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(54) **HANDLE LOCK ASSEMBLY**

(57) The invention relates to a handle lock assembly (100) for a cabinet door, the handle lock assembly (100) comprising a main body (20) having a handle housing (15) extending along a longitudinal axis (X) of the handle lock assembly (100); a handle (10) provided within the handle housing (15) and adapted to move between an unlocked position in which the handle (10) is lifted from the handle housing (15) and a locked position in which the handle (10) is substantially within the handle housing (15); a lock plug (40) provided at a lock plug housing (12) of the handle (10), having a spring-biased lock cam (42) adapted to lock the handle (10) within the handle housing (15) in the locked position. Said handle lock assembly (100) comprises at least one pivotable mounted handle wheel (35) being rotatable within the main body (20) when the handle (10) is lifted; at least one rack gear (31) and at least one pinion gear (38) in communication with the handle wheel (35) so as to convert a rotational movement from the handle wheel (35) to a linear movement wherein the pinion gear (38) is attached to a transmission bar (37) for rotating; and a base plate (30) attached to the main body (20) for substantially covering an open bottom end (25) of the main body (20).

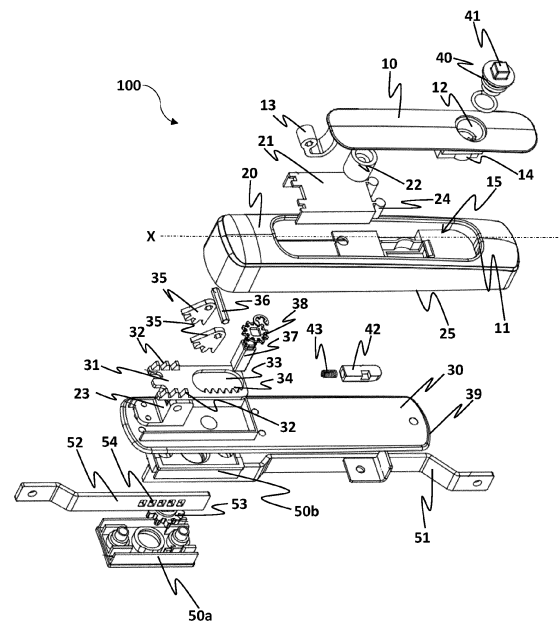


FIG. 1

Description

Technical Field of the Invention

[0001] The present invention relates to a linear acting handle lock assembly with an improved sealing feature.

Background of the Invention

[0002] It is known in the art that handle lock assembly structures, which are suitable for linear movement and have a handle that the user can move in the vertical direction, have been used for many years. Such handle lock assemblies are exposed to external factors, especially in the open air, and the working efficiency thereof may decrease as a result of rain, heat, temperature, etc.

[0003] A prior art publication in the technical field of the invention may be referred to as EP2476825 (A2), which discloses a lock mechanism comprising a main body accommodating a handle. Rotation of said handle activates longitudinal rods movable on a locking and unlocking direction with respective slots. Rotation of said handle is allowed upon operation of two locks in a sequence according to the present invention.

[0004] This type of vertical handle-operated lock assemblies may not exhibit sufficient resistance against sealing. Especially undesirable situations such as wetting and dusting of the gear structure to which the movement is transferred may reduce the working efficiency of the lock. There is a need for the handle-operated lock assemblies that will meet the increasing demand for hygiene in recent years.

Objects of the Invention

[0005] An object of the present invention is to provide a handle lock assembly with sealing feature.

[0006] Another object of the present invention is to provide a handle lock assembly which is produced from material which does not accumulate dirt and bacteria in particular to meet specified hygiene standards.

[0007] Another object of the present invention is to provide a long-lasting and durable handle lock assembly. Thanks to the sealing structure, the proposed handle lock assembly prevents dirt formation while ensuring impermeability.

Summary of the Invention

[0008] The invention relates to a handle lock assembly for a cabinet door, the handle lock assembly comprising a main body having a handle housing extending along a longitudinal axis of the handle lock assembly; a handle provided within the handle housing and adapted to move between an unlocked position in which the handle is lifted from the handle housing and a locked position in which the handle is substantially within the handle housing; a lock plug provided at a lock plug housing of the handle,

having a spring-biased lock cam adapted to lock the handle within the handle housing in the locked position. Said handle lock assembly comprises at least one pivotable mounted handle wheel being rotatable within the main body when the handle is lifted; at least one rack gear and at least one pinion gear (38) in communication with the handle wheel so as to convert a rotational movement from the handle wheel to a linear movement wherein the pinion gear is attached to a transmission bar for rotating; and a base plate attached to the main body for substantially covering an open bottom end of the main body.

Brief Description of the Drawings

[0009] The handle lock assembly which is the subject of the present invention is illustrated in the accompanying drawings for better understanding thereof, which drawings are only attached for better explaining the present invention and are not limiting the invention.

Figure 1 is an exploded view of a handle lock assembly according to the present invention.

Figure 2a is a perspective view of the handle lock assembly in a closed state according to the present invention.

Figure 2b is a perspective view of the handle lock assembly wherein the handle is brought into an open position according to the present invention.

Figure 3a is a perspective view of the handle lock assembly wherein the handle is lifted and the handle lock assembly is brought into an open position according to the present invention.

Figure 3b is a top perspective view of the handle lock assembly shown in Fig. 3a.

Figure 4 is a partially exploded view of the handle lock assembly according to the present invention.

Figure 5a is a perspective view of the handle lock assembly in a closed position wherein a suitable key is attached to a locking plug according to the present invention.

Figure 5b is a cross-sectional view of the handle lock assembly shown in Fig. 5a.

Figure 6a is a perspective view of the handle lock assembly in an open position wherein the suitable key is rotated, according to the present invention.

Figure 6b is a cross-sectional view of the handle lock assembly shown in Fig. 6a.

Figure 7a is a partial perspective view of the mid-

sectioned state of the handle lock assembly where the handle is in a closed position, according to the present invention.

Figure 7b is a partial perspective view of the mid-sectioned state of the handle lock assembly wherein the handle is lifted and in an open position, according to the present invention.

Figure 8 is a partial perspective view of the mid-sectioned state of the handle lock assembly wherein the handle is in a locked position and the circumferentially placed gasket is pressed, according to the present invention.

Figure 9 is a perspective view of a rack gear of the handle lock assembly according to the present invention.

Detailed Description of the Invention

[0010] The invention will now be explained in detail in this section with reference to the accompanying drawings and the list of reference numerals used in the appended drawings is as follows;

- 10. Handle
 - 11. Main body sealing member
 - 12. Lock plug housing
 - 13. Attachment portion
 - 14. Outer casing
 - 15. Handle housing
- 20. Main body
 - 21. Gear cover
 - 22. Support member
 - 23. Joint member
 - 24. Guiding portion
 - 25. Bottom end
- 30. Base plate
 - 31. Rack gear
 - 32. Upper tooth set
 - 33. Rack Opening
 - 34. Inner tooth set
 - 35. Handle wheel
 - 36. Connection member
 - 37. Transmission bar
 - 38. Pinion gear
 - 39. Bottom sealing member
- 40. Lock plug
 - 41. Engagement protrusion
 - 42. Lock cam
 - 43. Spring
- 50a. Bottom male cover
- 50b. Bottom female cover
 - 51. First longitudinal rod
 - 52. Second longitudinal rod
 - 53. Rotation gear
 - 54. Engagement slot

- 100. Handle lock assembly
- X Longitudinal axis of the handle lock assembly

[0011] The present invention relates to a handle lock assembly (100) for a cabinet door. The proposed handle lock assembly (100) comprises a main body (20) having a handle housing (15) extending along a longitudinal axis (X) of the handle lock assembly (100); a handle (10) provided within the handle housing (15) and adapted to move between an unlocked position in which the handle (10) is lifted from the handle housing (15) and a locked position in which the handle (10) is substantially within the handle housing (15); a lock plug (40) provided at a lock plug housing (12) of the handle (10), having a spring-biased lock cam (42) adapted to lock the handle (10) within the handle housing (15) in the locked position. Advantageously, said handle lock assembly (100) comprises at least one pivotable mounted handle wheel (35) being rotatable within the handle housing (15) when the handle (10) is lifted; at least one rack gear (31) and at least one pinion gear (38) in communication with the handle wheel (35) so as to convert a rotational movement from the handle wheel (35) to a linear movement wherein the pinion gear (38) is attached to a transmission bar (37), and a base plate (30) attached to the main body (20) for substantially covering an open bottom end (25) of the main body (20). With this arrangement, the handle lock assembly (100) is almost fully closed and is arranged to be resistant to external factors. One of the greatest advantages of the invention is that the handle lock assembly (100) is completely closed in order to impart a sealing feature. The base plate (30) forms the base of the handle lock assembly (100) and closes the bottom of the handle lock assembly (100). The handle lock assembly (100) is specially produced from material that does not accumulate dirt and bacteria in particular to meet specified hygiene standards.

[0012] Referring to Fig. 1, the base plate (30) has an at least partly circumferentially arranged and outwardly protruded bottom sealing member (39). Accordingly, the bottom sealing member (39) extends completely circumferentially to cover the lateral sides of the base plate (30). The bottom sealing member (39) is adapted to be in contact with a planar surface of the cabinet door. Thus, when the handle lock assembly (100) is attached to the cabinet, the bottom sealing member (39) is pressed against the planar surface of the cabinet door and the sealing member (39) is squeezed thereby obtaining fluid-tightness thereof. In a possible embodiment, the bottom sealing member (39) can be an overmolded gasket and extends radially outwardly beyond the lower surface of the base plate (30). The base plate (30) is a separate part and is attached to the main body (20) with a plurality of connection members.

[0013] The present invention also proposes an improved gear system for the handle lock assembly (100) which offers an easier opening and closing and requires less contact. According to Fig. 1 and 9, the rack gear (31)

has at least one upper tooth set (32) in mechanical communication with the handle wheel (35) and at least one inner tooth set (34) in mechanical communication with the pinion gear (38). Referring to Fig. 9, the upper tooth set (32) has a plurality of teeth, preferably 3 teeth and the inner tooth set (34) has a plurality of teeth, preferably 5 or 6 teeth. The numbers and the shapes of the teeth can vary with respect to the handle wheel (35) and the pinion gear (38). The inner tooth set (34) is provided at an inner lateral surface of the rack opening (33) as can be seen in Fig. 9. The location of the inner tooth set (34) in the rack opening (33) can also vary.

[0014] Referring to Fig. 1, the handle lock assembly (100) has two handle wheels (35) in mechanical communication with corresponding upper tooth sets (32) to move the rack gear (31) with respect to the longitudinal axis (X) of the handle lock assembly (100). The handle wheels (35) can be formed as a quarter-shaped gear wheel spaced apart from each other.

[0015] Referring to Fig. 4, the handle lock assembly (100) comprises a gear cover (21) provided within the main body (20) for covering the rack gear (31) and the pinion gear (38). Accordingly, the handle lock assembly (100) further comprises a support member (22) provided at the handle (10) and is suitable for compression in such a way that the support member (22) contacts the gear cover (21) when the handle lock assembly (100) is in the closed position. Fig. 5 shows the position of the pressed support member (22) against the gear cover (21). The support member (22) has a hollow cylindrical shape and is made from an elastic material. The gear cover (21) can have U-shaped cross-section and two guiding portions (24) for guiding the gear cover (21) within the main body (20). The main body (20) has corresponding holes for receiving guiding portions (24) in the form of a cylinder.

[0016] Referring to Fig. 7a, a rotation gear (53) is attached to the transmission bar (37) for retracting or extending a first longitudinal rod (51) and a second longitudinal rod (52) along the longitudinal axis (X) of the handle lock assembly (100). The first longitudinal rod (51) and the second longitudinal rod (52) have a plurality of engagement slots (54) for engaging gear teeth of the rotation gear (53). The engagement slot (54) is, preferably, in the form of a square-shaped hole. When the transmission is rotated the rotation gear (53) also rotates and moves the first longitudinal rod (51) and the second longitudinal rod (52) along the longitudinal axis (X). The handle lock assembly (100) comprises two matchable bottom male cover (50a) and a bottom female cover (50b) in which the first longitudinal rod (51) and the second longitudinal rod (52) are guided. The rotation gear (53) is also guided in the bottom male cover (50a).

[0017] Referring to Fig. 4, the handle lock assembly (100) comprises a joint member (23) attached to the base plate (30) in which two handle wheels (35) are pivotably coupled and an attachment portion (13) of the handle (10) is attached via a connection member (36) (i.e., a pin). The joint member (23) has preferably an attachment

base for attaching the base plate (30) by at least one connection member (i.e., screw) and has a U-shaped connection portion in which two handle wheels (35) are guided.

[0018] The handle (10) has a planar upper surface on which the lock plug housing (12) is formed for receiving a corresponding lock plug (40). The lock plug housing (12) has an outer casing (14) in which the lock plug (40) is guided. This outer casing (14) has an opening through which the spring-biased lock cam (42) can extend. The attachment portion (13) of the handle (10) has a through hole in which the connection member (36) is fitted. When the handle lock assembly (100) is in the closed position, the upper surface of the main body (20) and the handle (10) is brought to the same height level which also enhances the impermeability of the handle lock assembly (100).

[0019] In a preferable embodiment, the handle lock assembly (100) further comprises a main body sealing member (11) for covering the upper circumferential end of the handle housing (15). Said main body sealing member (11) is an overmolded gasket and protrudes outwardly from the handle housing (15) wherein the main body sealing member (11) is arranged to be pressed by the handle (10) when the handle lock assembly (100) is in the closed position. In another possible embodiment of the invention, the handle lock assembly (100) comprises a circumferentially arranged and outwardly protruded handle sealing member (not shown) for covering the lateral periphery of the handle housing (15) and is arranged to be pressed against the handle housing (15) when the handle lock assembly (100) is in the closed position. The handle sealing member can be similarly shaped as the bottom sealing member (39). Thus, when the handle (10) is released from the handle housing (15), the pressed handle sealing member and/or main body sealing member (11) allows the handle (10) to be partially lifted upwards, afterwards, the user can easily hold and lift the handle (10). Such main body sealing member (11) can be made of a thermoplastic elastomer. In a possible embodiment, the main body sealing member (11) may be made of a rubber material.

[0020] Referring to Fig. 1, the lock plug (40) is arranged to be rotated by a suitable handle key. When the handle key (60) is firstly engaged and then rotated, the spring-biased lock cam (42) is retracted and the handle (10) is released from the handle housing (15). The lock cam (42) can have a rectangular shape with an inclined end portion for engaging corresponding housing in the main body (20). One end of the lock cam (42) is under the effect of the spring (43) for keeping the lock plug (40) in the closed position. In a possible embodiment, the lock plug (40) may be of any type of suitable parts of a lock cylinder available in the market. For example, a radial pin cylinder in which pins supported by respective springs are radially arranged may be preferred. Such cylinders typically require tubular keys to operate the cylinder.

[0021] In a possible usage of the handle lock assembly

(100), the user puts the handle key (60) on an engagement protrusion (41) of the lock plug (40) as shown in Fig. 5a. The handle key (60) has a preferably corresponding hole which is shaped and dimensioned with respect to the engagement protrusion (41) of the lock plug (40). When the lock plug (40) is rotated, the lock cam (42) is retracted by compressing the spring (43) therein. This action transfers the pressure on the handle sealing member and/or main body sealing member (11) to the handle (10) and throws the handle (10) slightly upwards.

[0022] Thus, by holding the handle (10) easily, the handle (10) is rotated around the joint member (23) in the upward direction. This movement creates a rotation movement on the joint member (23) and is transferred to the improved rack-pinion system which creates a linear motion on the first longitudinal rod (51) and the second longitudinal rod (52). The skilled person in the art can replace another suitable means instead of such rods.

[0023] The handle lock assembly (100) presented within the scope of the present invention can be used on cabinets or panel doors. The proposed handle lock assembly (100) is arranged especially suitable for use in boxes or cabinet covers.

Claims

1. A handle lock assembly (100) for a cabinet door, the handle lock assembly (100) comprising:

a main body (20) having a handle housing (15) extending along a longitudinal axis (X) of the handle lock assembly (100);

a handle (10) provided within the handle housing (15) and adapted to move between an unlocked position in which the handle (10) is lifted from the handle housing (15) and a locked position in which the handle (10) is substantially within the handle housing (15);

a lock plug (40) provided at a lock plug housing (12) of the handle (10), having a spring-biased lock cam (42) adapted to lock the handle (10) within the handle housing (15) in the locked position **characterized in that** said handle lock assembly (100) comprises:

at least one pivotable mounted handle wheel (35) being rotatable within the main body (20) when the handle (10) is lifted;

at least one rack gear (31) and at least one pinion gear (38) in communication with the handle wheel (35) so as to convert a rotational movement from the handle wheel (35) to a linear movement wherein the pinion gear (38) is attached to a transmission bar (37) for rotating; and

a base plate (30) attached to the main body (20) for substantially covering an open bot-

tom end (25) of the main body (20).

2. The handle lock assembly (100) according to claim 1, wherein the base plate (30) has an at least partly circumferentially arranged and outwardly protruded bottom sealing member (39) which is adapted to be in contact with a planar surface of the cabinet door.
3. The handle lock assembly (100) according to claim 2, wherein the bottom sealing member (39) extends completely circumferentially to cover lateral sides of the base plate (30).
4. The handle lock assembly (100) according to claim 2 or 3, wherein the bottom sealing member (39) is an overmolded gasket and extends radially outwardly beyond the lower surface of the base plate (30).
5. The handle lock assembly (100) according to any one of the preceding claims, wherein the rack gear (31) has at least one upper tooth set (32) in mechanical communication with the handle wheel (35) and at least one inner tooth set (34) in mechanical communication with the pinion gear (38).
6. The handle lock assembly (100) according to claim 5, wherein the handle lock assembly (100) comprises two handle wheels (35) in mechanical communication with corresponding upper tooth sets (32) to move the rack gear (31) with respect to the longitudinal axis (X) of the handle lock assembly (100).
7. The handle lock assembly (100) according to claim 5 or 6, wherein the rack gear (31) has a rack opening (33) wherein said inner tooth set (34) is provided at an inner lateral surface of the rack opening (33).
8. The handle lock assembly (100) according to any one of the preceding claims, wherein the handle lock assembly (100) comprises a gear cover (21) provided within the main body (20) for covering the rack gear (31) and the pinion gear (38).
9. The handle lock assembly (100) according to claim 9, wherein the handle lock assembly (100) comprises a support member (22) provided at the handle (10) and is suitable for compression in such a way that the support member (22) contacts the gear cover (21) when the handle lock assembly (100) is in the closed position.
10. The handle lock assembly (100) according to any one of the preceding claims, wherein a rotation gear (53) is attached to the transmission bar (37) for retracting or extending a first longitudinal rod (51) and a second longitudinal rod (52) along the longitudinal axis (X) of the handle lock assembly (100).

11. The handle lock assembly (100) according to claim 10, wherein the first longitudinal rod (51) and the second longitudinal rod (52) has a plurality of engagement slots (54) for engaging gear teeth of the rotation gear (53). 5
12. The handle lock assembly (100) according to any one of the preceding claims, wherein the handle lock assembly (100) comprises a joint member (23) attached to the base plate (30) in which two handle wheels (35) are pivotably coupled and an attachment portion (13) of the handle (10) is attached via a connection member (36). 10
13. The handle lock assembly (100) according to any one of the preceding claims, wherein the handle lock assembly (100) further comprises a main body sealing member (11) for covering the upper circumferential end of the handle housing (15). 15
14. The handle lock assembly (100) according to claim 13, wherein the main body sealing member (11) is an overmolded gasket and protrudes outwardly from the handle housing (15) wherein the main body sealing member (11) is arranged to be pressed by the handle (10) when the handle lock assembly (100) is in the closed position. 20 25
15. The handle lock assembly (100) according to any one of the preceding claims, wherein the handle lock assembly (100) further comprises a circumferentially arranged and outwardly protruded handle sealing member for covering the lateral periphery of the handle housing (15) and is arranged to be pressed against the handle housing (15) when the handle lock assembly (100) is in the closed position. 30 35

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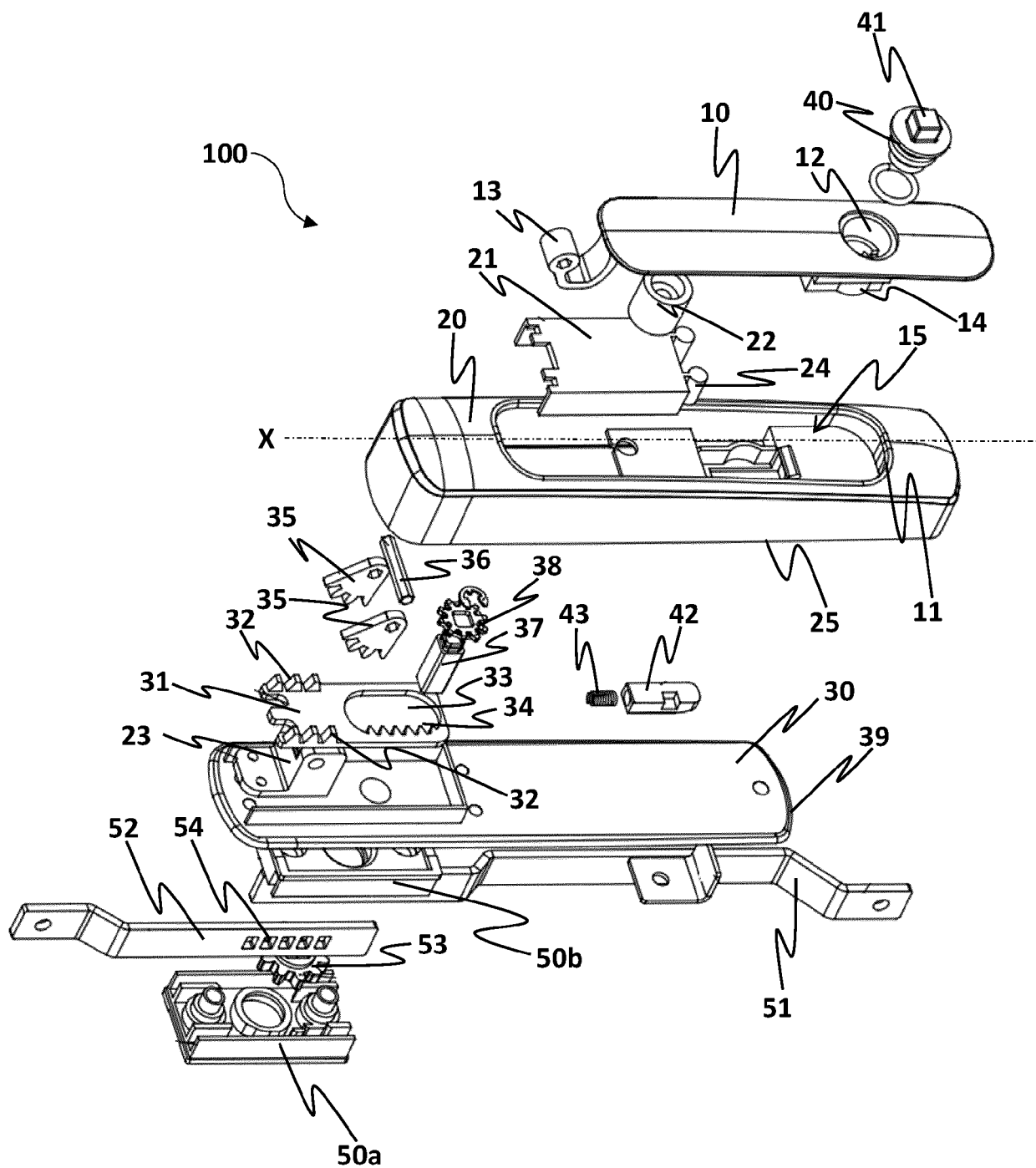


FIG. 1

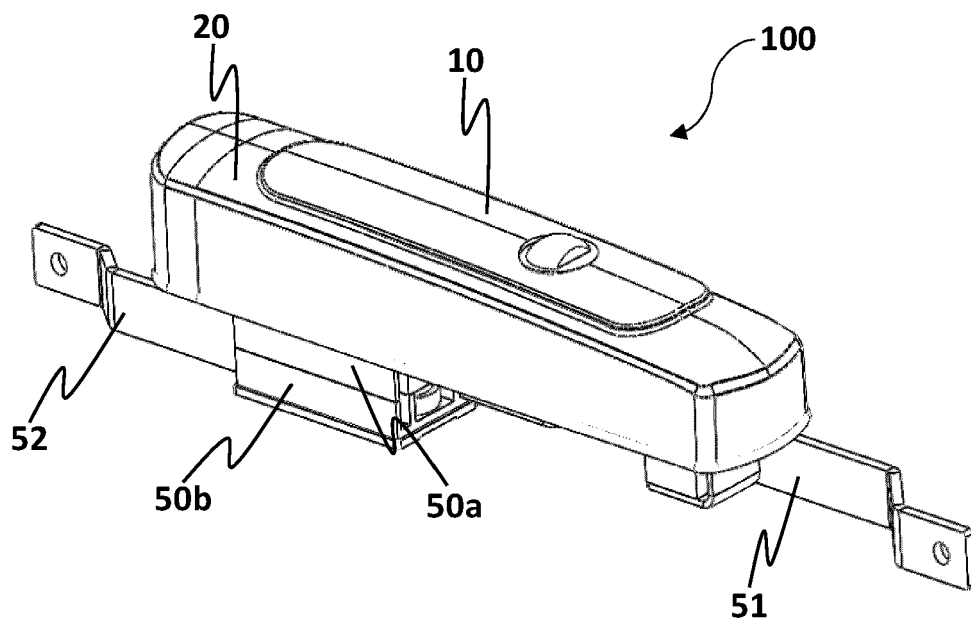


FIG. 2a

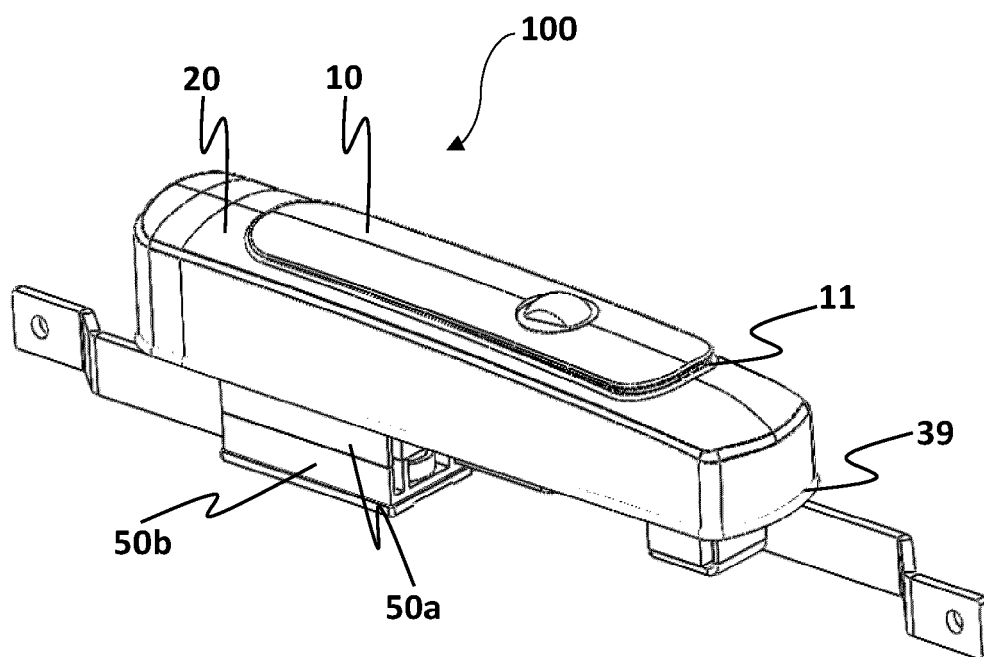


FIG. 2b

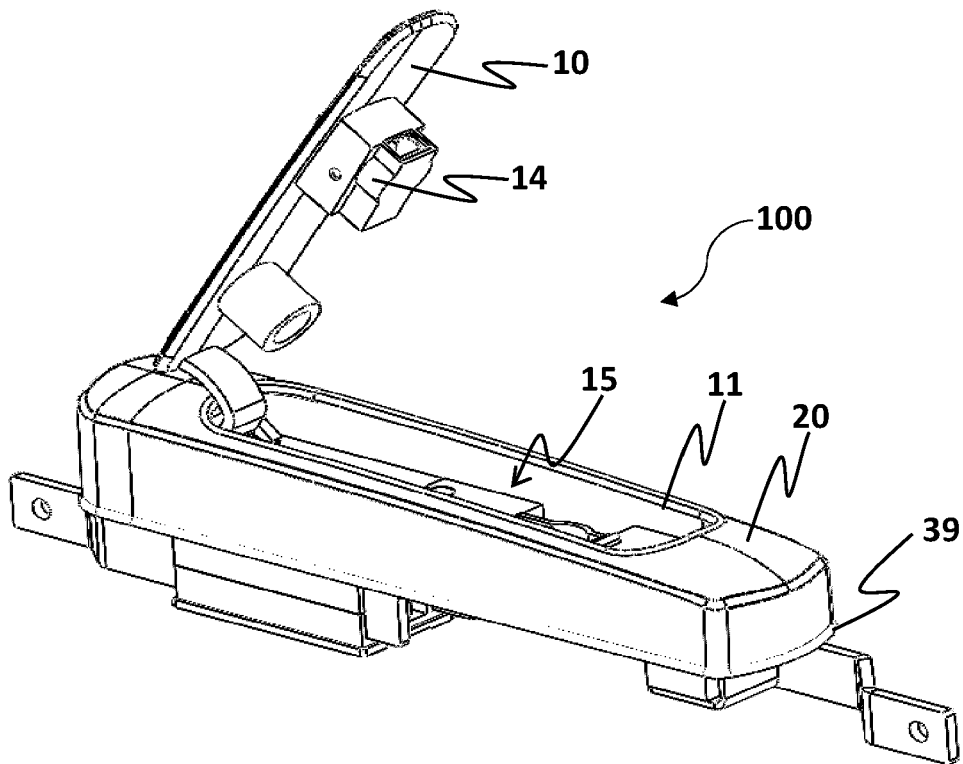


FIG. 3a

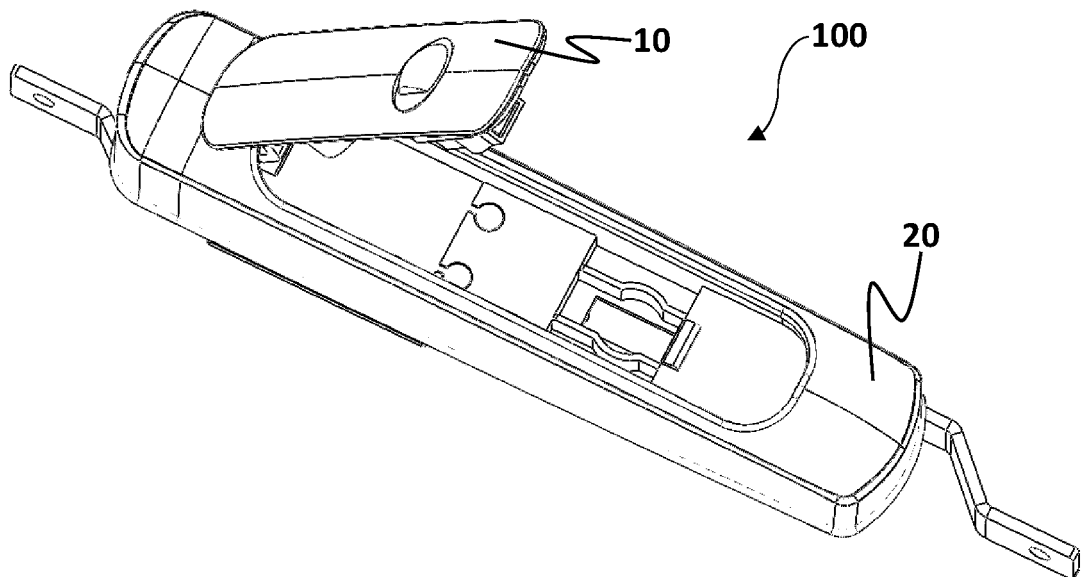


FIG. 3b

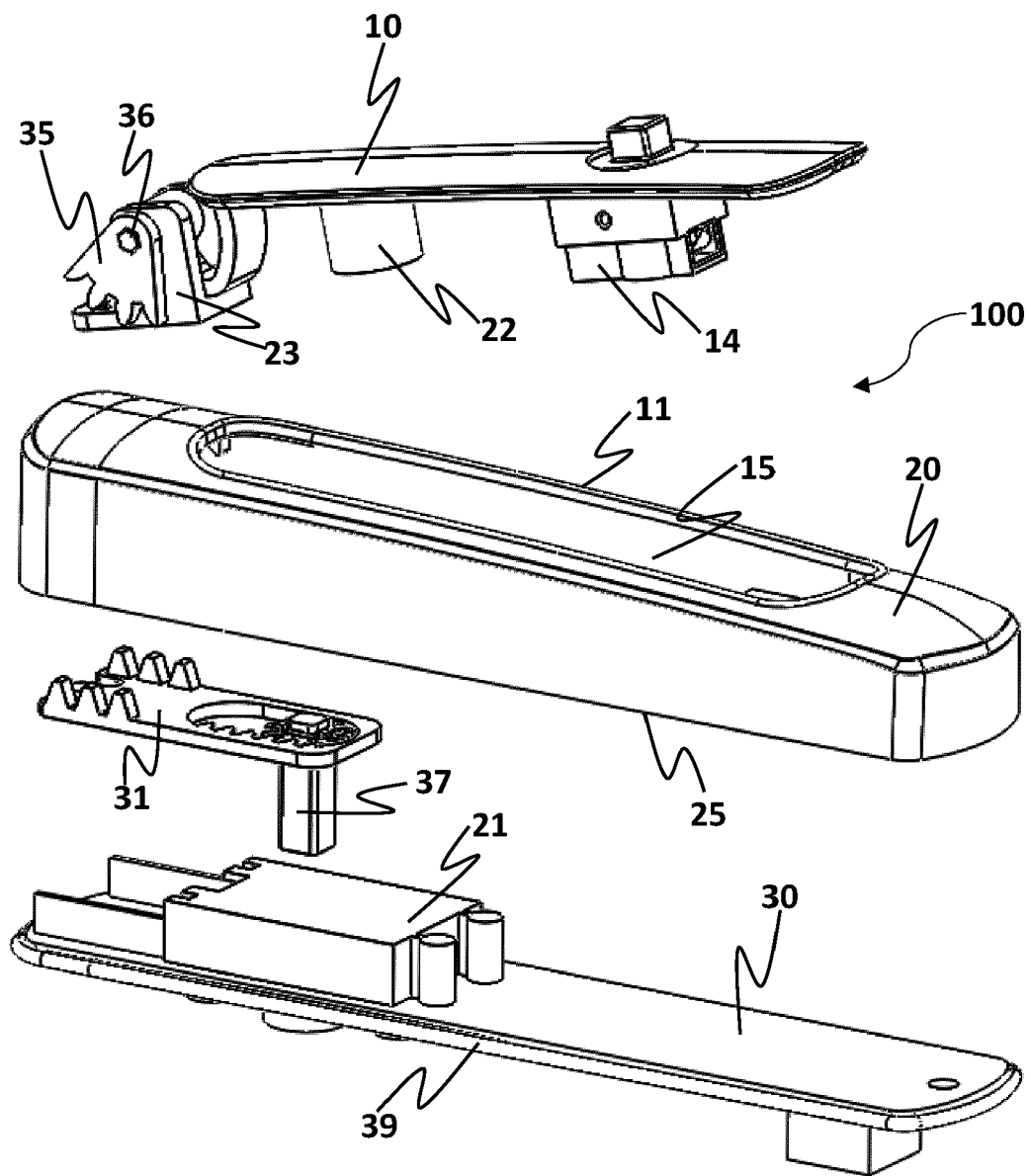


FIG. 4

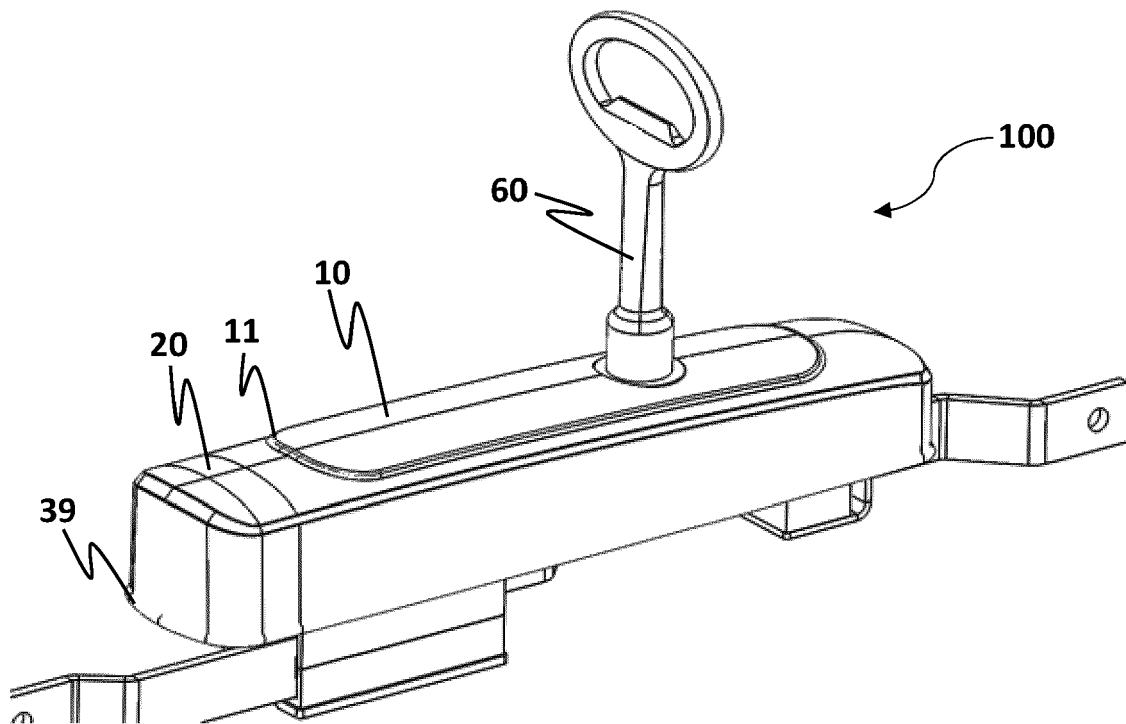


FIG. 5a

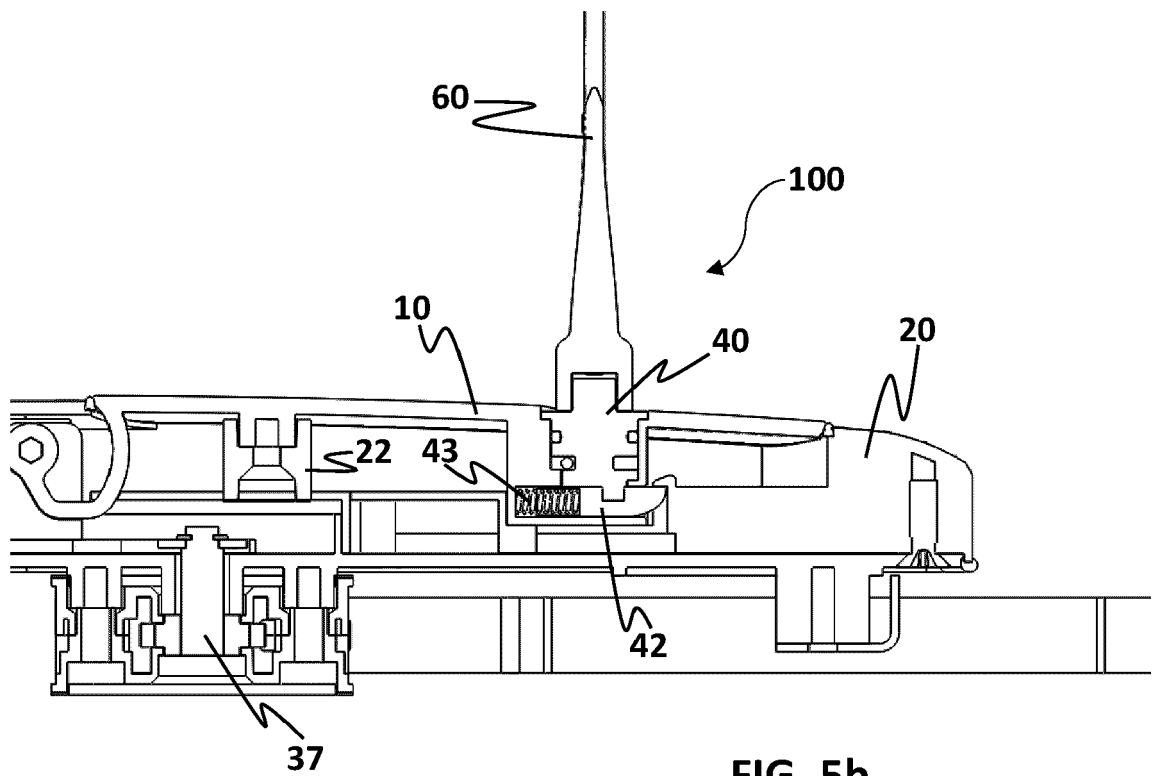


FIG. 5b

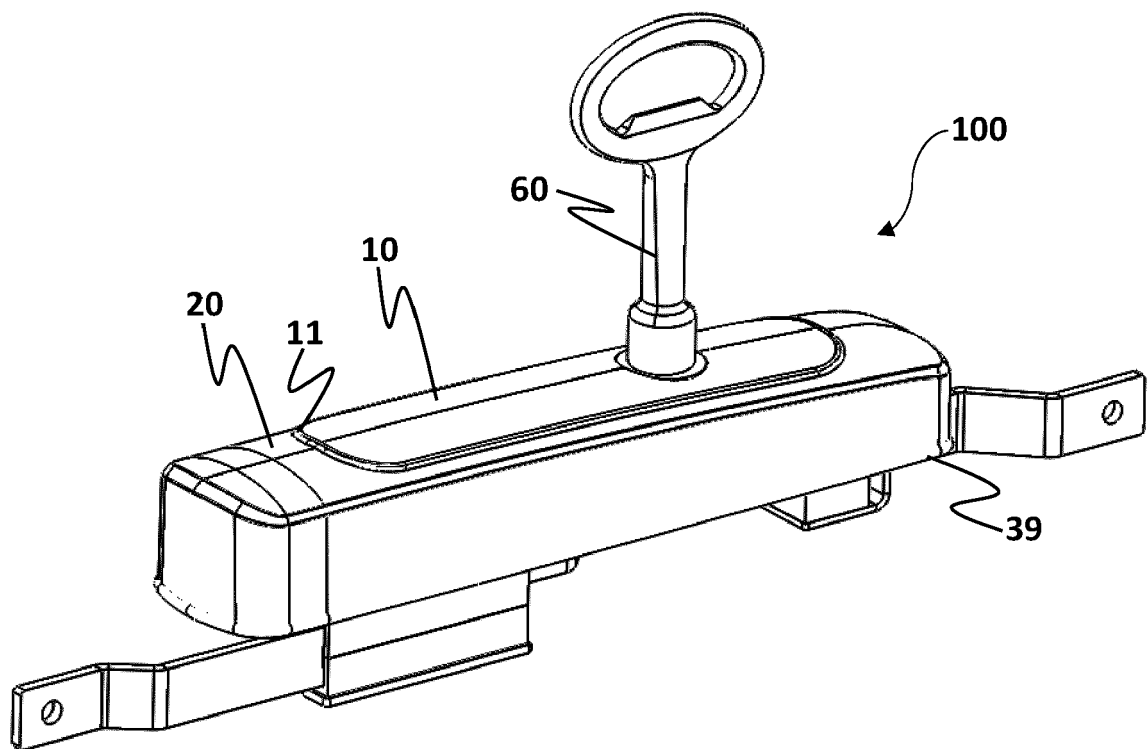


FIG. 6

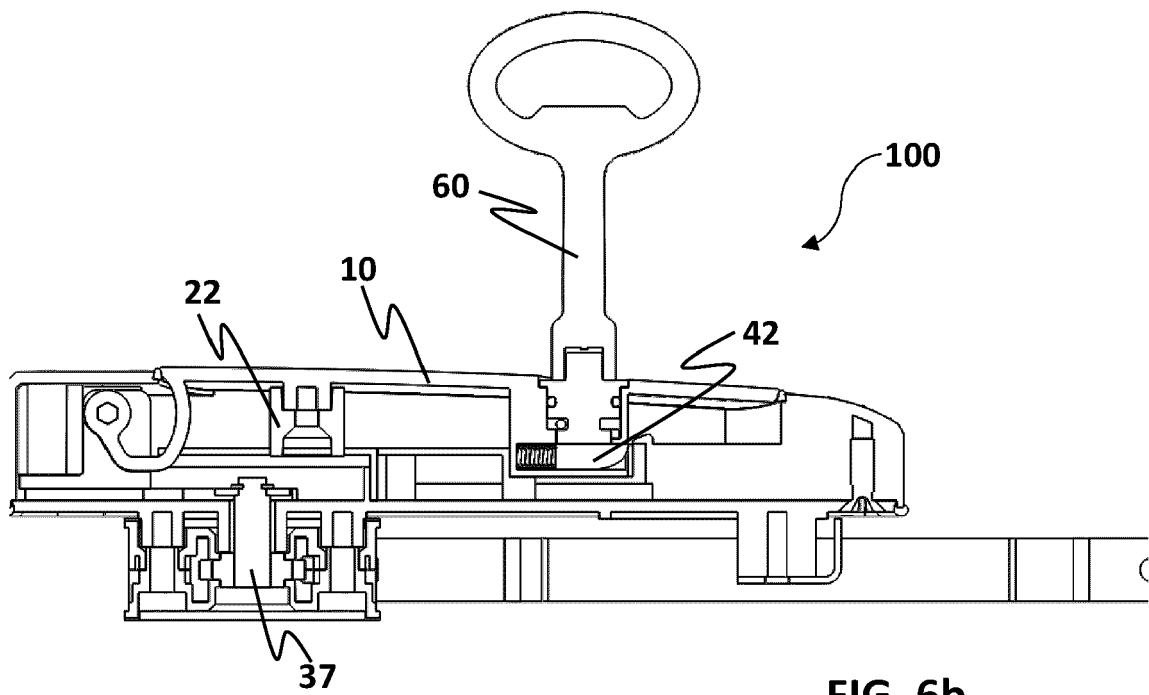


FIG. 6b

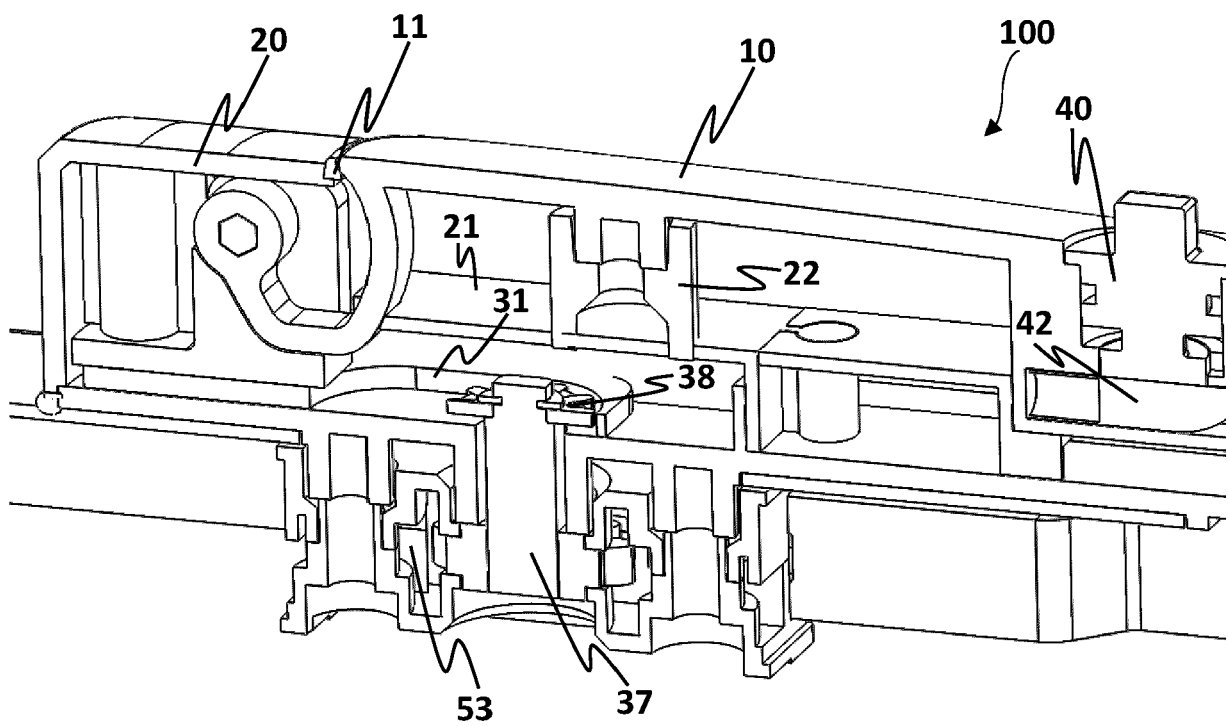


FIG. 7a

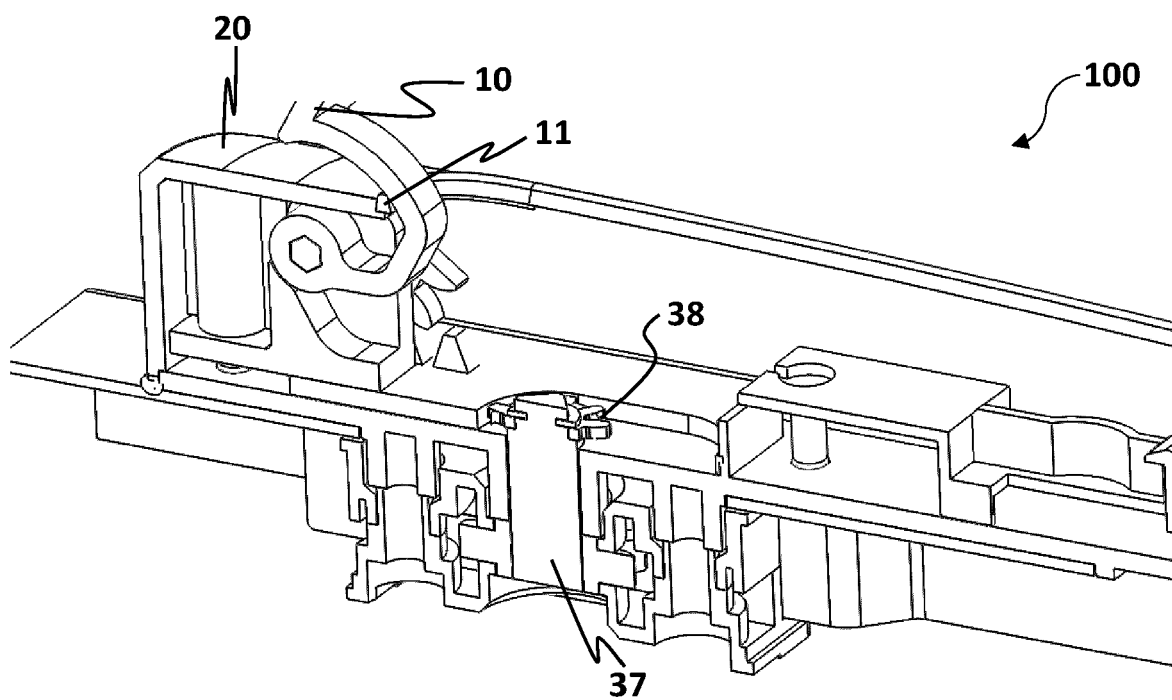


FIG. 7b

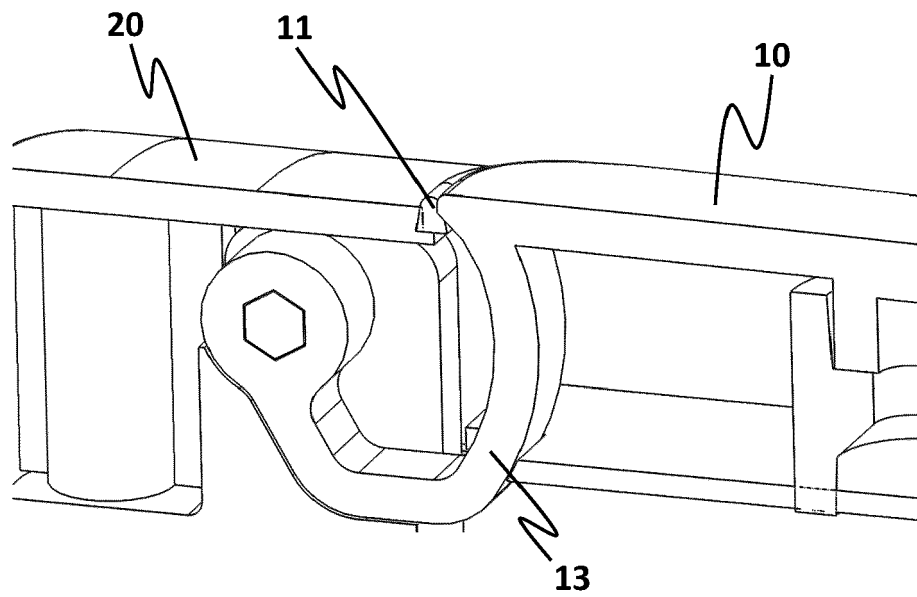


FIG. 8

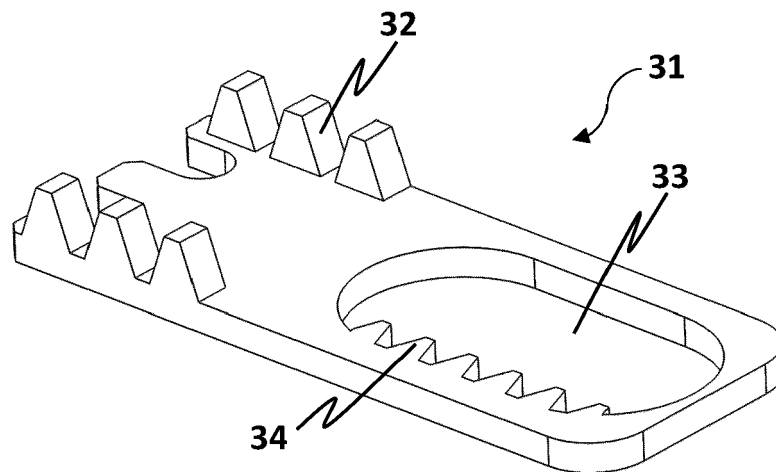


FIG. 9



EUROPEAN SEARCH REPORT

Application Number

EP 21 21 7783

DOCUMENTS CONSIDERED TO BE RELEVANT

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	TR 2019 04289 U5 (MESAN KILIT ANONIM SIRKETI [TR]) 21 October 2020 (2020-10-21)	1-3	INV. E05B13/10
A	* the whole document * -----	4-15	
X	DE 201 07 170 U1 (RAMSAUER DIETER [DE]) 29 August 2002 (2002-08-29)	1-3	
A	* page 8, line 1 - page 14; figures 1-10 * -----	4-15	
A	CN 104 005 600 A (HOSHIMOTO CO LTD) 27 August 2014 (2014-08-27) * page 3 - page 8; figures 1A-2D * -----	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			E05B E05C
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		10 June 2022	Goddar, Claudia
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EPO FORM 1503 03.82 (P04C01)

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

EP 21 21 7783

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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10-06-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
TR 201904289	U5	21-10-2020	NONE
DE 20107170	U1	29-08-2002	NONE
CN 104005600	A	27-08-2014	NONE

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 2476825 A2 [0003]