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(54) ELECTRONIC LOCK WITH HOOK COMPRISING AN IMPROVED TRIGGERING MECHANISM

(57) The present invention comprises a lock (10) comprising a main body (20) having an aperture (21) for engaging a locking tongue (50); a hook (30) for rotation within said main body (20), capable of being moved into a released position in which the tongue (50) can move in the aperture (21) and a locked position in which the tongue (50) is held in the aperture (21); a hook spring (31) associated with the hook (30), which applies force on the hook (30) in the direction of moving the hook (30) into the released position; an electric motor (40) in the main body (20) suitable to be instructed by a user; a triggering mechanism (60) actuated by the electric motor (40), which moves the hook (30) from the locked position to the released position by transmitting the movement of the electric motor (40) to the hook (30); and a switch (41) electrically coupled to the electric motor (40), having a closed position where it allows energy transmission to the electric motor (40) and an opened position where it ceases energy transmission to the electric motor (40).

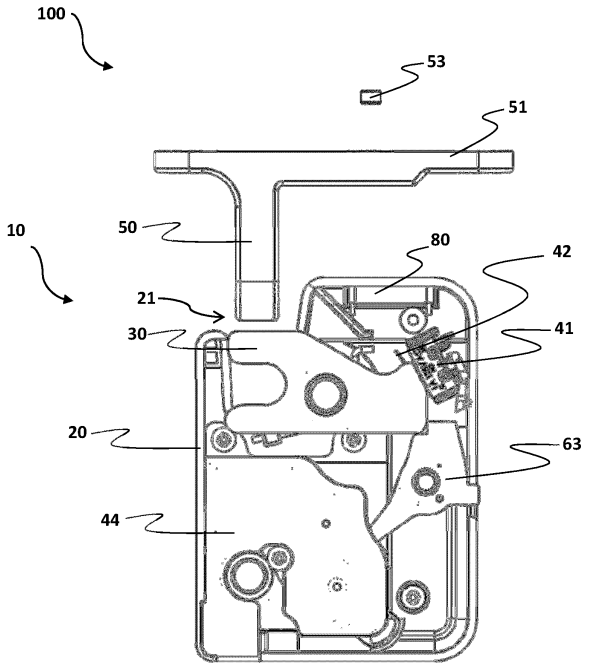

FIGURE 4

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Description

Technical Field of the Invention

[0001] The present invention relates to a lock with reduced energy consumption, suitable for use in mailboxes, cargo lockers or similar cabinet doors.

Background Art

[0002] In the prior art, mechanically-operated lock structures are widely used. Mechanical locks may be vulnerable to outside interventions, and it is also difficult to keep track of whether the lock is opened or closed.

[0003] In the current electronic locks in the art, it is common to use a microprocessor in order to ensure electronic control of the lock and to monitor the sensor status. Since the microprocessor and the peripheral elements require energy, they constantly need energy consumption. In addition, due to the fact that the torque values achieved by the internal gear mechanisms of the geared direct current motors used in many of the systems in the prior art are higher than the torque value required to trigger the electronic lock, energy consumption is also high.

[0004] A prior art publication in the technical field of the invention may be referred to as CN109113443 (A1), which discloses an electronic lock in which the movement is transferred by means of the gear structures thereon for locking and unlocking operations.

Objects of the Invention

[0005] An object of the present invention is to provide a lock with reduced energy consumption, that consumes energy only when the lock is triggered, but not when the lock is not used or during the resting period.

[0006] Another object of the present invention is to provide a lock that can be moved from a locked position to an opened position using the energy supplied from the electric motor efficiently so consuming less energy.

[0007] Another object of the present invention is to provide a lock where the information whether it is opened or locked is inferred in a cost-effective manner.

Summary of the Invention

[0008] The lock which is the subject of the present invention comprises a main body having an aperture for engaging a locking tongue; a hook for rotation within said main body, capable of being moved into a released position in which the tongue can move in the aperture and a locked position in which the tongue is held in the aperture; a hook spring associated with the hook, which applies force on the hook in the direction of moving the hook into the released position; an electric motor in the main body suitable to be instructed by a user; a triggering mechanism actuated by the electric motor, which moves the hook from the locked position to the released position by transmitting the movement of the electric motor to the hook; and a switch electrically coupled to the electric motor, having a closed position where it allows energy transmission to the electric motor and an opened position where it ceases energy transmission to the electric motor. Said lock also comprises a switch arm that is suitable to be pressed by the hook, which enables the switch to be triggered by moving the hook, when in use, from the released position to the locked position by driving it into rotation by the tongue, and complements the circuit in such a way to transmit energy to the electric motor, and a hook that allows the switch to be moved into the opened position by cutting its contact with the switch arm of the switch when it is moved from the locked position to the released position by actuating the trigger mechanism by means of the electric motor. In this way, it is ensured that the lock does not consume energy when the hook is in the released position.

[0009] In a preferred embodiment of the invention, the triggering mechanism comprises a trigger having a supporting position in which it supports the hook to remain in the locked position when the hook is in the locked position, and a tensioning position where it does not contact the hook, which is disposed in the main body to be movable between a supporting position and a tensioning position. The triggering mechanism also comprises an electric motor gear, one end of which is connected to the electric motor, a gear set connected to the electric motor gear and rotating with the electric motor gear, and a trigger gear set connected to the gear set, which moves the trigger from the supporting position to the tensioning position once the electric motor is operated while the trigger is in the supporting position.

[0010] In a preferred embodiment of the invention, the lock comprises a trigger spring that is connected to the trigger and applies force to the trigger to keep the trigger in the supporting position. In this way, it is ensured that the trigger, which is moved from the supporting position to the tensioning position by applying force thereon, is returned to the supporting position after the force applied on the trigger is terminated.

[0011] In a preferred embodiment of the invention, the trigger gear set comprises a trigger gear connected to the gear set, and a trigger protrusion located on the trigger gear, which is moved by the rotation of the trigger gear by means of the electric motor when the trigger is in the supporting position, and during this movement, pushes the trigger in order to move it from the supporting position to the tensioning position. This makes it easier to move the trigger.

[0012] In a preferred embodiment of the invention, the lock comprises a stopper located in the main body to extend towards the trigger gear set, which contacts the trigger protrusion during the movement of the trigger protrusion so as to stop the trigger protrusion. The stopper is in the form of an asymmetrical circle. In this way, a stopper is obtained which allows the trigger protrusion, which has an inclined surface and a rear surface behind

the inclined surface, to pass over its inclined surface, while preventing it from passing over the rear surface, thereby allowing it to make a full turn only in one direction.

[0013] In a preferred embodiment of the invention, the lock comprises an actuation means that is connected to the electric motor and enables the electric motor to be started by the user. The actuation means may be a button located on the main body. The actuation means can also be wirelessly coupled to the electric motor. In this way, the users can operate the electric motor via a mobile device.

[0014] In a preferred embodiment of the invention, the lock comprises a circuit board located inside the main body, which is electrically coupled to the electric motor and the switch in order to allow an electrical transmission between the electric motor and the switch. Other electronic elements in the main body can also be connected on the circuit board. In this way, it is ensured that the electronic elements are fixed in the main body and there is an electrical transmission between each other.

[0015] In a preferred embodiment of the invention, the lock comprises an electric motor cover located inside the main body, which covers the electric motor and enables the electric motor to be carried in the main body. The electric motor cover is disposed inside the main body such that it also covers the circuit board. In this way, the electric motor and the circuit board are fixed in the main body.

[0016] In a preferred embodiment of the invention, the lock comprises a main body protective member on the main body and a cover protective member on the cover. The main body protective member and the cover protective member are made of rigid materials and prevent the members inside the main body from being damaged due to external impacts.

[0017] In a preferred embodiment of the invention, the lock comprises a bearing group that enables the hook and/or trigger to be carried in the main body. The bearing group comprises a lower carrier on which the hook and/or trigger is seated, and an upper carrier that covers the hook and/or trigger. The bearing group also comprises a first connection holes formed on the lower carrier, the upper carrier and the hook, a first connection member that is passed through the first connection holes so as to allow the lower carrier, the upper carrier and the hook to be connected to each other, and a second connection holes formed on the lower carrier, the upper carrier and the trigger, a second connection member that is passed through the second connection holes so as to allow the lower carrier, the upper carrier and the trigger to be connected to each other.

[0018] In a preferred embodiment of the invention, the lock comprises a magnetic sensor located in the main body, close to the aperture where the tongue is placed.

[0019] In a preferred embodiment of the invention, the locking unit has a lock and a latch unit containing a tongue suitable for triggering this lock. There is a magnetic member on said latch unit. The magnetic member is a magnet. The magnetic sensor is placed inside the main body in such a way to be opposite to the magnetic member, while the hook is in the locking position where the tongue is kept in the aperture and thus the latch unit is locked on the main body.

[0020] In a preferred embodiment of the invention, the latch unit has a T-shape. It includes a tongue opening on the tongue suitable for inserting and removing the hook.

Brief Description of the Drawings

[0021] The lock 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 a schematic view of a lock and a latch unit in a first embodiment of the present invention, with the hook being in the released position.

Figure 2 is a schematic view of the lock and the latch unit in the first embodiment of the present invention, with the hook being the locked position.

Figure 3 is an exploded view of the lock and the latch unit in the first embodiment of the present invention.

Figure 4 is a schematic view of the lock and the latch unit in the first embodiment of the present invention, with the cover being removed to expose the inner mechanism.

Figure 5 is a schematic view of the lock in the first embodiment of the present invention, showing the released position of the hook with the cover removed.

Figure 6 is a schematic view of the lock illustrated in Fig. 5 with the electric motor cover removed.

Figure 7 is a schematic view of the lock in the first embodiment of the present invention, with the hook therein being in the locked position.

Figure 8 is a perspective view of the lock and the latch unit in the first embodiment of the present invention, with the hook being in the released position.

Figure 9 is a schematic view of the lock in the first embodiment of the present invention, with the hook being in the released position.

Figure 10 is a perspective view of the lock and the latch unit in a second embodiment of the present invention.

Figure 11 is an exploded view of the lock in the sec-

ond embodiment of the present invention.

Figure 12 is a schematic view of the lock and the latch unit in the second embodiment according to the present invention, with the hook being in the released position.

Figure 13 is a perspective view of the lock in the third embodiment of the present invention, with the hook being the locked position.

Figure 14 is a perspective view of the lock in the third embodiment of the present invention, with the hook being the released position.

Figure 15 is a schematic view of the lock in the third embodiment of the present invention, showing the locked position of the hook with the cover removed.

Figure 16 is a schematic view of the lock in the third embodiment of the present invention, showing the released position of the hook with the cover removed.

Figure 17 is a perspective view of the lock in the third embodiment of the present invention, showing the released position of the hook with the cover removed.

Figure 18 a perspective view of the lock in the third embodiment of the present invention.

Detailed Description of the Invention

[0022] According to the present invention, the lock (10) comprises a main body (20) with an aperture (21) suitable for engaging a locking tongue (50) when in use; a hook (30) suitable for rotation within said main body (20), capable of being moved into a released position in which the tongue (50) can move in the aperture (21) and a locked position in which the tongue (50) is held in the aperture (21); a hook spring (31) associated with the hook (30), which applies force on the hook (30) in the direction of moving the hook (30) into the released position; an electric motor (40) in the main body (20) suitable to be instructed by a user; a triggering mechanism (60) actuated by the electric motor (40), which moves the hook (30) from the locked position to the released position by transmitting the movement of the electric motor (40) to the hook (30); and a switch (41) electrically coupled to the electric motor (40), having a closed position where it allows energy transmission to the electric motor (40) and an opened position where it ceases energy transmission to the electric motor (40). The electric motor (40) is a 5V micro direct current electric motor. Figure 1 shows a schematic view of the lock when the hook (30) is in the released position. The hook (30) is moved from the released position to the locked position by being rotated by the tongue (50) while the tongue (50) is engaged into the aperture (21). The hook (30) is moved from the released position to the locked position only by the mechanical force applied by the user. While the hook (30) is moved from the released position to the locked position, no power is consumed by the electric motor (40).

[0023] A first embodiment of the present invention is given in Figs. 1-9. Figs. 10-12 illustrates a second embodiment of the present invention and a third embodiment of the present invention is given in Figs. 13-18. The lock (10) of the second embodiment includes parts smaller than the lock (10) of the first embodiment. The lock (10) of the second embodiment is highly functional for locking in a small area.

[0024] A third embodiment of the present invention is given in Figs. 13-18. As can be seen in Figs 13 and 14, the cover protective member (24) in the third embodiment is bigger than the other two embodiments. Thus, mechanical endurance of the main body (20) is enhanced. Third embodiment of the present invention comprises a rotation limiting member (97) which limits the rotation of the hook (30). Third embodiment of the present invention also comprises a cable holder (98) which is provided in the main body (20) for organizing the cable layout of the lock (10). The trigger (63) which is used in the third embodiment is located in the main body (20) differently from other two embodiments. The trigger (63) in the third embodiment has also a contacting surface (69) which contacts the switch arm (42) when the trigger (63) is moved from the supporting position to the tensioning position.

[0025] Figure 2 shows a schematic view of the lock (10) when the hook (30) is in the locked position. When the hook (30) is to be moved from the locked position to the released position, the electric motor (40) is operated by the user. The triggering mechanism (60) transmits the movement of the electric motor (40) to the hook (30) and enables the hook (30) to be moved from the locked position to the released position. The lock (10) which is the subject of the invention also comprises a switch arm (42) that can be pressed by the hook (30), which enables the switch (41) to be triggered by moving said lock (10) from the released position to the locked position by driving the hook (30), when in use, into rotation by the tongue (50), and complements the circuit in such a way to transmit energy to the electric motor (40), and a hook (30) that allows the switch (41) to be moved into the opened position by cutting off its contact with the switch arm (42) of the switch (41) when it is moved from the locked position to the released position by actuating the triggering mechanism (60) by means of the electric motor (40). When the hook (30) is in the locked position, it contacts the switch arm (42) and ensures that the switch (41) is in the closed position. When the switch (41) is in the closed position, the circuit is completed and energy is transmitted to the electric motor (40). The hook (30) does not press on the switch arm (42) in the released position. In this case, the switch (41) moves into opened position and energy transmission to the electric motor (40) is in-

terrupted. In this way, it is ensured that the lock (10) does not consume energy when it is not in use.

[0026] The triggering mechanism (60) presented within the scope of the present invention comprises a trigger (63) having a supporting position in which it supports to the hook (30) to remain in the locked position when the hook (30) is in the locked position, and a tensioning position where it does not contact the hook (30), which is disposed in the main body (20) to be movable between a supporting position and a tensioning position. The hook spring (31) applies a continuous force on the hook (30) in the direction of moving the hook (30) from the locked position to the released position. When the trigger (63) is in the supporting position, the force applied by the hook spring (31) is countered by the trigger (63) and the hook (30) is kept in the locked position. In Figure 7, the hook (30) is in the locked position and the trigger (63) is in the supporting position. When the trigger (63) is in the supporting position, it supports the hook (30) to keep the hook (30) in the locked position. As a result of the force applied on the trigger (63), the trigger (63) can be moved from the supporting position to the tensioning position. When the trigger (63) is moved into the tensioning position, it does not come into contact with the hook (30). When the hook (30) is not supported by the trigger (63), it moves from the locked position to the released position as a result of the force applied by the hook spring (31). In Figure 6, the hook (30) is in the released position and the trigger (63) is in the tensioning position. Thanks to the triggering mechanism (60), the force resulting from the operation of the electric motor (40) only for 0.2 ms is efficiently transmitted to the hook (30) and thus the hook (30) is moved from the locked position to the released position.

[0027] As can be seen in Figs. 4 and 5, the triggering mechanism (60) comprises an electric motor gear (61), one end of which is connected to the electric motor (40), a gear set (62) connected to the electric motor gear (61) and rotating with the electric motor gear (61), and a trigger gear set (64) connected to the gear set (62), which moves the trigger (63) in order to bring the trigger (63) from the supporting position to the tensioning position once the electric motor (40) is operated while the trigger (63) is in the supporting position. The electric motor gear (61) rotates with the power received from the electric motor (40). In a preferred version of the invention, the electric motor gear (61) is a worm gear. The gear set (62) is connected to the electric motor gear (61). The gear set (62) may include one or more gears. The trigger gear set (64) is connected to the gear set (62). The trigger (63) extends within the main body (20) towards the trigger gear set (64). When the trigger gear set (64) is rotated while the trigger (63) is in the supporting position, it pushes the trigger (63) to move the trigger (63) from the supporting position to the tensioning position. In this way, the force from the electric motor (40) is transmitted to the trigger (63).

[0028] The trigger gear set (64) comprises a trigger gear (66) connected to the gear set (62), and a trigger protrusion (67) located on the trigger gear (66), which is moved by the rotation of the trigger gear (66) by the electric motor (40) when the trigger (63) is in the supporting position, and during this movement, pushes the trigger (63) to move the trigger (63) from the supporting position to the tensioning position.

[0029] As can be seen in Figs. 3 and 11, the lock (10) comprises a trigger spring (65), which is connected to the trigger (63) and applies force to the trigger (63) in the direction of moving the trigger (63) to the supporting position when the trigger (63) is in the tensioning position. The trigger spring (65) is located in the main body (20). The trigger spring (65) ensures that the trigger (63), which is moved from the supporting position to the tensioning position by applying force thereon, is returned to the supporting position after the force applied on the trigger (63) is terminated.

[0030] In an embodiment of the present invention, the lock (10) comprises a sitting surface (68) on the trigger (63) on which the hook (30) sits when the hook (30) is in the locked position and the trigger (63) is in the supporting position. The sitting surface (68) is formed on the trigger (63) in the form of a recess. The hook (30) comprises an engagement protrusion (32) overlapping with the sitting surface (68) when the trigger (63) is moved to the supporting position by placing it on the sitting surface (68). On one side of the sitting surface (68), which is in the form of a recess, there is an elevation on which the engagement protrusion (32) rests when the trigger (63) is in the supporting position. On the other side of the sitting surface (68), there is no elevation so that the trigger (63) can be easily moved from the supporting position to the tensioning position. In this way, insertion and removal of the engagement protrusion (32) on the sitting surface (68) is facilitated.

[0031] In an embodiment of the present invention, the lock (10) comprises a stopper (70) located in the main body (20) to extend towards the trigger gear set (64), which contacts the trigger protrusion (67) during the movement of the trigger protrusion (67) so as to stop the trigger protrusion (67). When the electric motor (40) is started by the user while the hook (30) is in the locked position, the trigger gear set (64) is rotated. The trigger (63) pushed by the trigger protrusion (67) is moved from the supporting position to the tensioning position, and thus the hook (30) moves from the locked position to the released position. When the hook (30) is moved to the released position, its contact with the switch arm (42) is terminated and the switch (41) takes the opened position and cuts off the energy transmission to the electric motor (40). After the energy transmission to the electric motor (40) is interrupted, the gear set (62) and the trigger gear set (64) continue to rotate for a while. In order to stop the trigger gear set (64), which continues to rotate, there is a stopper (70) extending towards the trigger protrusion (67) inside the main body (2). In this way, it is ensured that the trigger protrusion (67) is always stopped at the

same place. In addition, the elements in the electric motor gear (61), gear set (62) and trigger gear (64) set are prevented from rotating and eroding each other unnecessarily.

[0032] As can be seen in Fig. 9, the trigger protrusion (67) has an inclined surface and a rear surface behind the inclined surface. In a preferred version of the invention, the rear surface is in the form of a flat extension. The stopper (70) is in the form of an asymmetrical circle, which allows the trigger protrusion (67) to pass over the inclined surface while preventing it from passing over the rear surface. Thus, it is ensured that the trigger protrusion (67) makes a full turn only in one direction.

[0033] In an embodiment of the present invention, the lock (10) comprises an actuation means that is connected to the electric motor (40) and enables the electric motor (40) to be operated by the user.

[0034] In an embodiment of the present invention, the lock (10) comprises a circuit board (43) located in the main body (20), which provides electrical transmission between the electric motor (40) and the switch (41) by being electrically coupled to the electric motor (40) and the switch (41). In this way, the electrical connection between the electric motor (40) and the switch (41) is provided.

[0035] As can be seen in Figs. 4 and 5, it comprises an electric motor cover (44) located inside the main body (20), which covers the electric motor (40) and enables the electric motor (40) to be carried in the main body (20). In this way, the electric motor (40) is fixed in the main body.

[0036] As can be seen in Fig. 3, the lock (10) comprises a main body protective member (22) located on the main body (20). The main body protective member (22) is made from a metal material. In this way, the resistance of the main body (20) against impacts that may come from the outside is increased.

[0037] In Figs. 3 and 8, the lock (10) comprises a cover (23) that almost completely covers one face of the main body (20) and a cover protective member (24) located on the cover (23).

[0038] The cover protective member (24) is made from a metal material. In this way, the durability of the cover (23) is increased.

[0039] As can be seen in Fig. 11, the lock (10) of the second embodiment, comprises a bearing group (90) enabling the hook (30) and/or the trigger (63) to be carried in the main body (20). The bearing group (90) comprises a lower carrier (91) on which the hook (30) and/or the trigger (63) is seated, and an upper carrier (92) that covers the hook (30) and/or the trigger (63). By means of a first connection holes (93) formed on the lower carrier (91), the upper carrier (92) and the hook (30), and a first connection member (94) that is passed through the first connection holes (93) in order to connect the lower carrier (91), the upper carrier (92) and the hook (30) to each other, the hook (30) is rotatably carried in the main body (20). After the first connection holes (93) are aligned, a first connection member (94) is passed through the first connection holes (93). The first connection member (94) is a rivet. By means of a second connection holes (95) formed on the lower carrier (91), the upper carrier (92) and the trigger (63), and a second connection member (96) that is passed through the second connection holes (95) in order to connect the lower carrier (91), the upper carrier (92) and the trigger (63) to each other, the trigger (63) is rotatably carried in the main body (20). The second connection member (96) is a rivet.

[0040] In an embodiment of the present invention, the locking unit (100) comprises the lock (10) and the latch unit (51) with a tongue (50) suitable for triggering the lock (10). The lock (10) includes a magnetic sensor (80) located in the main body (20) such that it is close to the aperture (21) where the tongue (50) is located. As can be seen in Fig. 6, a magnetic member (53) is located on said latch unit (51). In this way, when the latch unit (51) is locked on the lock (10), a magnetic field is created between the lock (10) and the magnetic member (53), due to the magnetic member (53). By positioning the magnetic sensor (80) in proximity to the aperture (21), the magnetic field created can be detected by the magnetic sensor (80). Thus, it is possible to determine whether the latch unit (51) remains on the lock (10) in a locked position.

[0041] As can be seen in Fig. 12, when the locking unit (100) comprises a magnetic sensor (80) located inside the main body (20) so as to be opposite to the magnetic member (53) when said hook (30) is in the locking position where said tongue (50) is held in the aperture (21) and thus the latch unit (51) is locked on the main body (20). In this way, it is easier for the magnetic sensor (80) to detect the magnetic field created between the magnetic member (53) and the lock (10).

[0042] Referring to Fig. 12, the latch unit (51) is T-shaped. In a preferred version of the invention, the latch unit (51) has an asymmetrical T-shape. As can be seen in Fig. 10, the latch unit (51) includes a tongue opening (52) located on the tongue (50) suitable for inserting and removing the hook (30). In this way, it is easier for the hook (30) to grasp the tongue (50).

[0043] Referring to Fig. 15 - 17, the lock (10) comprises a rotation limiting member (97) which limits the rotation of the hook (30) when the hook (30) is forced to rotate towards the switch (41). As can be seen in Fig. 15, the hook (30) presses the switch arm (42) in order to complete the circuit when the hook (30) is at the locked position. The rotation limiting member (97) limits the rotation of the hook (30) when the user pushed the hook (30) towards switch (41) accidentally or incidentally when the hook (30) is at the locked position. Thus, the switch (41) and the switch arm (42) are prevented from damaging by the hook (30). The rotation limiting member (97) is in the form of a rivet. Moreover, the rotation limiting member (97) is used for mounting the cover (23) on the main body (20).

[0044] Referring to Fig. 15-17, the trigger (63) has a

contacting surface (69) which contacts with the switch arm (42) at least one time while the trigger (63) is being moved from the supporting position to the tensioning position. As can be seen in Fig. 17, when the trigger (63) is moved from the supporting position to the tensioning position, the hook (30) is moved to releasing position. When the hook (30) is moved to released position, the switch arm (42) is not pressed. Therefore, the switch (41) is moved to the opened position. When the switch (41) is moved to opened position, the electric motor (40) is powered off. In this case, the trigger protrusion (67) cannot get rid of the trigger (63) as the trigger protrusion (67) is not moved by the trigger gear set (64). Since the trigger (63) has a contacting surface (69) which contacts with the switch arm (42) at least one time while the trigger (63) is being moved from the supporting position to the tensioning position, the switch arm (42) is pressed for another while. Thus, the trigger protrusion (67) is moved by the trigger gear set (64) until the trigger (63) is moved to tensioning position and the trigger protrusion (67) gets rid of the trigger (64).

[0045] Referring to Fig. 18, the lock (10) comprises a cable housing (25) in the form of a hollow box which is suitable for passing a cable through for moving the trigger (63) from outside of the main body (20). The cable is passed through the cable housing (25). As can be seen in Fig. 18, the cable housing (25) is provided on the main body (20) so as to be in the vicinity of the trigger (63). According to the preferred embodiment of the invention, the trigger (63) is moved between the supporting position and the tensioning position by the cable which is moved by the user. Thus, the user may move the trigger (63) manually from outside of the main body (20).

[0046] 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. Lock
20. Main Body
21. Aperture
22. Main body protective member
23. Cover
24. Cover protective member
25. Cable housing
30. Hook
31. Hook spring
32. Engagement protrusion
40. Electric motor
41. Switch
42. Switch arm
43. Circuit board
44. Electric motor cover
50. Tongue
51. Latch unit
52. Tongue opening
53. Magnetic member
60. Triggering mechanism
61. Electric motor gear
62. Gear set
63. Trigger
64. Trigger gear set
65. Trigger spring
66. Trigger gear
67. Trigger protrusion
68. Sitting surface
69. Contacting surface
70. Stopper
80. Magnetic sensor
90. Bearing group
91. Lower carrier
92. Upper carrier
93. First connection holes
94. First connection member
95. Second connection holes
96. Second connection member
97. Rotation limiting member
100. Locking unit

Claims

1. A lock (10) comprising:

a main body (20) having an aperture (21) for engaging a locking tongue (50);
a hook (30) for rotation within said main body (20), capable of being moved into a released position in which the tongue (50) can move in the aperture (21) and a locked position in which the tongue (50) is held in the aperture (21);
a hook spring (31) associated with the hook (30), which applies force on the hook (30) in the direction of moving the hook (30) into the released position;
an electric motor (40) in the main body (20) suitable to be instructed by a user;
a triggering mechanism (60) actuated by the electric motor (40), which moves the hook (30) from the locked position to the released position by transmitting the movement of the electric motor (40) to the hook (30); and
a switch (41) electrically coupled to the electric motor (40), having a closed position where it allows energy transmission to the electric motor (40) and an opened position where it ceases energy transmission to the electric motor (40), **characterized in that** the lock (10) further comprises:

a switch arm (42) of the switch (41) that is suitable to be pressed by the hook (30), which enables the switch (41) to be triggered by moving the hook (30) from the released position to the locked position by driving it into rotation by the tongue (50),

and complements the circuit in such a way to transmit energy to the electric motor (40); and

a hook (30) arranged to be movable from the locked position to the released position by actuating the triggering mechanism (60) by means of the electric motor (40) and that enables the switch (41) to be moved to the opened position by cutting off its contact with the switch arm (42) that the hook (30) keeps in the closed position.

2. A lock (10) according to claim 1, wherein the triggering mechanism (60) comprises a trigger (63) having a supporting position in which it supports to the hook (30) to remain in the locked position when the hook (30) is in the locked position, and a tensioning position where it does not contact the hook (30), which is disposed in the main body (20) to be movable between a supporting position and a tensioning position.

3. A lock (10) according to claim 2, wherein the triggering mechanism (60) comprises an electric motor gear (61), one end of which is connected to the electric motor (40), a gear set (62) connected to the electric motor gear (61) and rotating with the electric motor gear (61), and a trigger gear set (64) connected to the gear set (62), which moves the trigger (63) in order to bring the trigger (63) from the supporting position to the tensioning position once the electric motor (40) is operated while the trigger (63) is in the supporting position.

4. A lock (10) according to claim 2 or 3, wherein the lock (10) comprises a trigger spring (65) which is connected to the trigger (63) and applies force to the trigger (63) in the direction of moving the trigger (63) to the supporting position when the trigger (63) is in the opened position.

5. A lock (10) according to any of the claims 2 to 4, wherein the lock (10) comprises a sitting surface (68) formed in the form of a recess on said trigger (63), and an engagement protrusion (32) located on the hook (30), which overlaps with the sitting surface (68) when the hook (30) is disposed on the sitting surface (68) and the trigger (63) is moved to the supporting position.

6. A lock (10) according to any one of claims 2 to 5, wherein the lock (10) comprises a trigger gear set (64) including a trigger gear (66) connected to the gear set (62), and a trigger protrusion (67) located on the trigger gear (66), which is moved by the rotation of the trigger gear (66) by means of the electric motor (40) when the trigger (63) is in the supporting position, and during this movement, pushes the trigger (63) to move the trigger (63) from the supporting position to the tensioning position.

7. A lock (10) according to claim 6, wherein the lock (10) comprises a stopper (70) located in the main body (20) to extend towards the trigger gear set (64), which contacts the trigger protrusion (67) during the movement of the trigger protrusion (67) so as to stop the trigger protrusion (67).

8. A lock (10) according to claim 6 or 7, wherein the lock (10) comprises a trigger protrusion (67) with an inclined surface and a rear surface behind the inclined surface, and a stopper (70) in the form of an asymmetrical circle, which allows the trigger protrusion (67) to pass over its inclined surface, while preventing it from passing over the rear surface, thereby allowing the trigger protrusion (67) to make a full turn only in one direction.

9. A lock (10) according to any one of the preceding claims, wherein the lock (10) comprises a circuit board (43) located in the main body (20), which provides electrical transmission between the electric motor (40) and the switch (41) by being electrically coupled to the electric motor (40) and the switch (41).

10. A lock (10) according to any one of claim 2 to 9, wherein the lock (10) comprises a bearing group (90) that enables said hook (30) and/or trigger (63) to be carried in the main body (20).

11. A lock (10) according to claim 10, wherein said bearing group (90) comprises a lower carrier (91) on which the hook (30) and/or the trigger (63) is seated, and an upper carrier (92) that covers the hook (30) and/or the trigger (63).

12. A lock (10) according to any one of the preceding claims, wherein the lock (10) comprises a rotation limiting member (97) arranged to limit the rotation of the hook (30) when the hook (30) is forced to rotate towards the switch (41) by the user.

13. A lock (10) according to any one of the preceding claims, wherein the trigger (63) has a contacting surface (69) which contacts with the switch arm (42) at least one time while the trigger (63) is being moved from the supporting position to the tensioning position.

14. A lock (10) according to any one of the preceding claims, wherein the lock (10) comprises a cable housing (25) in the form of a hollow box for allowing a cable pass through for moving the trigger (63) from outside of the main body (20).

15. A lock (10) according to any one of the preceding

claims, wherein the lock (10) comprises a magnetic sensor (80) located in the main body (20) such that it is close to the aperture (21) where the tongue (50) is located.

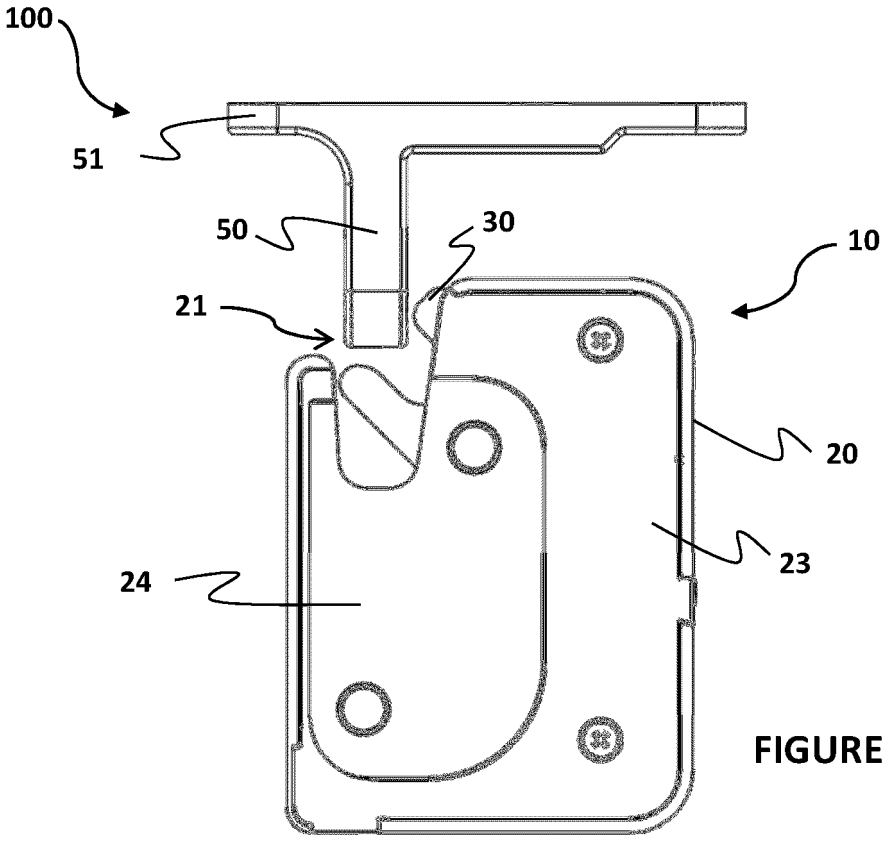

FIGURE 1

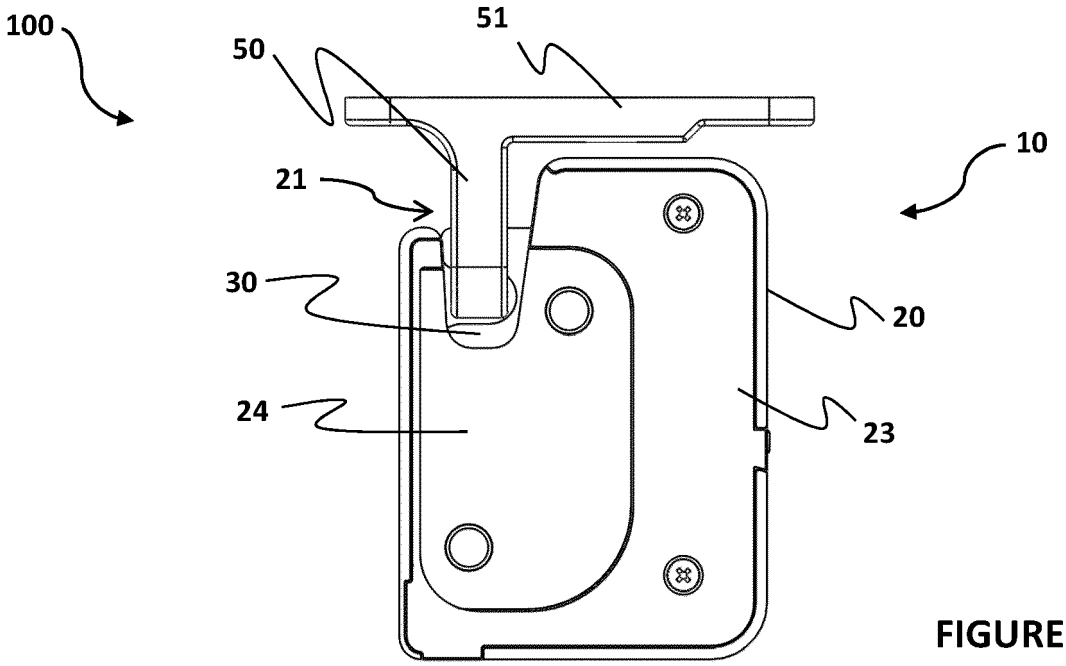

FIGURE 2

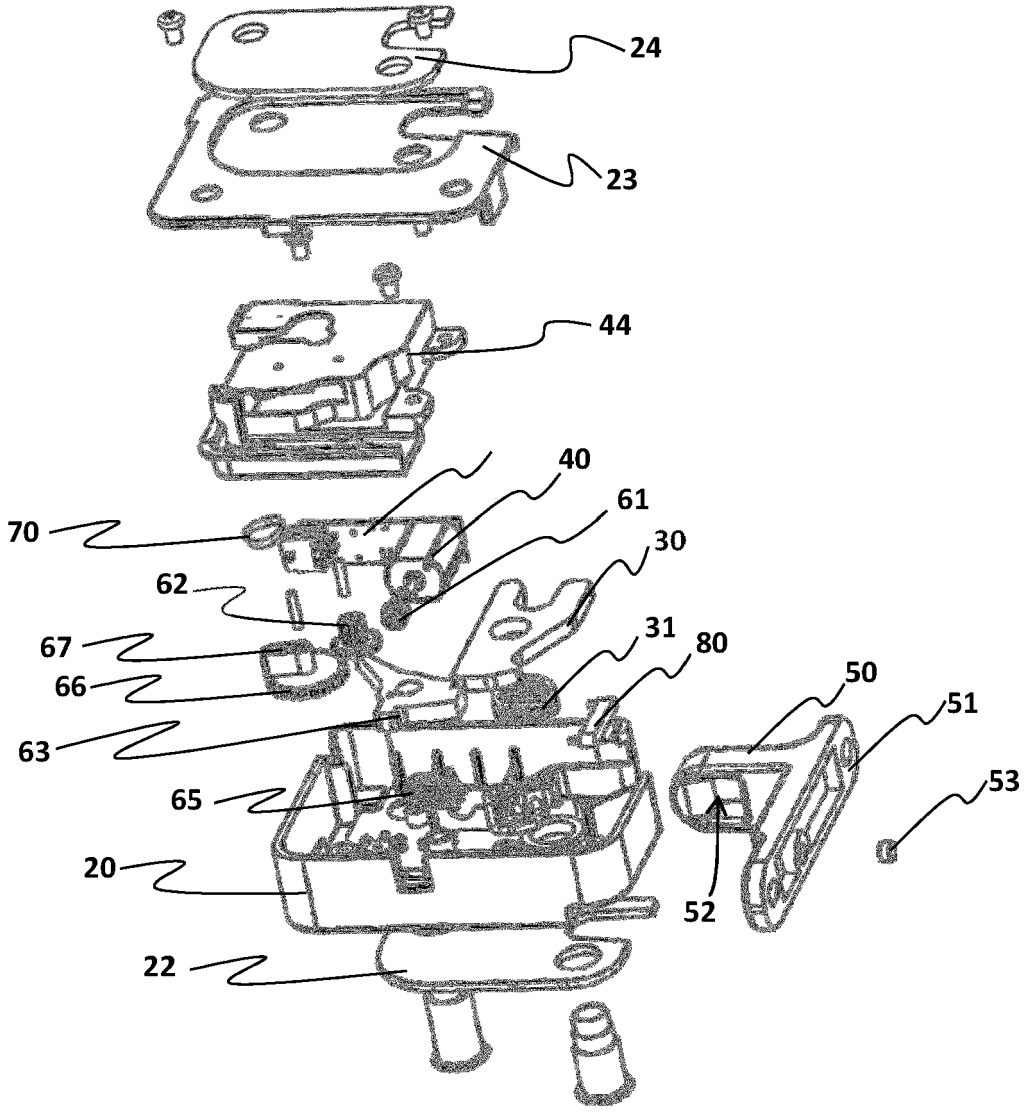

FIGURE 3

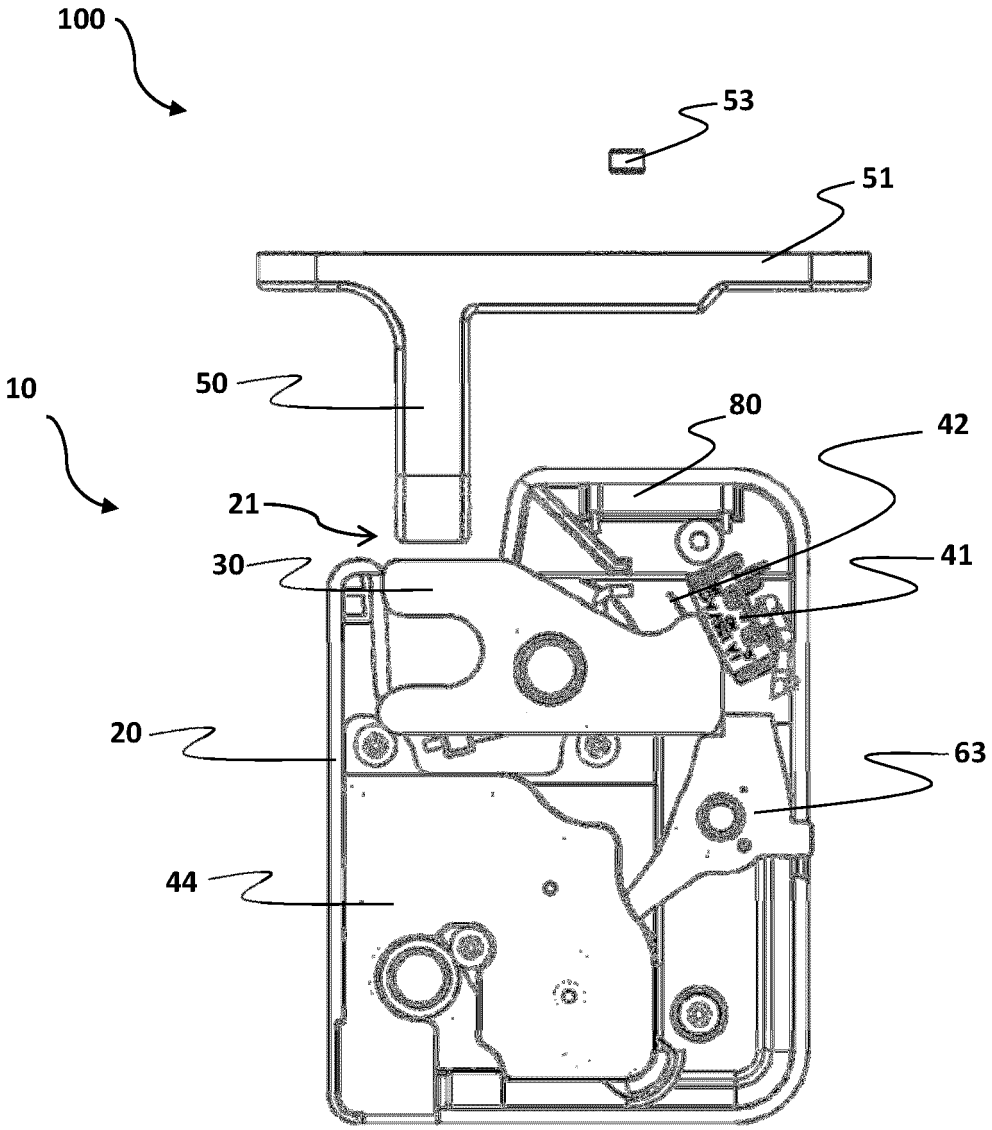

FIGURE 4

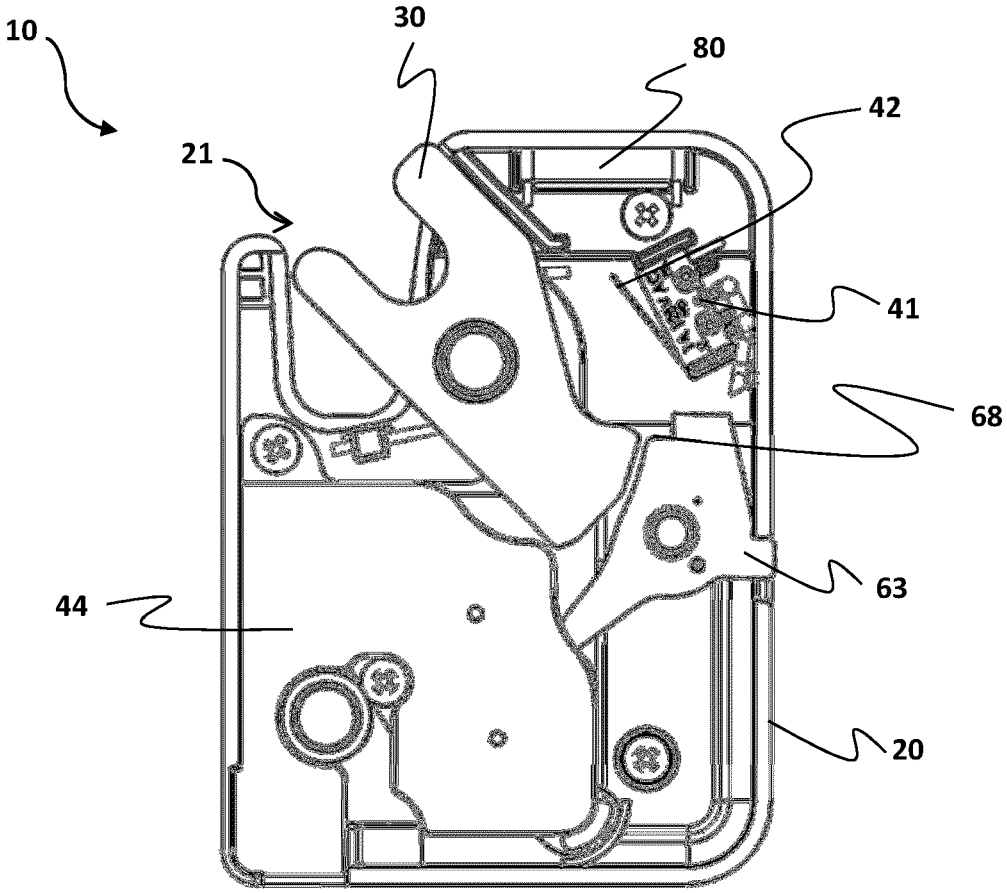

FIGURE 5

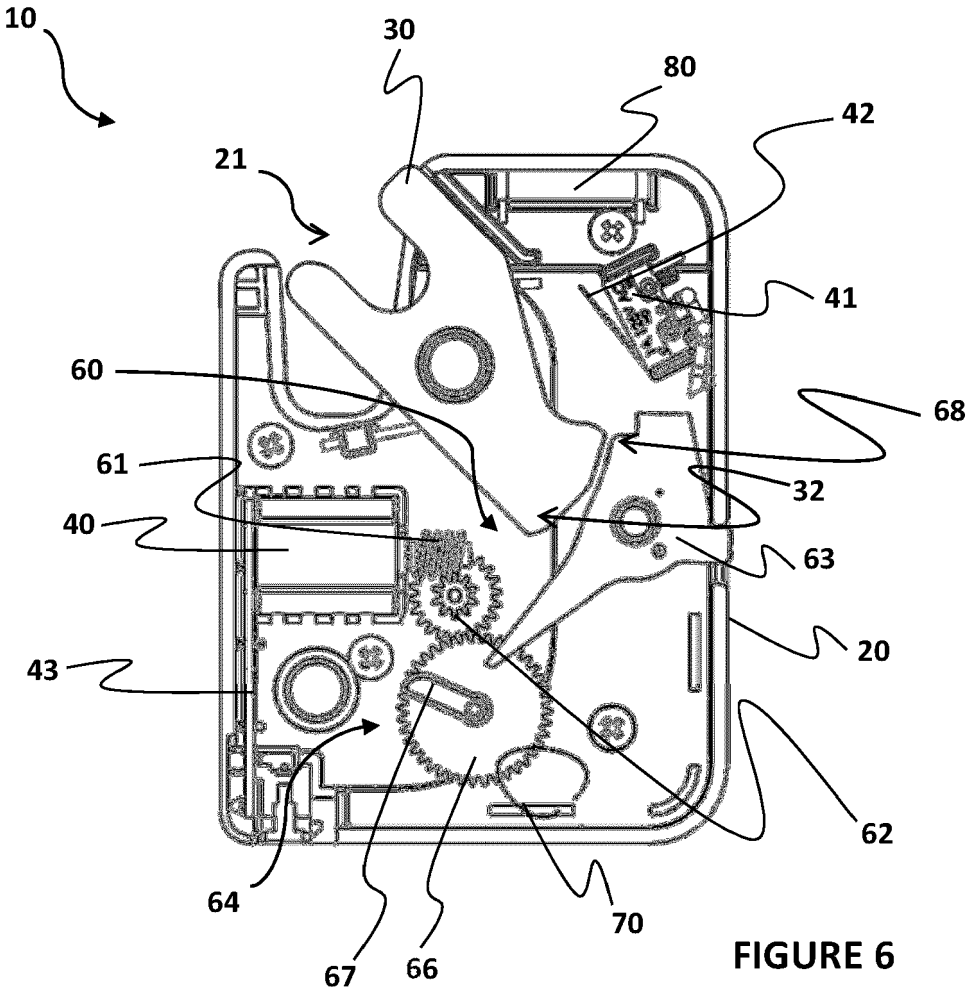

FIGURE 6

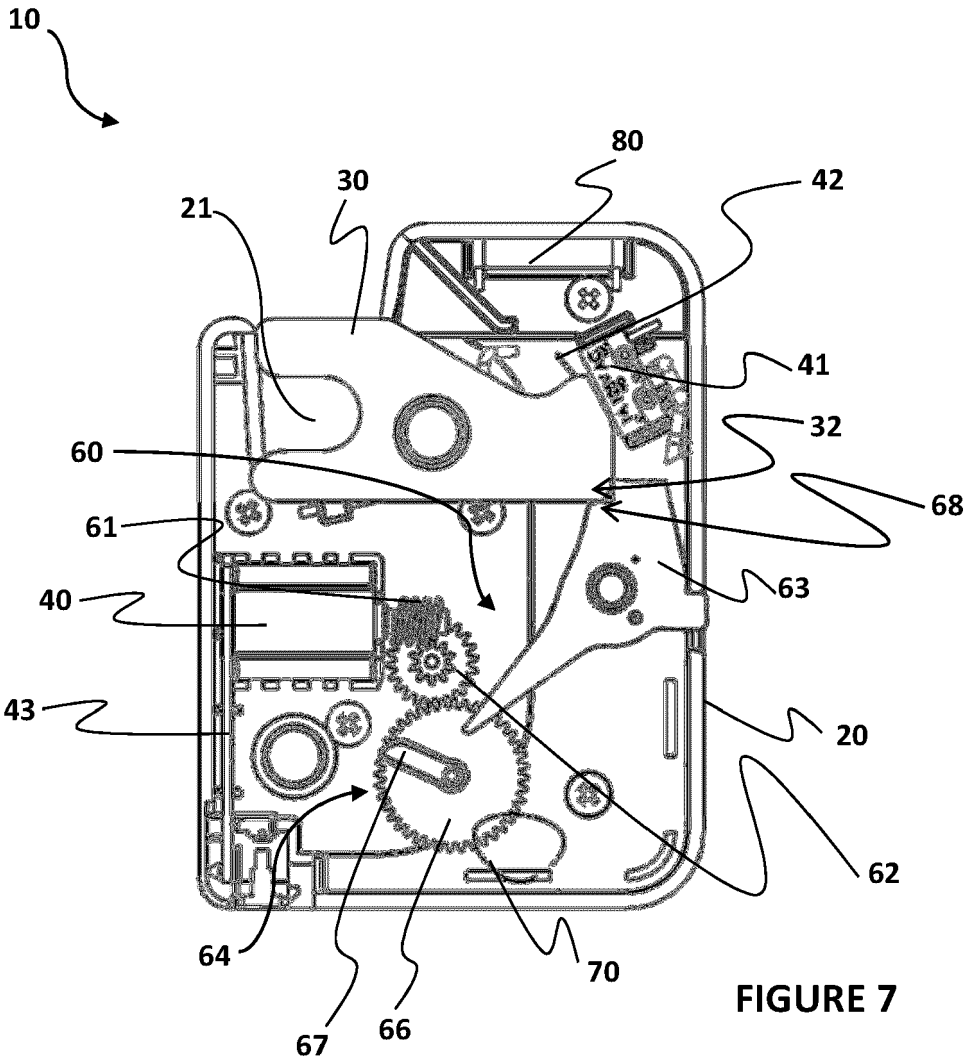

FIGURE 7

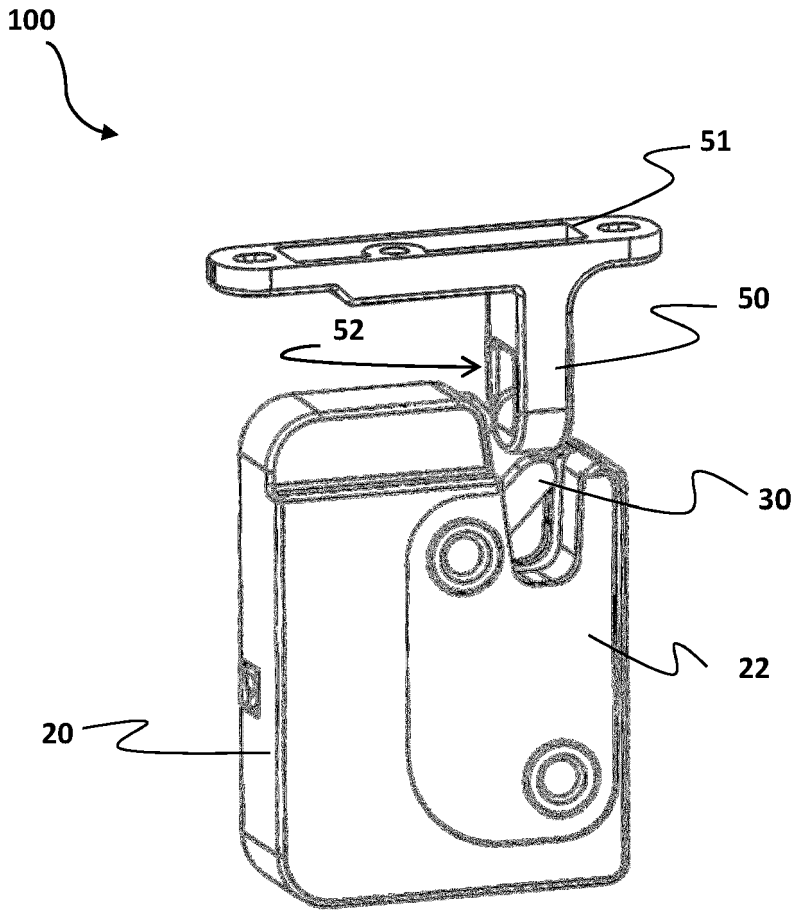

FIGURE 8

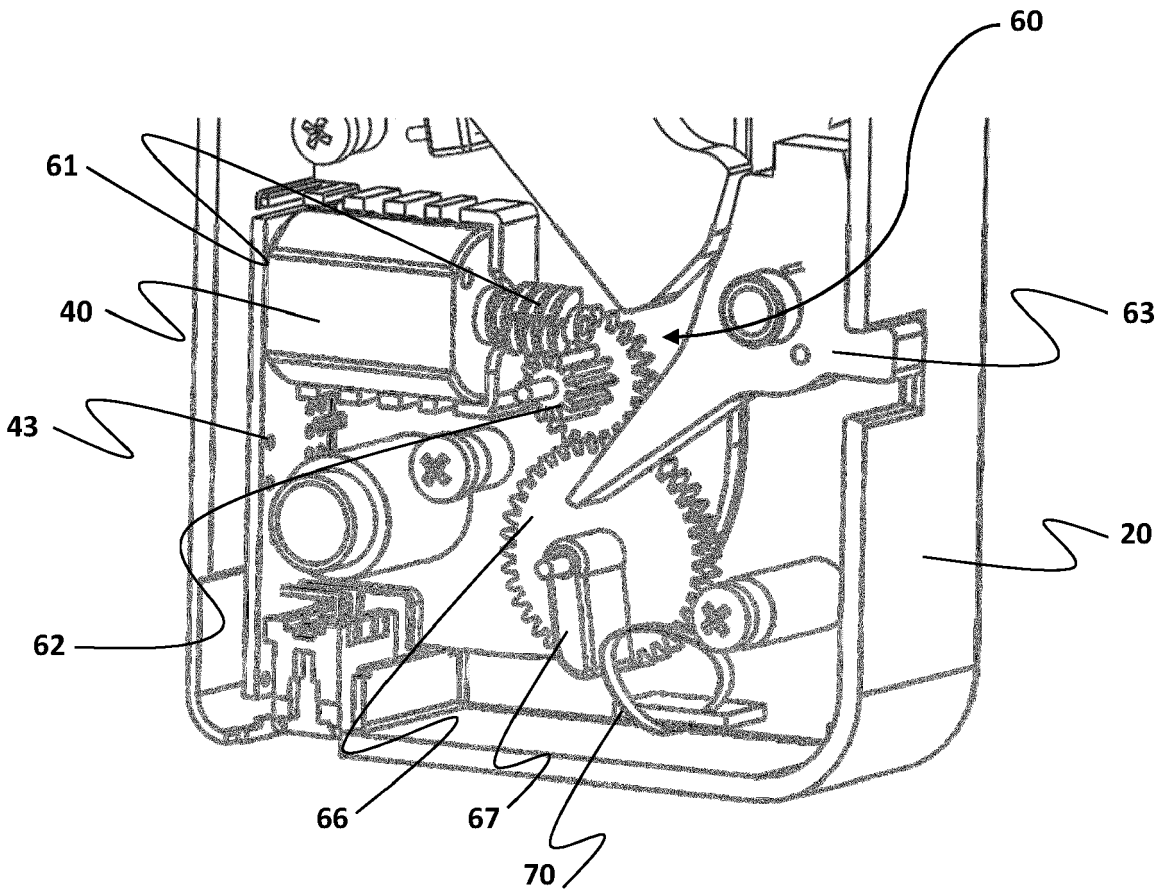

FIGURE 9

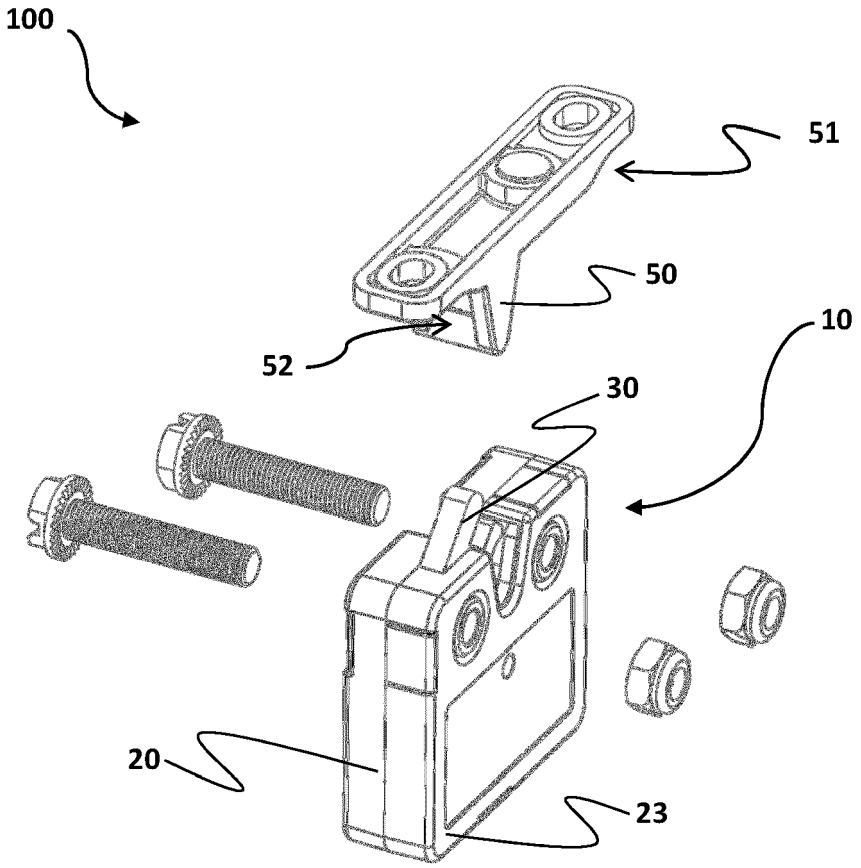

FIGURE 10

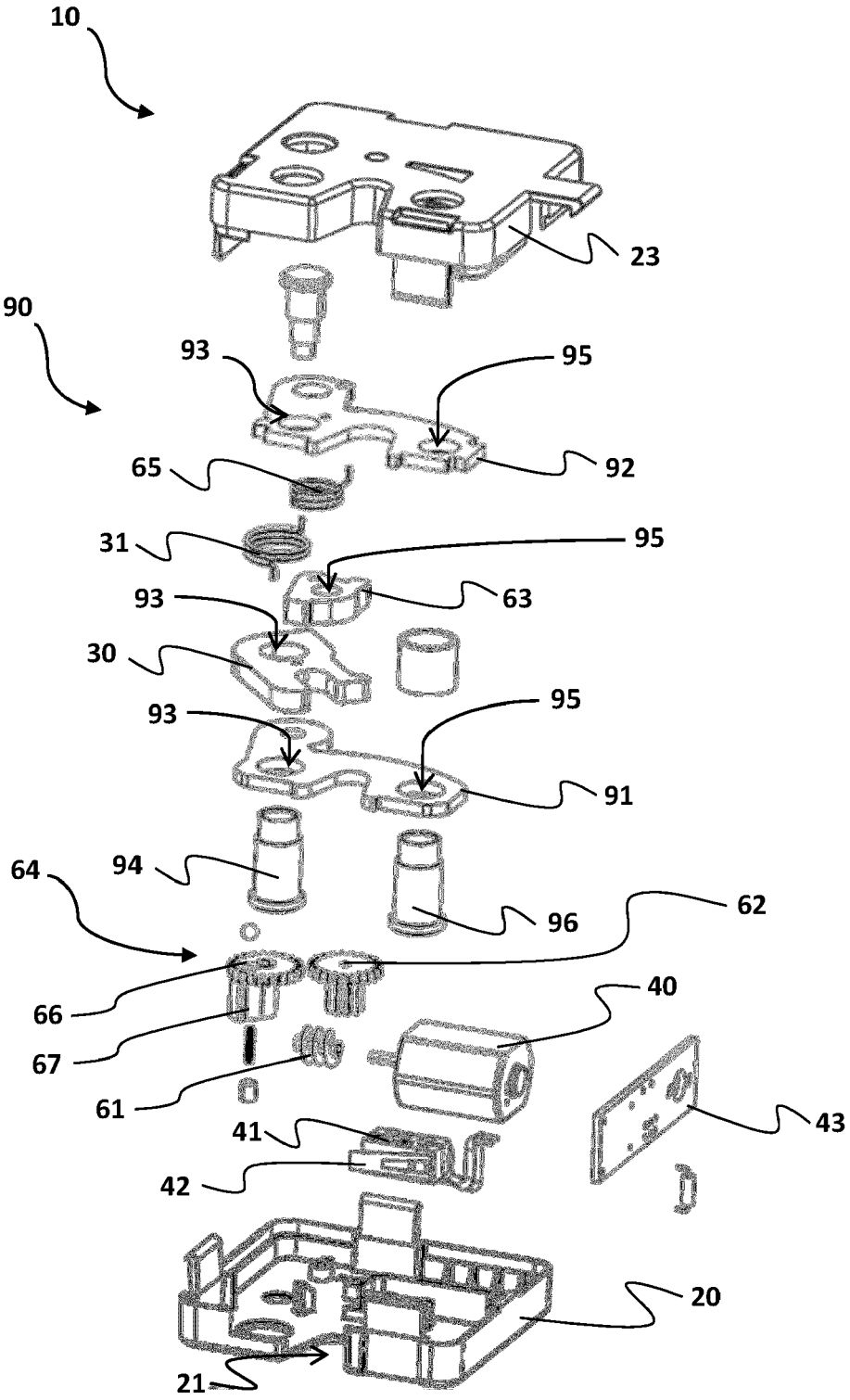
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FIGURE 11

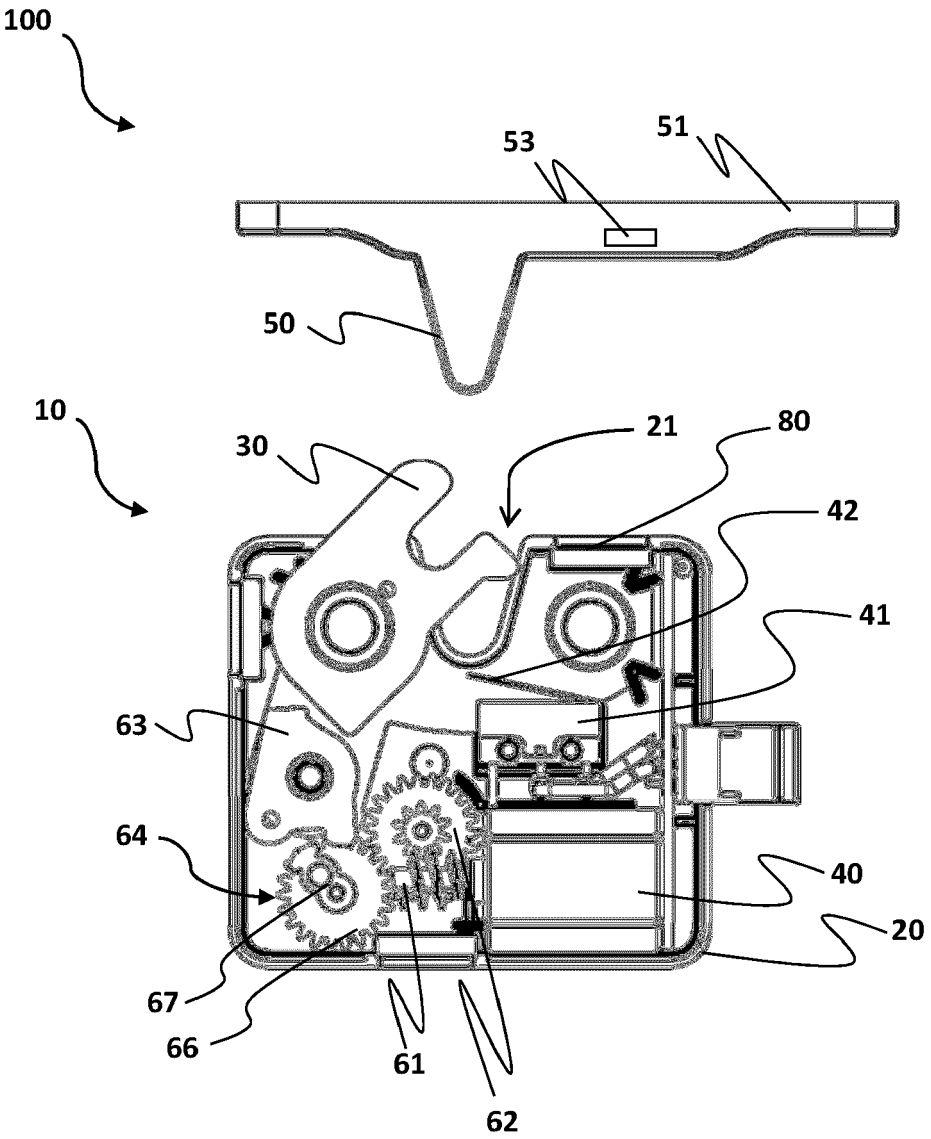

FIGURE 12

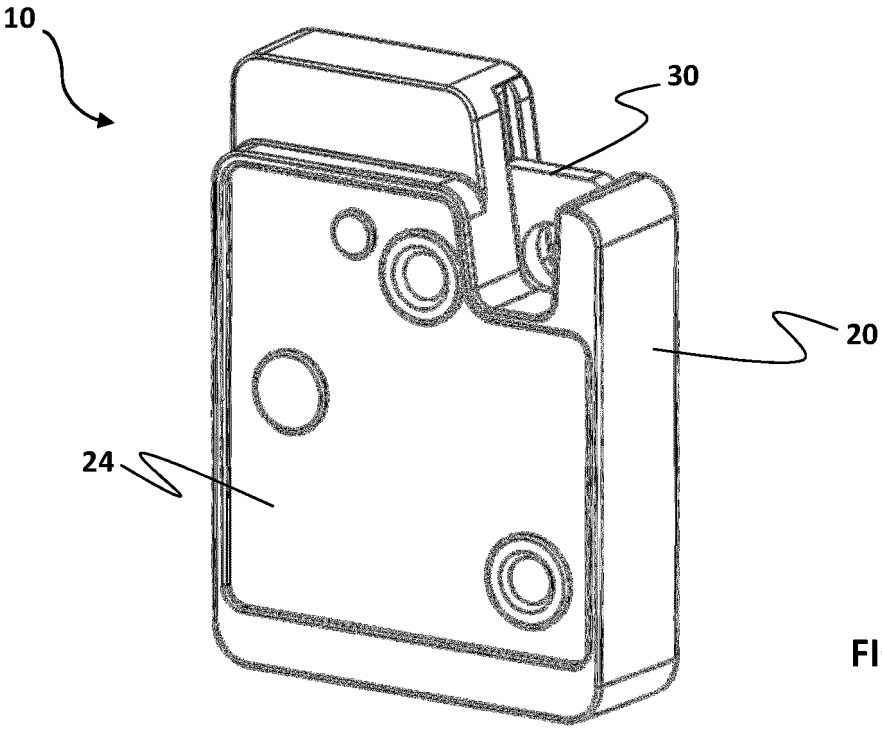

FIGURE 13

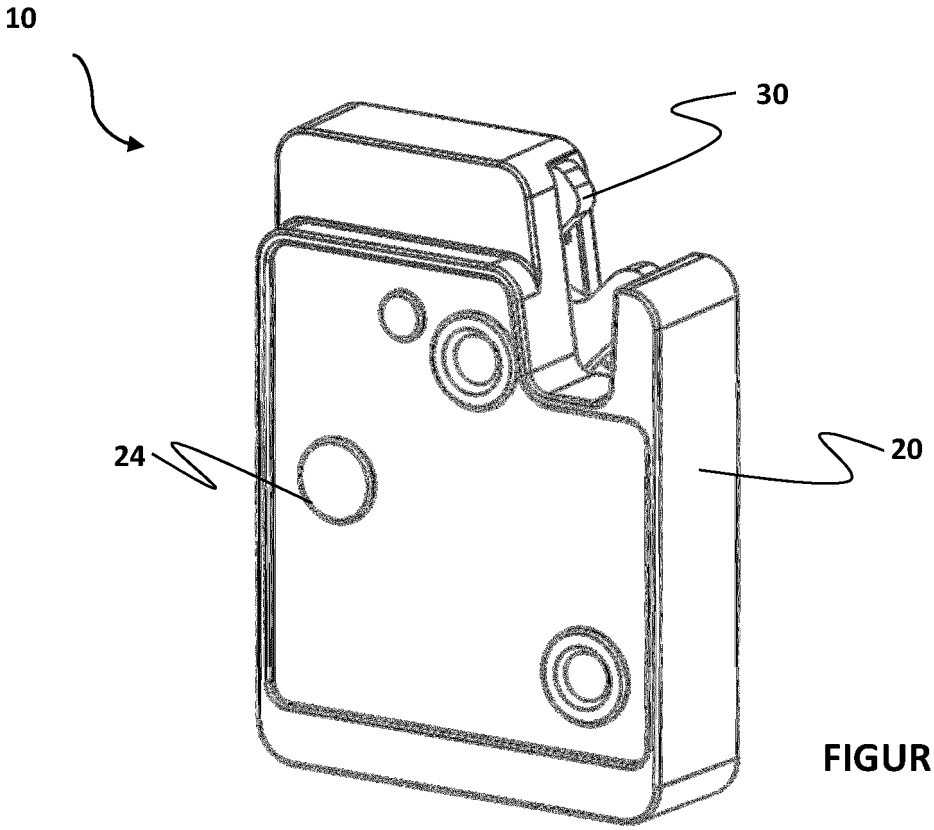

FIGURE 14

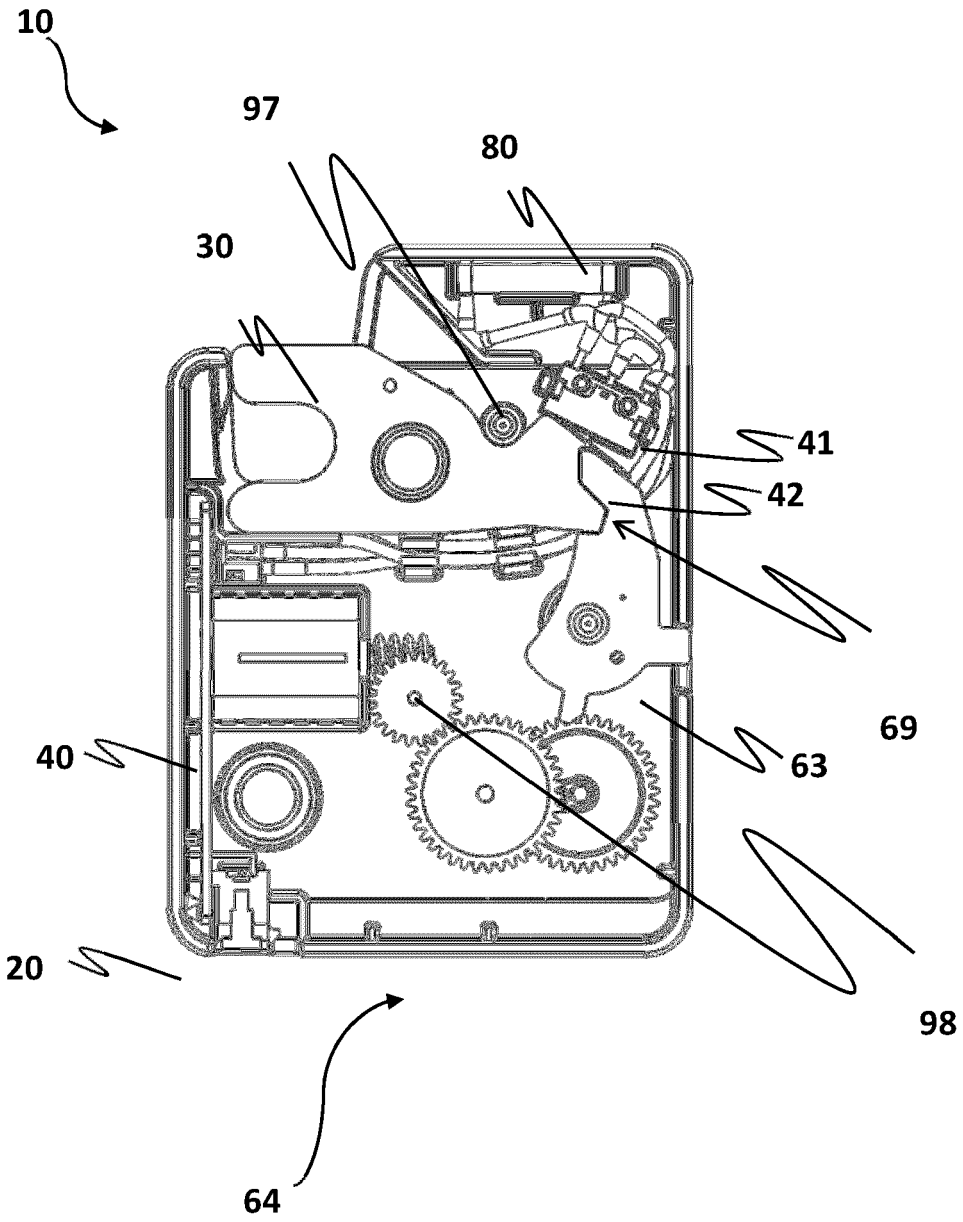

FIGURE 15

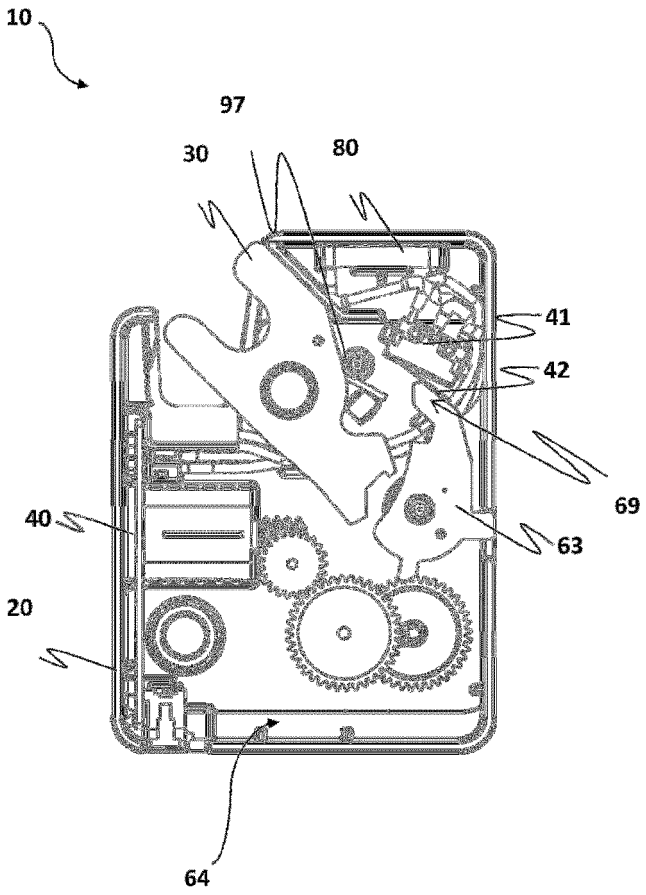

FIGURE 16

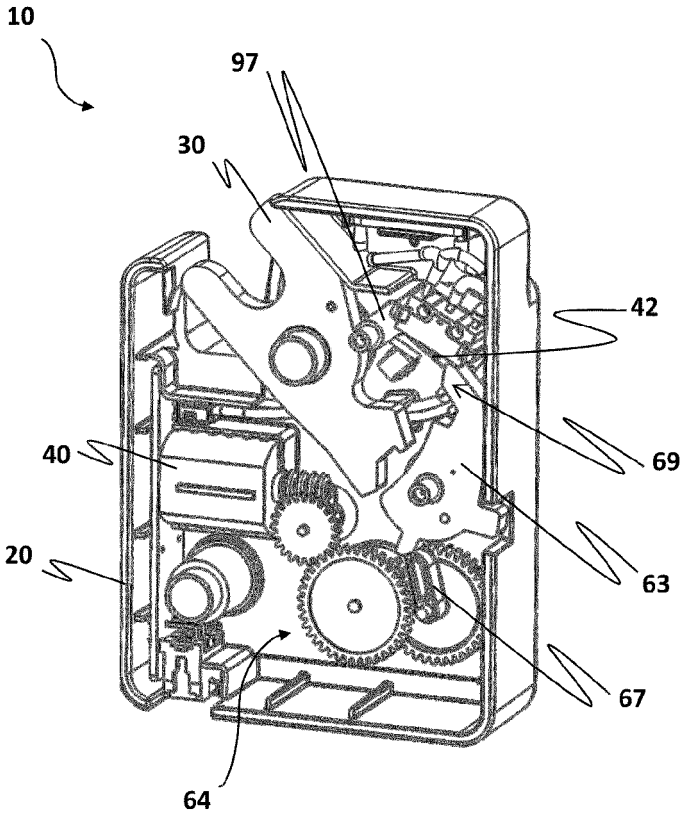

FIGURE 17

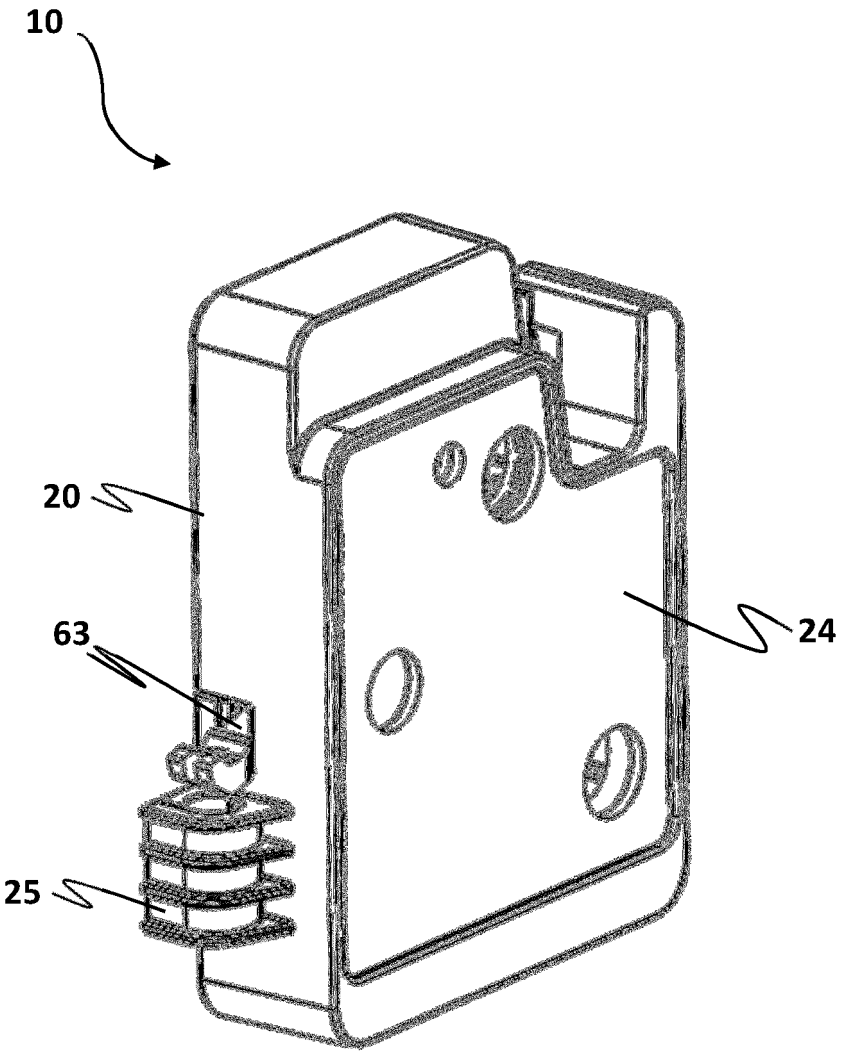

FIGURE 18

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EUROPEAN SEARCH REPORT

Application Number
EP 21 21 5999

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			E05B47/06
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	4 May 2022	Ansel, Yannick

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