear edge 106a, and a cutting edge integral with second linear edge 106b. When blade 106 is inserted in the slot in the front edge of blade holder 104, the tab 109 on blade lock 108 engages mounting notch 106c and locks utility blade 106 to blade holder 104. When blade holder 104 is in an extended position, utility blade 106 extends out of the aperture in the front face of handle 102. When blade holder 104 is in a retracted position, utility blade 106 is fully disposed in handle 102.

[0012] As shown in FIGS. 3A-3C, blade holder 104 is pivotally combined to handle 102 to move in an arcuate path between a retracted position (shown in FIG. 3A) and an extended position (shown in FIG. 3C). A first linkage 112 and a second linkage 114 are each combined to handle 102 at one end and to blade holder 104 at the other end to create a four-bar mechanism that controls the movement of blade holder 104.

[0013] More specifically, first linkage 112 is fastened at its lower portion 118 with rivets 122 to right-side plate 103b and second linkage 114 is fastened at its lower portion 120 with rivets 122 to right-side plate 103b. First linkage 112 has an upper portion 124 that is fastened with rivets 122 to blade holder 104 and second linkage 114 has an upper portion 128 that is similarly fastened with rivets 122 to blade holder 104.

[0014] The four-bar mechanism is defined by first linkage 112 and second linkage 114 as the pivoting links. Second plate 103b, and more specifically, an integral portion of second plate 103b measured by the distance between lower portion 118 of first linkage 112 and lower portion 120 of second linkage 114, define a fixed frame of the four-bar mechanism. Blade holder 104, and more specifically, an integral portion of blade holder 104 measured by the distance between upper portion 124 of first linkage 112 and upper portion 128 of second linkage 114,

define a floating link. This four-bar mechanism moves blade holder 104, as shown in FIGS. 3A-3C and 4A-4c, in an arcuate path between the fully retracted position and the fully extended position.

[0015] A button assembly 130 projects from left handle side 102a to enable a user to easily move blade holder 104 between its respective positions. Button assembly 130 includes a button 132 which has on opposite sides a pair of protrusions 134. Button 132 fits in a slot in a housing 136 and is biased outward by a spring (not shown) in the housing 136, so that it projects outwardly from housing 136. Housing 136 has a projection 138 that cooperates with a slot 140 in blade holder 104. Slot 140 has a vertical portion 142 perpendicular to a horizontal portion 144, which together provide a path of travel for projection 138 of housing 136.

[0016] As blade holder 104 moves between its respective positions, button 132 of button assembly 130 moves across a slot 148 while projection 138 of button assembly 130 pushes blade holder 104. More specifically, slot 148 includes aligned slots 148a, 148b, and 148c in left handle side 102a, left-side plate 103a, and right-side plate 103b, respectively, to secure button assembly 130 to both sides of handle 102. As projection 138 pushes blade holder 104, as shown in FIGS. 3A-3C, the four-bar mechanism forces blade holder 104 to arc upwardly as the vertical portion 142 of slot 140 moves with respect to projection 138. When blade holder 104 approaches its fully extended position, projection 138 slides forward along horizontal portion 144 of slot 140. FIGS. 4A-4C similarly show blade holder 104 moving between its respective positions. Thus, during extension and retraction of blade holder 104, button 132 moves linearly across slot 148 of handle 102 as the button assembly 130 pushes blade holder 104. As blade holder 104 moves, first linkage 112 and second linkage 114 pivot about their axes to move blade holder 104 in its arcuate path.

[0017] Blade holder 104 can be locked in the retracted position and the extended position. Protrusions 134 on button 132 cooperate with a first notch 146a and a second notch 146b in slot 148 on left-side handle portion 102a. In a retracted position, protrusion 134 on button 132 engages first notch 146a to hold blade holder 104 in the retracted position. In an extended position, protrusion 134 engages second notch 146b to hold blade holder 104 in the extended position. To unlock blade holder 104 and move blade holder 104 to an extended position, a user presses inward button 132 to disengage protrusion 134 from first notch 146a. Button assembly 130 can then be slid across slot 148 to the engaged position where protrusion 134 of button 132 engages second notch 146b.

[0018] FIGS. 5-8 illustrate another embodiment of a compact utility knife 200 constructed in accordance with the principles of the present disclosure. As shown in FIG. 5, knife 200, includes a handle 202, a blade holder 204 pivotally connected to handle 202, a trapezoidal utility blade 106 detachably mounted to the blade holder 204,

and a blade lock mechanism 207 for selectively locking the blade 206 onto blade holder 204.

[0019] As shown in FIG. 6, handle 202 comprises left side portion 202a and right-side portion 202b that are fastened together with suitable fasteners to hold between them a corresponding left-side plate 203a and right-side plate 203b. One or more spacers 205 positions left side plate 203 from right-side plate 203b a sufficient distance apart so that blade holder 204 can extend out apertures in a front face and top side of handle 202. A bottom portion 209 and a rear portion 211 fit together beneath left-side plate 203a and right-side plate 203b to cover the bottom side of handle 202. Rear portion 211 can be formed with an aperture 231, so handle 202 can be connected to a key ring or the like. Bottom portion 209 is formed with a catch 213 to arrest blade holder 204's movement in the extended position. While the illustrated handle 202 comprises a variety of components, one or more of these components may be omitted without deviating from the scope of this disclosure.

[0020] Blade holder 204 comprises left and right blade holder portions 204a, 204b that are fastened to each other using rivets or other single fastening mechanisms (e.g., screws, integral formation, glue, welding, etc.). In another contemplated embodiment, blade holder 104 is a single, integrally formed member rather than two members secured together. Blade holder 204 has a hook 215 positioned on its rear side to cooperate with catch 213 on bottom portion 209 of handle 202. As blade holder 204 is moved to the engaged position, its movement is arrested by the cooperation of hook 215 and catch 213.

[0021] Blade holder 204 includes blade lock mechanism 207 that is received in a slot in the top edge of blade holder 104 to selectively hold blade 206 in blade holder 204. Blade lock mechanism 207 includes a blade lock 208 biased by a biasing member to pivot between a blade-lock position and a blade-release position in a manner similar to the manner described for blade lock mechanism 107. Similarly, to hold blade 206 in blade holder 204, a tab on blade lock 208 is configured to align with a notch in blade 206. Blade 206 is constructed in a manner similar to blade 106.

[0022] As shown in FIGS. 7A-7C, blade holder 204 is pivotally combined to handle 202 to move in an arcuate path between a retracted position (shown in FIG. 7A) and an extended position (shown in FIG. 7C). A first linkage 212 and a second linkage 214 are combined to handle 202 at one end and to blade holder 204 at the other end to create a four-bar mechanism that controls the movement of blade holder 204.

[0023] More specifically, first linkage 212 is fastened at its lower portion 218 with rivets to right-side plate 203b and second linkage 214 is fastened at its lower portion 220 with rivets to left-side plate 203b. First linkage 212 has an upper portion 224 that is fastened with rivets 222 to blade holder 204 and second linkage 214 has an upper portion 228 that is similarly fastened with rivets 222 to blade holder 204.

[0024] The four-bar mechanism is defined by first linkage 212 and second linkage 214 as the pivoting links. Second plate 203b, and more specifically, an integral portion of second plate 203b measured by the distance between lower portion 218 of first linkage 212 and lower portion 220 of second linkage 214 define a fixed frame of the four-bar mechanism. Blade holder 204, and more specifically, an integral portion of blade holder 204 measured by the distance between upper portion 224 of first linkage 212 and upper portion 228 of second linkage 214 define a floating link. This four-bar mechanism moves blade holder 204, as shown in FIGS. 7A-7B, in an arcuate path between the fully retracted position and the fully extended position.

[0025] A button assembly 232 projects from a top side of handle 202 to enable a user to easily move blade holder 204 between its respective positions. Button 232 is part of a button assembly 230. Button assembly 230 includes a housing 236 and a spring to bias outward button 232 from a slot in housing 236. Housing 236 is combined to a plate 238 and a guide 237, which cooperate with a slot 240 in blade holder 204. Slot 240 has a vertical portion 242 perpendicular to a horizontal portion 244, which together provide a path of travel for guide 237.

[0026] As blade holder 204 moves to the extended position, guide 237 moves across a slot 248 in left side plate 203a while plate 238 of button assembly 230 pushes blade holder 204. As plate 238 pushes blade holder 204, as shown in FIGS. 7A-7C, the four-bar mechanism forces blade holder 204 to arc upwardly as vertical portion 242 of slot 240 in blade holder 204 moves with respect to plate 238. When blade holder 204 approaches its fully extended position, plate 238 slides forward along horizontal portion 244 of slot 240 in blade holder 204.

[0027] As blade holder 204 moves to the retracted position, guide 237 moves across a slot 248 in left side plate 203a. A catch 237a grabs the side of slot 240 to pull blade holder 204 toward the retracted position. As catch 237a pulls blade holder 204, as shown in FIGS. 8B, blade holder 204 arcs upwardly as vertical portion 242 of slot 240 in blade holder 204 moves with respect to catch 237a of guide 237. When blade holder 204 is in its fully retracted position, catch 237a of guide 237 holds blade holder 204 in position until button 232 releases protrusion 234 of button 232 from a first notch 246a in a slot 248 (discussed below).

[0028] FIGS. 8A-8C similarly show blade holder 204 moving between its respective positions. Thus, during extension and retraction of blade holder 204, button 232 moves generally linearly across the top of handle 102 as the plate 238 pushes blade holder 204. As blade holder 204 moves, first linkage 212 and second linkage 214 pivot about their axes to move blade holder 204 in its arcuate path.

[0029] Blade holder 204 can be locked in the retracted position and the extended position. Protrusion 234 on button 232 cooperates with a first notch 246a and a second notch 246b in a slot 248 on left side plate 203a. In a

retracted position, protrusion 234 on button 232 engages first notch 246a to hold blade holder 204 in the retracted position. In an extended position, protrusion 234 engages second notch 246b to hold blade holder 204 in the extended position. To unlock blade holder 204 and move blade holder 204 to an extended position, a user presses inward button 232 to disengage protrusion 234 from first notch 246a. Button assembly 230 can then be slid across slot 248 to the engaged position where protrusion 234 of button 232 engages second notch 246b.

[0030] Various aspects of any of the embodiments can be combined in different combinations than the ones shown to create new embodiments that fall within the scope of the appended claims.

[0031] While the present invention has been particularly shown and described with reference to exemplary embodiments thereof, it should be understood by those of ordinary skill in the art that various changes, substitutions and alterations can be made herein without departing from the scope of the invention as defined by appended claims and their equivalents. The invention can be better understood by reference to the following claims. For purpose of claim interpretation, the transitional phrases "including" and "having" are intended to be synonymous with the transitional phrase "comprising."

Claims

1. A utility knife, comprising:

a handle;
a blade holder pivotally carried by the handle for pivotal movement about at least two axes in an arcuate path relative to the handle between a retracted position and an extended position; and
a utility blade replaceably attached to the blade holder for selective removal and replacement of the utility blade.

2. The utility knife of claim 1, wherein the handle further comprises a first aperture from which the blade holder projects in the extended position.

3. The utility knife of claim 2, wherein the handle further comprises a second aperture from which the blade holder projects as it is moved between the retracted position and the extended position.

4. The utility knife of claim 3, wherein the handle further comprises a right side, a left side, a front face, and a top side, wherein the first aperture is in the front face and the second aperture is in the top side.

5. The utility knife of claim 4, wherein the blade holder further comprises a slot having a vertical portion perpendicular to a horizontal portion, which cooperate to provide the blade holder with ability to move in the

arcuate path with respect to the handle.

6. The utility knife of claim 5, and further comprising a button assembly that cooperates with the slot in the blade holder, wherein the button assembly pushes the blade holder to the extended position and the blade holder moves with respect to the button assembly.

7. The utility knife of claim 1, and further comprising a first linkage and a second linkage, wherein the first linkage and the second linkage are pivotally attached to the handle and pivotally attached to the blade holder to create a four-bar mechanism that enable the blade holder to move in an arcuate path with respect to the handle between the retracted position and the extended position.

8. The utility knife of claim 1, wherein the utility blade further comprises a first and second parallel linear edges, a mounting notch formed in the first linear edge, and a cutting edge, wherein a portion of the blade holder engages the mounting notch and locks the utility blade to the blade holder, the utility blade extending out of an aperture in a front face of the handle when the blade holder is in the extended position, the utility blade not extending out of the aperture when the blade holder is in the retracted position.

9. The utility knife of claim 8, wherein the extended position is an operative position in which the blade is locked to the blade holder and the cutting edge is partially exposed for cutting.

10. The utility knife of claim 9, wherein the retracted position is a safety position in which the blade holder and the blade is fully retracted so that no portion of the blade holder and the utility blade extends from an aperture in a front face of the handle.

11. A utility knife, comprising:

a handle;
a blade holder
a pair of linkages each combined at a first end to the handle and each combined at a second end to the blade holder, the linkages moving the blade holder in an arcuate path relative to the handle between a retracted position and an extended position; and
a utility blade replaceably attached to the blade holder for selective removal and replacement of the utility blade.

12. The utility knife of claim 11, wherein the handle further comprises a first aperture from which the blade holder projects in the extended position.

13. The utility knife of claim 12, wherein the handle further comprises a second aperture from which the blade holder projects as it is moved between the retracted position and the extended position. 5
14. The utility knife of claim 13, wherein the handle further comprises a right side, a left side, a front face, and a top side, wherein the first aperture is in the front face and the second aperture is in the top side. 10
15. The utility knife of claim 11, wherein the blade holder further comprises a slot having a vertical portion perpendicular to a horizontal portion, which cooperate to provide the blade holder with ability to move in the arcuate path with respect to the handle. 15
16. The utility knife of claim 15, and further comprising a button assembly that cooperates with the slot in the blade holder, wherein the button assembly pushes the blade holder to the extended position and the blade holder moves with respect to the button assembly. 20
17. The utility knife of claim 11, wherein the pair of linkages define to a four-bar mechanism that enable the blade holder to move in the arcuate path with respect to the handle between the retracted position and the extended position. 25
18. The utility knife of claim 11, wherein the utility blade further comprises a first and second parallel linear edges, a mounting notch formed in the first linear edge, and a cutting edge, wherein a portion of the blade holder engages the mounting notch and locks the utility blade to the blade holder, the utility blade extending out of an aperture in a front face of the handle when the blade holder is in the extended position, the utility blade not extending out of the aperture when the blade holder is in the retracted position. 30
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19. The utility knife of claim 18, wherein the extended position is an operative position in which the blade is locked to the blade holder and the cutting edge is partially exposed for cutting. 45
20. The utility knife of claim 19, wherein the retracted position is a safety position in which the blade holder and the blade is fully retracted so that no portion of the blade holder and the utility blade extends from an aperture in a front face of the handle. 50
21. The utility knife of claim 11, and further comprising a utility blade selectively combined to the blade holder, where in the handle further comprises a right side, a left side, a top side, a bottom side, and a front face, and wherein a first aperture is in the front face of the handle and the blade holder projects from the front face of the handle in the extended position, and 55

wherein the blade holder has a right side, a left side, a top side, a bottom side, and a front face, wherein the utility blade projects from the front face of the blade holder, and wherein the top side of the blade holder remains parallel with the top side of the handle as the blade holder moves in the arcuate path relative to the handle between the retracted position and the extended position

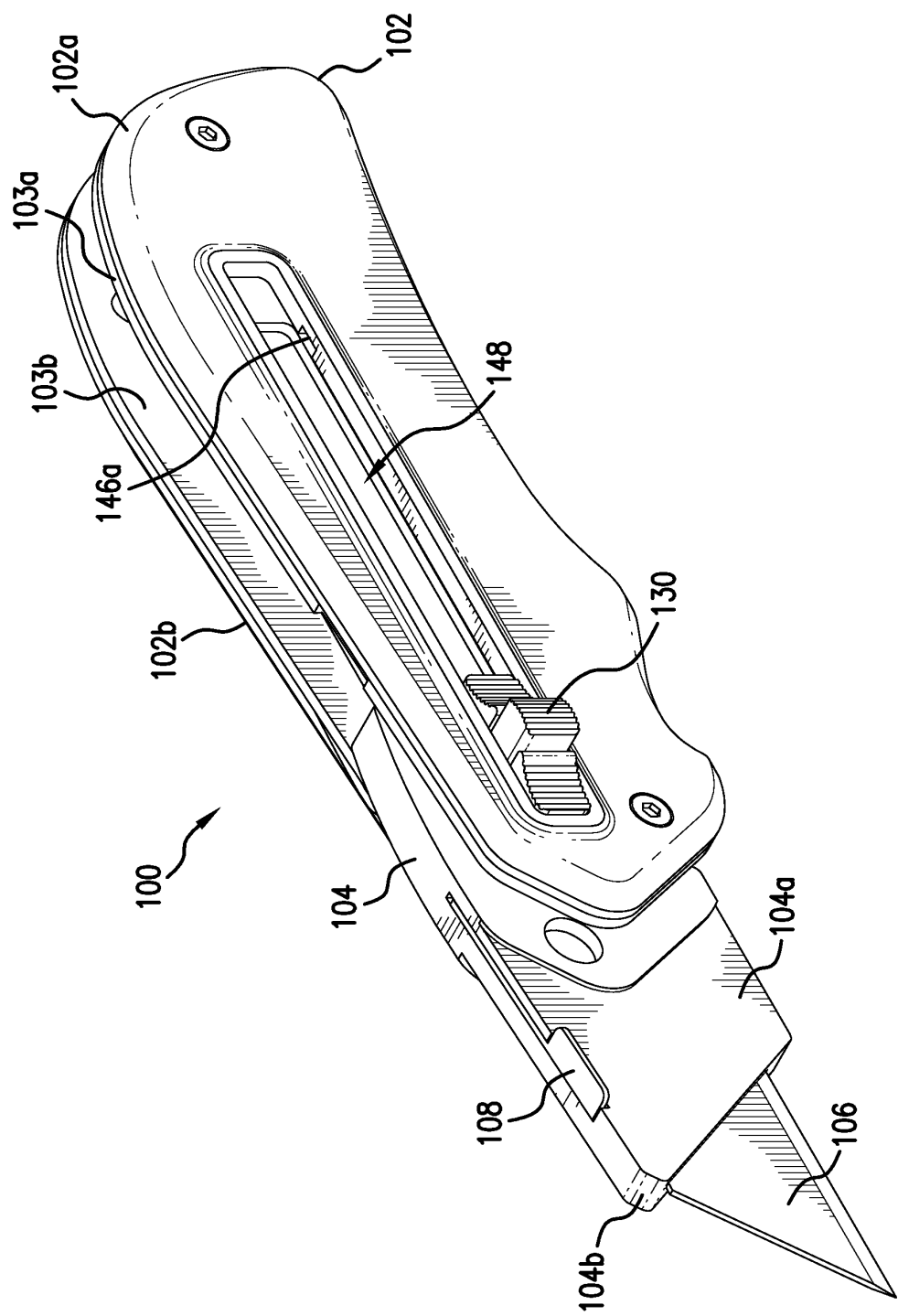


FIG.1

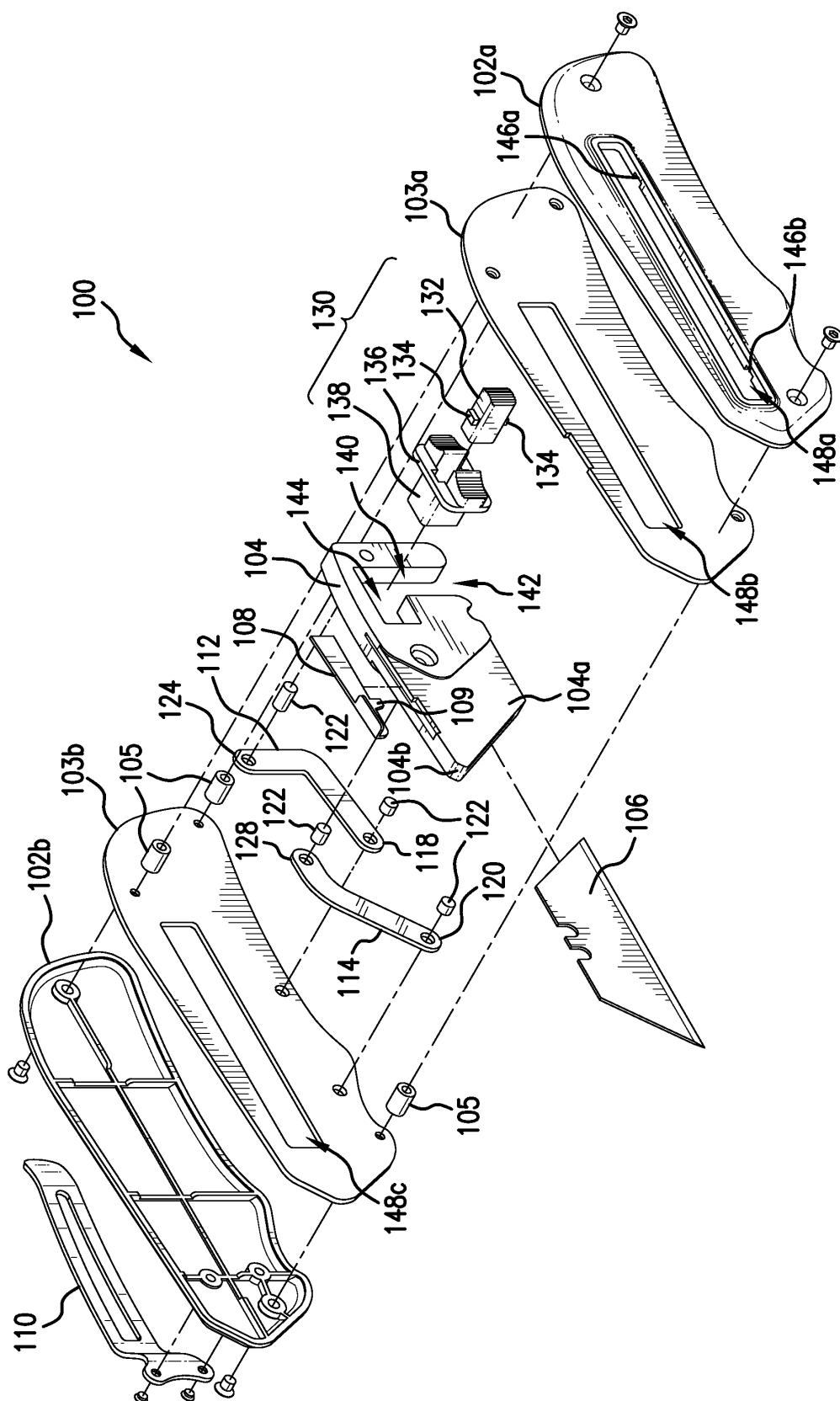


FIG. 2

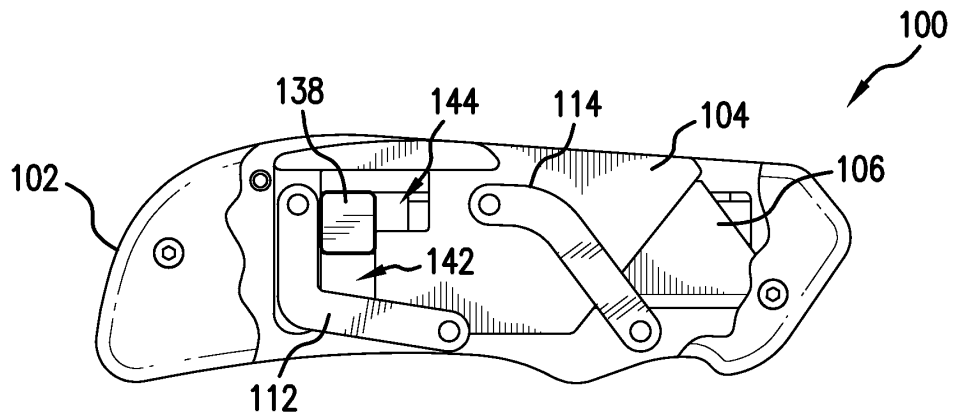


FIG. 3A

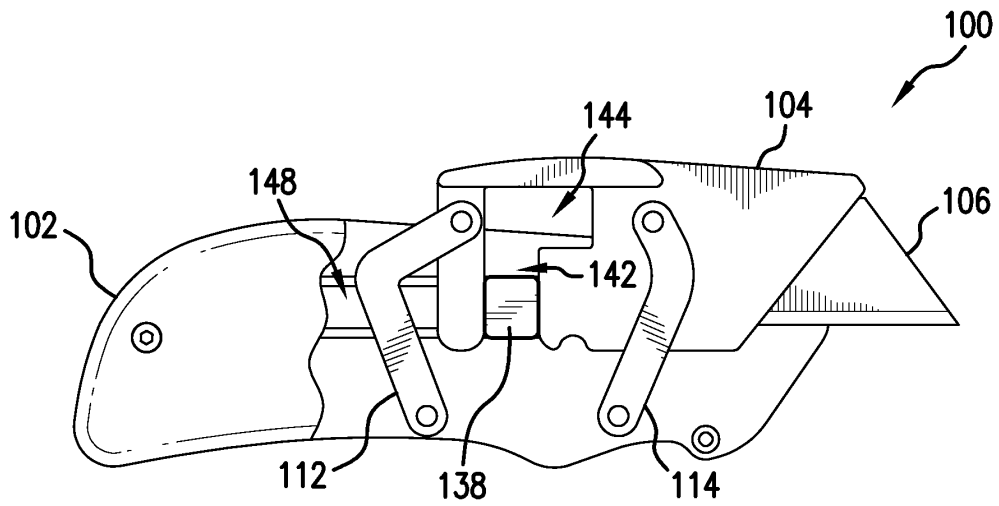


FIG. 3B

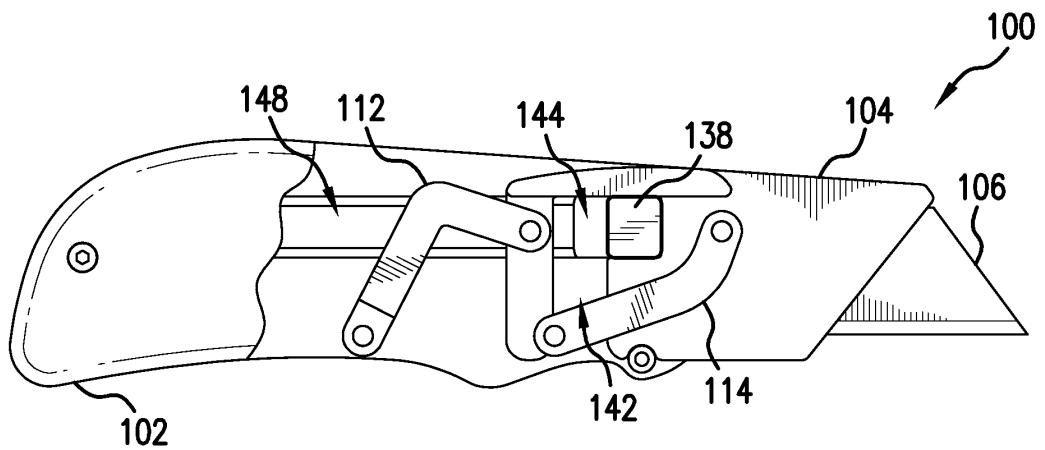


FIG. 3C

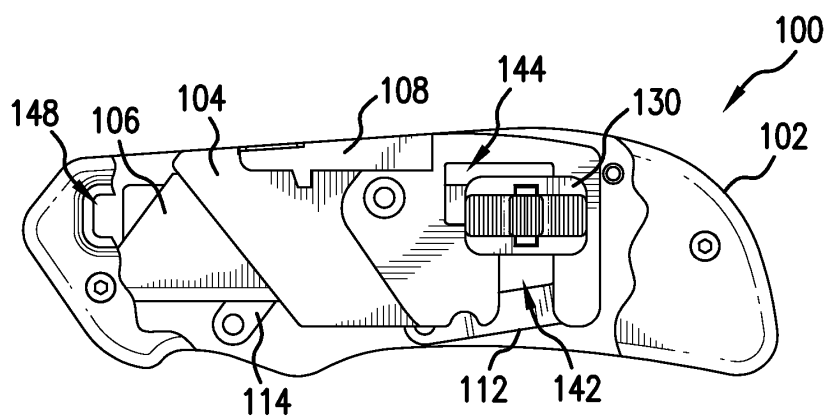


FIG. 4A

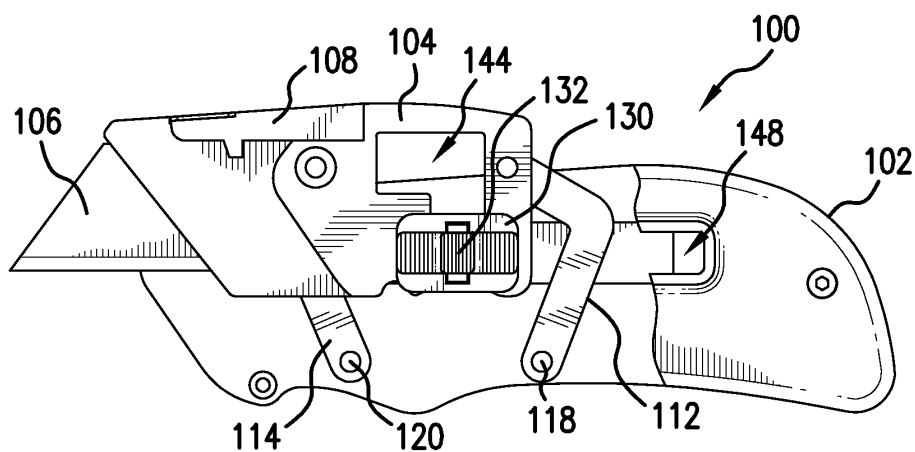


FIG. 4B

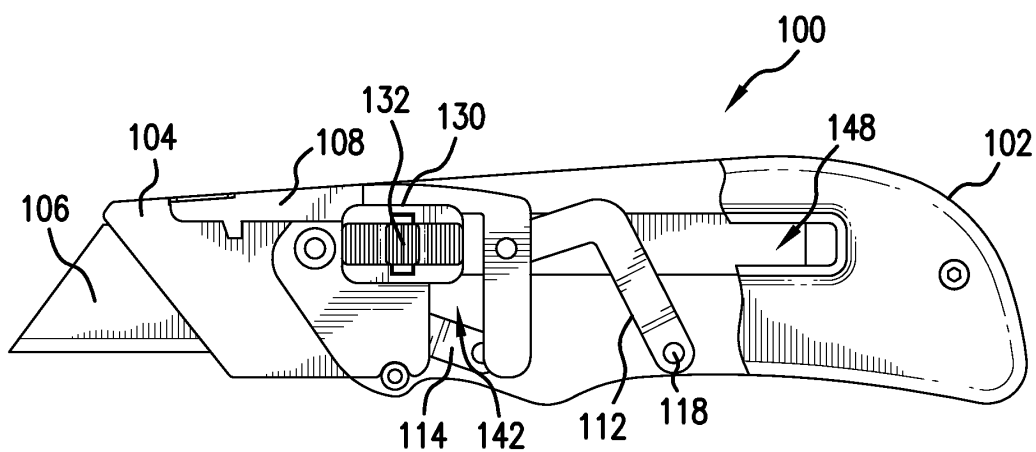


FIG. 4C

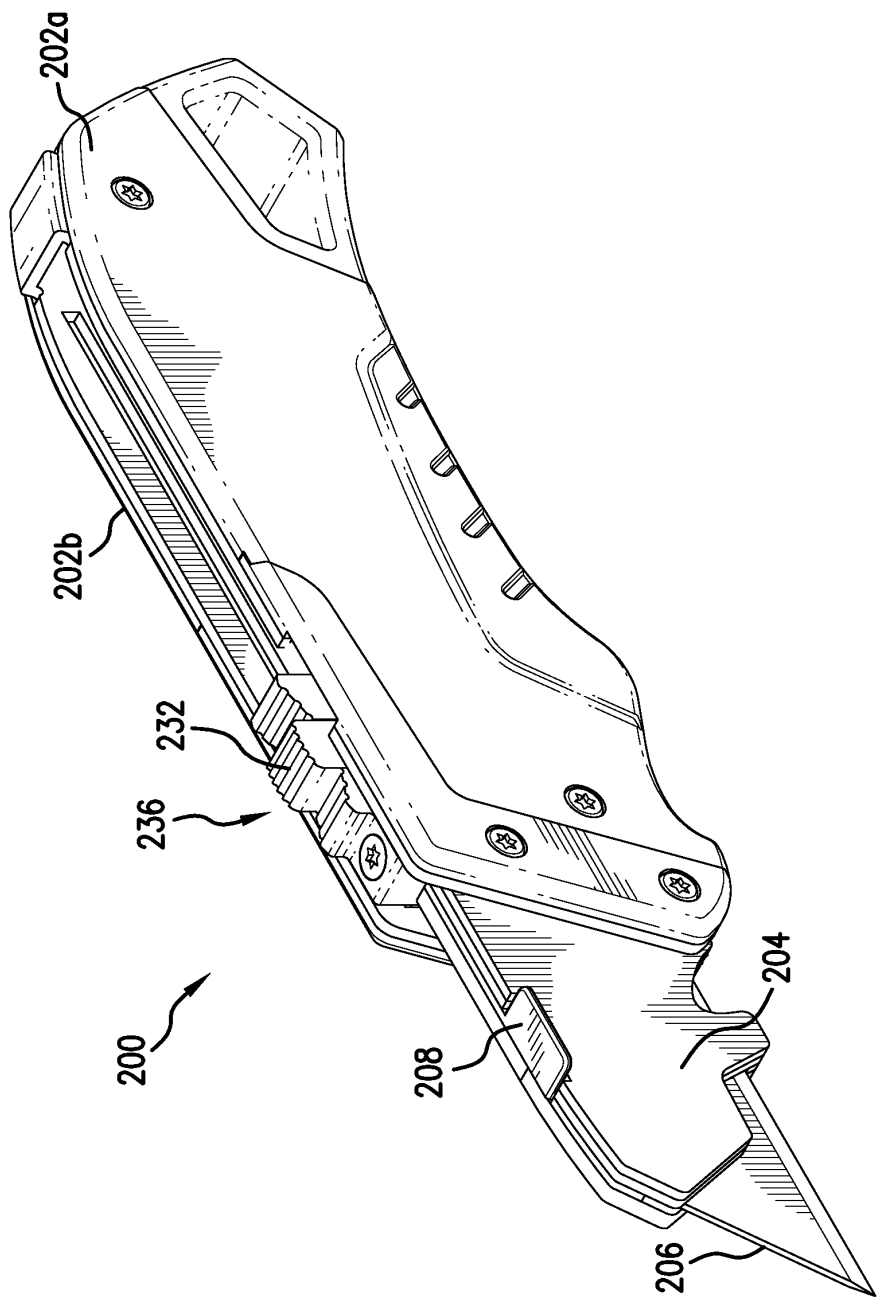


FIG. 5

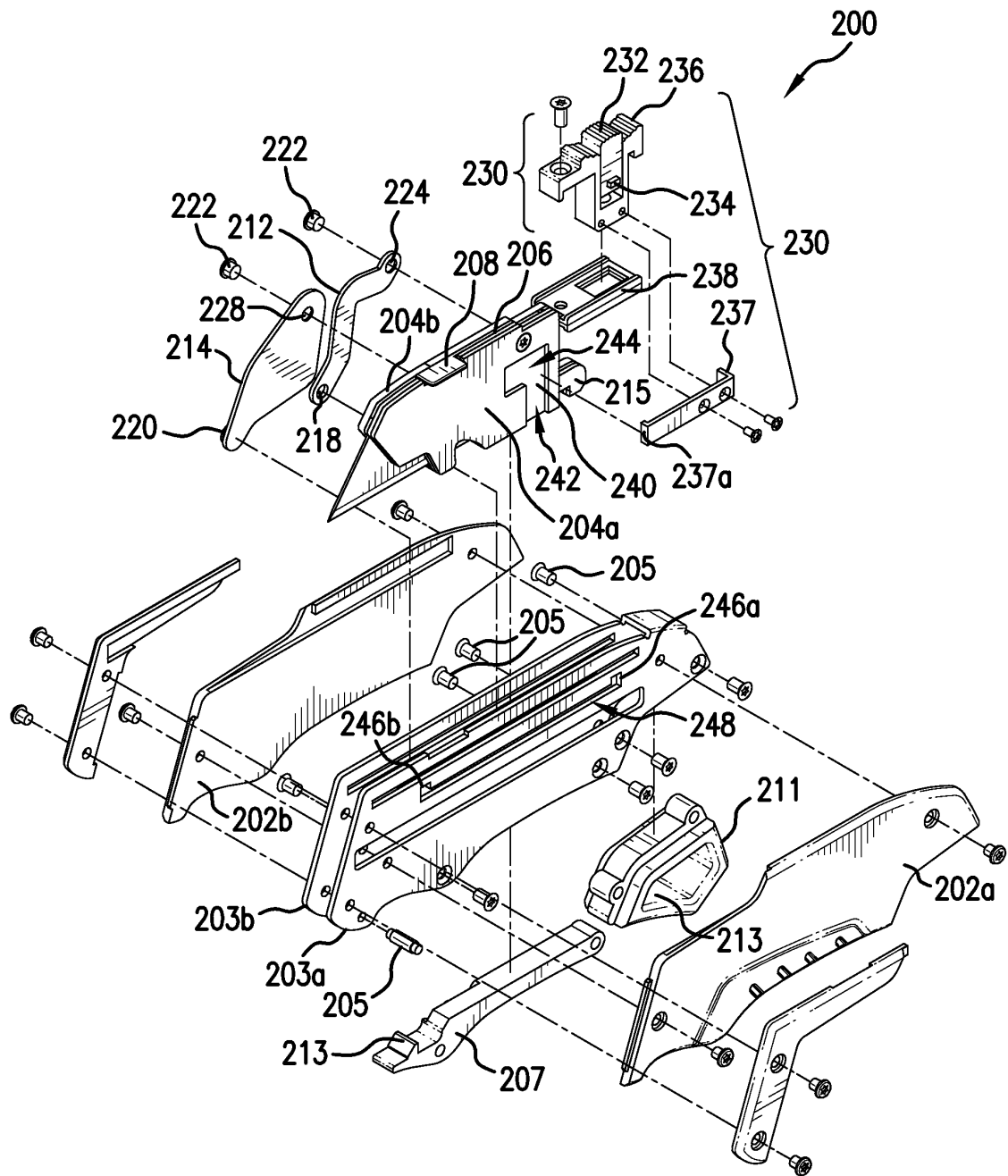


FIG.6

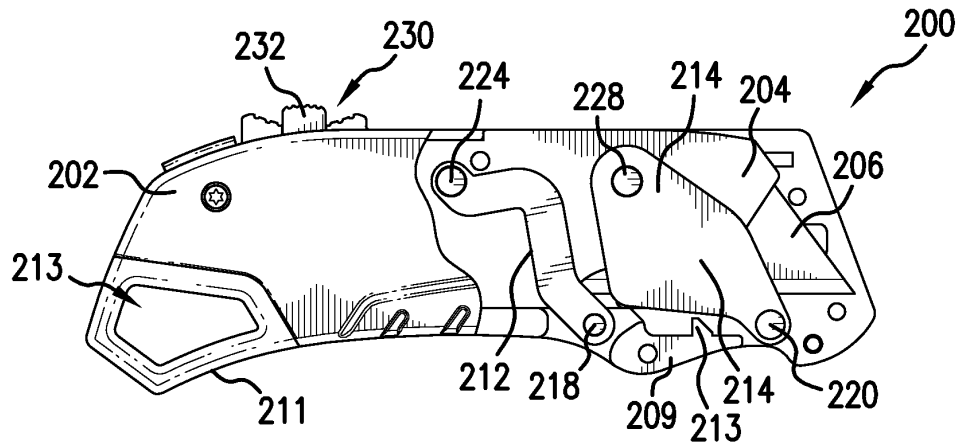


FIG. 7A

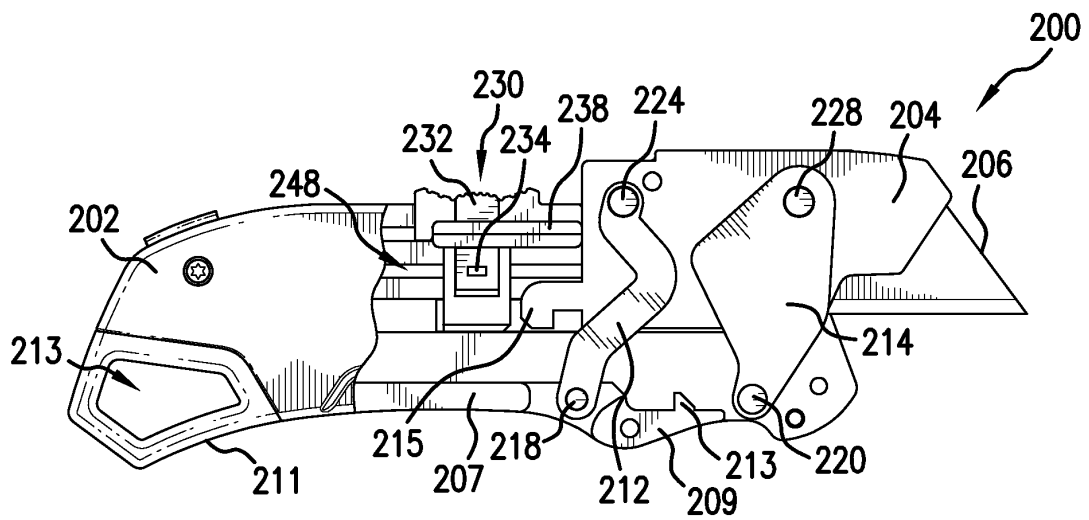


FIG. 7B

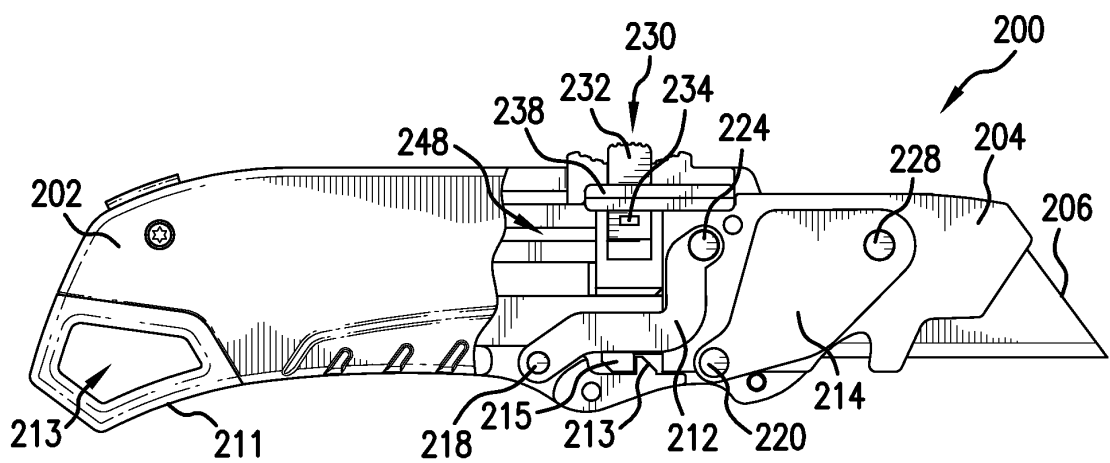


FIG. 7C

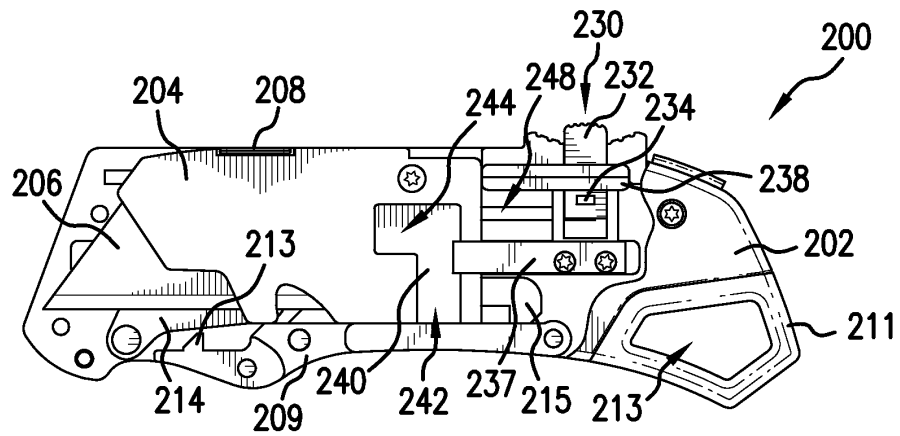


FIG. 8A

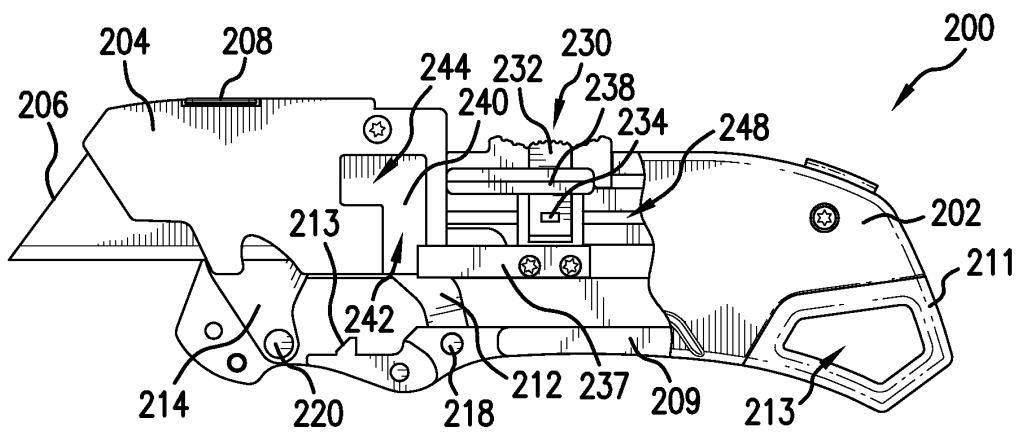


FIG. 8B

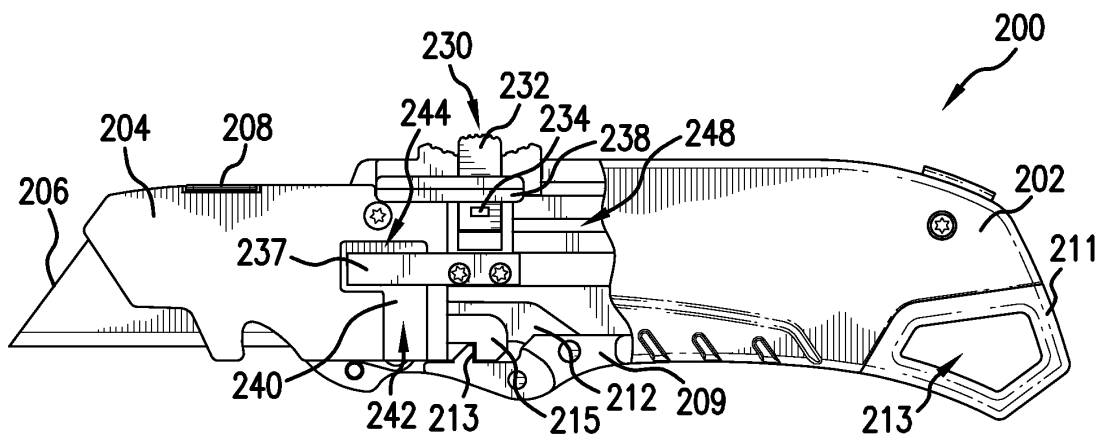


FIG. 8C



EUROPEAN SEARCH REPORT

Application Number
EP 13 16 0730

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 13 June 2013	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			

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EPO FORM 1503 03.82 (P04C01)

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

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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13-06-2013

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