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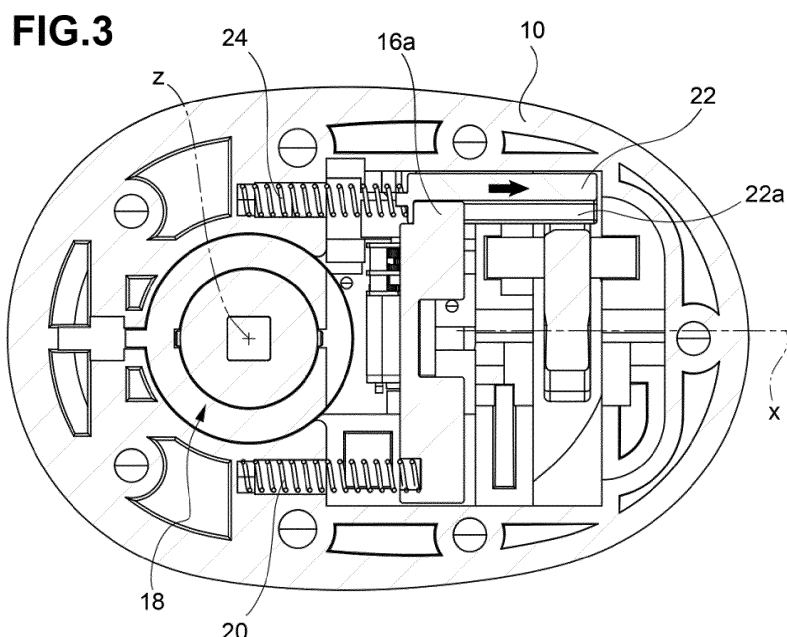
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(54) **A LOCK WITH A SUPPLEMENTARY UNLOCKING DEVICE**

(57) A lock 9 comprises an outer body 10 adapted to be secured to a movable leaf, a hooking element (12), a slide (16) movable by means of a first actuating device (18), and a locking element (22) adapted to lock the hooking element (12) in rotation, which locking element (22) has a slot (22a) in which a drag formation (16a) may slide,

the drag formation protruding from the slide (16) and being movable integrally with the latter, the lock (9) also comprising a second actuating device (29) capable of retracting the locking element (22) with respect to the drag formation (16a).



Description

Technical field

[0001] The present invention generally lies within the field of locks; in particular, the invention relates to a lock provided with an additional release device.

Prior art

[0002] Locks are known for a variety of applications, including the closure of the accesses to the compartments of vehicles, in particular commercial vehicles.

[0003] According to one embodiment provided in the prior art, a vehicle lock includes a body applied to a door, the latter being hinged to the frame of the vehicle. The body of the lock is provided with a pivoting element which engages a striker plate associated with another part of the vehicle (typically, the frame or the other leaf of the door). When the pivoting element is in a condition of engagement with the striker plate, the door is locked in a closed position.

[0004] The pivoting element is generally pushed by a spring toward a position of disengagement with respect to the striker plate, but may be held in the engagement position (such that the door remains closed) by means of a slidable bar, actuated electrically or mechanically, which abuts against the pivoting element and prevents said pivoting element from returning into the disengagement position.

[0005] One solution of this kind is known from US 2007 252394 A1, which describes a lock in which the pivoting element is a half-moon lock bolt which is adapted to be inserted into a seat or notch associated with another part of the vehicle. When the bolt is rotated so as to engage this seat, an electric device causes a bar to move forward, which bar abuts against a rear wall of the bolt and prevents said bolt from returning inside the body of the lock.

[0006] A similar solution is known from ITBA2013U000006, in which the pivoting element is a hook which engages a ring fixed to another part of the vehicle. By rotating the door toward the closed position, the hook and the ring move closer until they interpenetrate one another, causing the hook to rotate toward the inside of the body of the lock. Once rotated, the hook is locked in the engagement position by means of advancing a cylinder which is pushed by a cam which is in turn actuated by a mechanical latch.

[0007] Nevertheless, it may be useful to guarantee that the pivoting element remains in the disengagement position, regardless of the position thereof with respect to the striker plate. In the cases described above, this condition would be satisfied, for example, whenever the locking bar is held in the retracted position. In this way, the pivoting element would always be free to rotate and to withdraw from the striker plate.

[0008] In the prior art, this effect is obtained, for example, by configuring the lock such that the bar is held in

the retracted or inactive position when the key is rotated by an extra turn in the opening direction of the lock. In other words, the key is rotated in one direction in order to move the bar forward and activate the locking (firmly closing the lock) or rotated in the opposite direction to retract the bar and open the lock. Once the bar has reached the end point, the user may rotate the key by a further fraction of a turn, again in the opening direction, so as to trigger the locking of the bar and permanently deactivate the lock.

[0009] Nevertheless, a similar solution is inadequate from the point of view of security, because the user could inadvertently rotate the key further than necessary, not realizing that they had disabled the locking (with the consequence that the door may not be closed again). Conversely, the user could wish to deactivate the locking (for example in order to prevent accidental reclosure of the bar during an operation of loading and unloading the vehicle) but, in the absence of a reference of any kind (visual or tactile), may not be certain of having rotated the key sufficiently and/or in the correct direction.

[0010] For these reasons, some locks comprise references (for example visual references, such as notches arranged around the cylinder in which the key is inserted, or of any other type) which allow the user to discern which configuration the lock is in. These solutions, however, are not reliable (because the operator may not be able to clearly distinguish the notch) or are not secure as a result of the little evidence of the state of the device (activated-deactivated).

[0011] This may reduce the performance of the device in terms of both security and ease of use.

Summary of the invention

[0012] One aim of the present invention is to overcome the aforementioned problems.

[0013] To obtain this result, a lock according to the invention comprises two distinct actuating devices, which are adapted to individually move the two elements which cooperate to lock the rotatable hook, namely a cylinder (which, by being inserted into a suitable recess on the hook, prevents said hook from rotating) and a slide which is adapted to drag the cylinder from the position in which it engages the hook toward a retracted position in which the hook, no longer engaged, is free to rotate.

[0014] The first actuating device, actuated at the slide, is suitably a traditional mechanical cylinder (normally actuated by a key) which, using a cam mechanism, causes the translation of the slide toward the hook (position in which the cylinder engages the hook, and the lock is in the closed configuration) or away therefrom (which drags the cylinder toward the retracted position, allowing the hook to rotate and the lock to open).

[0015] The second actuating device, associated with the cylinder, has the function of retracting said cylinder toward the position of disengagement from the hook, even when the slide is in its position proximal to the hook

(i.e. when the lock would normally be closed).

[0016] In so doing, it is possible to prevent the lock from closing, even when the lock has been armed for closure by the operator with the turn of a key, for example.

[0017] This is achieved by forming a slot in the cylinder, in which slot a projection that is integral with the slide may slide, such that the projection engages the cylinder when the slide moves back toward the position distal from the hook (so as to drag the cylinder toward the retracted position thereof), while the cylinder is free to translate between the end point positions thereof when the slide is in the advanced position, by virtue of the fact that the relative projection may slide in the slot of the cylinder.

[0018] The second actuating device is advantageously an electric actuator (reciprocating or rotary) associated with a control system that actuates a toothed segment, which in turn engages a toothed segment integral with the cylinder, thereby causing the latter to translate when the electric motor is set into rotation. This may happen when a control signal (for example a radio signal) is transmitted by the user, which control signal is received by the electronic control system which actuates the electric motor into rotation.

[0019] The aforesaid and other aims and advantages are achieved, according to one aspect of the invention, by a lock having the features defined in claim 1. Preferred embodiments of the invention are defined in the dependent claims.

Brief description of the drawings

[0020] The functional and structural features of some preferred embodiments of a lock according to the invention will now be described. Reference is made to the appended drawings, in which:

- Fig. 1 and 2 are two schematic perspective views of a lock in an open and closed configuration, respectively, according to one embodiment of the present invention;
- Fig. 3 and 4 are, respectively, a vertical and horizontal sectional view of the lock of Fig. 1, with the cylinder in a condition of engagement with the rotatable hook, and the lock in a closed configuration; and
- Fig. 5 and 6 are, respectively, a vertical and horizontal sectional view of the lock of Fig. 1, with the cylinder in a condition of disengagement from the rotatable hook, and the lock in an open configuration.

Detailed description

[0021] Before describing in detail a plurality of embodiments of the invention, it should be clarified that the invention is not limited in its application to the design details and configuration of the components presented in the following description or illustrated in the drawings. The invention is able to assume other embodiments and to be implemented or constructed in practice in different

ways. It should also be understood that the phraseology and terminology have a descriptive purpose and should not be construed as limiting.

[0022] Referring by way of example to Fig. 1, a lock 9 comprises an outer body 10, adapted to be secured to a movable leaf (for example, a first door for closing a loading compartment of a commercial vehicle), and a hooking element 12, housed in the outer body 10 and comprising a portion adapted to accommodate a fastening element 14 (which, in turn, is securable to a second door, associated with the first, or to the vehicle frame).

[0023] The hooking element 12 is pivotable, with respect to the outer body 10, around a first axis x between a first disengagement position, in which the fastening element 14 is insertable into the hooking element 12, and a second engagement position, in which the hooking element 12 is configured to engage the fastening element 14 in such a way as to make the fastening element 14 and the outer body 10 integral with each other. For example, in the case of a lock 9 mounted on the two leaves of a door for closing a loading compartment of a vehicle, the first disengagement position of the fastening element 14 would correspond to an open configuration of the lock (therefore with freedom to open the leaves of the door), while the second engagement position of the fastening element 14 would correspond to a closed configuration of the lock (with the leaves of the door made integral with one another).

[0024] There is also a slide 16, slidably housed in the outer body 10 and translatable along a direction parallel to the first axis x between a position distal to the hooking element 12 and a position proximal to the hooking element 12.

[0025] The lock comprises a first actuating device 18, supported by the outer body 10 and adapted to move the slide 16 between said distal and proximal positions with respect to the hooking element 12.

[0026] There are also first elastic elements 20, which engage the outer body 10 and the slide 16 in such a way as to push said slide 16 toward said position proximal to the hooking element 12.

[0027] The lock 9 comprises a locking element 22, elongated in a direction parallel to the first axis x and movable, with respect to the outer body 10, along a direction parallel to the first axis x between a first retracted position, in which said locking element 22 avoids engaging the hooking element 12 (which hooking element 12 is free to rotate around the first axis x), and a second advanced position, in which said locking element 22 engages the hooking element 12, locking the latter in the second engagement position thereof.

[0028] Second elastic elements 24 engage the outer body 10 and the locking element 22 in such a way as to push said locking element 22 toward said second locking position.

[0029] The locking element 22 has a slot 22a extended (along a direction parallel to the first axis x) between a first end (which, in the example shown, is proximal to the

portion of said locking element 22 against which the second elastic elements 24 abut) and a second end opposite to the first end, said slot 22a slidably accommodating a drag formation 16a which protrudes from the slide 16 and is movable integrally with the latter.

[0030] The second elastic elements 24 are capable of pushing the locking element 22 toward the drag formation 16a in such a way that, when the slide 16 is in the position distal to the hooking element 12, the drag formation 16a abuts against the first end of the slot 22a and the locking element 22 is in the first retracted position, and in such a way that, when the slide 16 is in the position proximal to the hooking element 12, the locking element 22 is in the second advanced position, with the drag formation 16a abutting against the first end of the slot 22a.

[0031] The lock 9 also comprises a second actuating device 29, supported by the outer body 10 and adapted to move the locking element 22 from said second advanced position toward said first retracted position, while avoiding moving the slide 16.

[0032] In other words, when the slide 16 is in the position proximal to the hooking element 12, the second actuating device 29 is capable of making the locking element 22 translate from the second advanced position to the first retracted position, so that the lock 9 remains in the open configuration, regardless of the position of the slide 16.

[0033] According to one embodiment which is not shown, the second actuating device 29 may be a linear actuator, connected to the locking element 22 so as to cause it to retract or advance with respect to the slide 16.

[0034] According to a preferred embodiment, there is a first toothed profile 28 (for example a crown wheel segment) which may be pivoted around a second axis y perpendicular to the first axis x, said first toothed profile 28 being adapted to engage a corresponding second toothed profile 30 integral with the locking element 22. The first toothed profile 28 is movable by means of the second actuating device 29. When the slide 16 is in the relevant position proximal to the hooking element 12, the pivoting of the first toothed profile 28 is capable of making the locking element 22 translate, with respect to the slide 16, from said second advanced position to said first retracted position.

[0035] According to a preferred embodiment, the second actuating device 29 is an electric actuator (for example an electric motor actuable in rotation around the second axis y), supported by the outer body 10 and including an electronic control system, which comprises receiving means, adapted to receive electromagnetic and/or electrical and/or electronic signals, said electronic control system being configured to actuate said electric actuator in rotation in response to an electromagnetic and/or electrical and/or electronic control signal received by said receiving means.

[0036] The receiving means may preferably be configured to receive radio signals (for example using the Bluetooth standard).

[0037] For example, the receiving means may be NFC devices configured to allow near-field communication by wireless connection with a radio frequency transmitting device, using which the user may send a control signal to the electronic control system of the second actuating device 29 in order to activate the release of the locking element 22 and the deactivation of the lock 9.

[0038] According to one embodiment, the first actuating device 18 comprises a latch, supported by the external body 10 and actuable in rotation around a third axis z perpendicular to the first axis x and to the second axis y.

[0039] The latch comprises a pin 18a housed in a shaped hole 16b in the slide 16 and pivotable between a first open position, in which the pin 18a abuts against a first elbow of the shaped hole 16b (distal to the hooking element 12), and a second open position, in which the pin 18a abuts against a second elbow of the shaped hole 16b (proximal to the hooking element 12), so that when the pin 18a is in the first open position, the slide 16 is in the position distal to the hooking element 12, and when the pin 18a is in the second closed position, the slide 16 is in the position proximal to the hooking element 12. In other words, the pin 18a cooperates with the shaped hole 16b (and with the first elastic elements 20) so as to create a cam mechanism, whereby the pivoting of the pin 18a causes the slide 16 to translate. This may be obtained, for example, using a traditional mechanical opening mechanism, with a cylinder actuated by a key, as is well known to a person skilled in the art.

[0040] The lock 9 optionally comprises a closing plate 15, adapted to be secured to a movable leaf complementary to the movable leaf to which the outer body 10 is securable, said closing plate 15 carrying the fastening element 14.

[0041] The fastening element 14 is preferably an eyelet or ring protruding from the closing plate 15.

[0042] According to one preferred embodiment, the hooking element 12 is shaped like a hook, and is pivotable against the force of a torsion spring adapted to push the hooking element 12 toward said second position of engagement with the fastening element 14.

[0043] The hooking element 12 suitably comprises a recess into which the eyelet-shaped fastening element 14 is insertable.

[0044] According to one embodiment (not shown), noise and/or light indicators may be present, adapted to indicate the position of the locking element 22. These indicators are advantageously activatable by means of a sensor (suitably interfaced with the control system of the second actuating device 29) adapted to detect a given position of the locking element 22 and to provide a user with information about the state (for example, disarmed or closed) of the lock 9.

[0045] Purely by way of illustration, the deactivation, activation and opening phases of a lock according to a preferred embodiment of the present invention will be summarized in the following.

[0046] With reference to Fig. 1, the rotation of a key in

the direction indicated by the arrow A (deactivation of the lock) produces a pivoting of the pin 18a in the direction indicated by the arrow B. The pin 18a, sliding in the shaped hole 16b, retracts the slide 16 with respect to the hooking element 12, which slide 16 drags the locking element 22 in the direction indicated by the arrow C. This releases the hooking element 12, which rotates toward the first disengagement position thereof, in the direction indicated by the arrow D. In this configuration, the lock 9 is open.

[0047] With reference to Fig. 2, the rotation of the key in the opposite direction, indicated by the arrow A' (activation of the lock), produces a counter-pivoting of the pin 18a in the direction indicated by the arrow B'. The pin 18a, sliding in the shaped hole 16b, advances the slide 16 with respect to the hooking element 12, which slide 16 drags the locking element 22 in the direction indicated by the arrow C'. This constrains the hooking element 12 in the second engagement position thereof (in which it holds the fastening element 14). In this configuration, the lock 9 is closed.

[0048] Meanwhile, Fig. 4 and 5 show the subsequent steps for actuating the toothed profile E, which rotates in the direction indicated by the arrow E, producing (in cooperation with the second toothed profile 30) a translation of the locking element 22 with respect to the slide 16. In this configuration, the lock 9 is open although armed by the rotation of the key.

[0049] Various aspects and embodiments of a lock according to the invention have been described. It is understood that each embodiment may be combined with any other embodiment. Furthermore, the invention is not limited to the described embodiments, but may be varied within the scope defined by the appended claims.

Claims

1. A lock (9), comprising:

- an outer body (10), adapted to be secured to a movable leaf;
- a hooking element (12), housed in the outer body (10) and comprising a portion adapted to accommodate a fastening element (14), said hooking element (12) being pivotable, with respect to the outer body (10), around a first axis (x) between a first disengagement position, in which the fastening element (14) is insertable into the hooking element (12), and a second engagement position, in which the hooking element (12) is configured to engage the fastening element (14) in such a way that said fastening element (14) and said outer body (10) are integral with each other;
- a slide (16), slidably housed in the outer body (10) and translatable along a direction parallel to the first axis (x), between a position distal to

the hooking element (12) and a position proximal to the hooking element (12);

- a first actuating device (18), supported by the outer body (10) and adapted to move the slide (16) between said positions distal and proximal to the hooking element 12;
- first elastic elements (20), which engage the outer body (10) and the slide (16) in such a way as to push said slide (16) towards said position proximal to the hooking element (12);
- a locking element (22), elongated in a direction parallel to the first axis (x) and movable along a direction parallel to the first axis (x) between a first retracted position, in which said locking element (20) avoids engaging the hooking element (12), which hooking element (12) is free to rotate around the first axis (x), and a second advanced position, in which said locking element (20) engages the hooking element (12), locking the latter in the second engagement position thereof; and
- second elastic elements (24), which engage the outer body (10) and the locking element (22) in such a way as to push said locking element (22) towards said second locking position;

said locking element (22) having a slot (22a) extended along a direction parallel to the first axis (x) between a first end and a second end, opposite to the first end, said slot (22a) slidably accommodating a drag formation (16a), protruding from the slide (16) and movable integrally with the latter, the second elastic elements (24) being capable of pushing the locking element (22) towards the drag formation (16a) in such a way that, when the slide (16) is in the position distal to the hooking element (12), the drag formation (16a) abuts against the first end of the slot (22a) and the locking element (22) is in the first retracted position, and in such a way that, when the slide (16) is in the position proximal to the hooking element (12), the locking element (22) is in the second advanced position, the drag formation (16a) abutting against the first end of the slot (22a); the lock (9) further comprising a second actuating device (29), supported by the outer body (10) and adapted to move the locking element (22) from said second advanced position to said first retracted position, avoiding moving the slide (16).

2. The lock according to claim 1, further comprising a first toothed profile (28), pivotable around a second axis (y) perpendicular to the first axis (x), said first toothed profile (28) being adapted to engage a corresponding second toothed profile (30), integral with the locking element (22), the pivoting of the first toothed profile (28) being capable of making the locking element (22) translate from said second advanced position to said first retracted position, when

the slide (16) is in the relevant position proximal to the hooking element (12), said first toothed profile (28) being actuatable in rotation by means of the second actuating device (29).

3. The lock according to claim 1 or 2, wherein the second actuating device (29) is an electric actuator, supported by the outer body (10) and including an electronic control system, which comprises receiving means, adapted to receive electrical and/or electronic electromagnetic signals, said electronic control system being configured to actuate said electric actuator in response to an electromagnetic and/or electrical and/or electronic control signal received by said receiving means. 5
4. The lock according to claim 3, wherein the receiving means are configured to receive radio signals. 10
5. The lock according to claim 4, wherein the receiving means may be NFC devices configured to allow near-field communication by wireless connection with a radio frequency transmitting device. 15
6. The lock according to any of the preceding claims, wherein the first actuating device (18) comprises a latch, supported by the outer body (10) and actuatable in rotation around a third axis (z) perpendicular to the first axis x and to the second axis (y), said latch comprising a pin (18a) housed in a shaped hole (16b) in the slide (16) and pivotable between a first open position, in which the pin (18a) abuts against a first elbow of the shaped hole (16b) distal to the hooking element (12), and a second open position, in which the pin (18a) abuts against a second elbow of the shaped hole (16b) proximal to the hooking element (12), so that when the pin (18a) is in the first open position, the slide (16) is in the position distal to the hooking element (12), and when the pin (18a) is in the second closed position, the slide (16) is in the position proximal to the hooking element (12). 20 25 30 35 40
7. The lock according to any of the preceding claims, comprising a closing plate (15), adapted to be secured to a movable leaf complementary to the movable leaf to which the external body (10) is securable, said closing plate (15) carrying the fastening element (14). 45
8. The lock according to claim 7, wherein the fastening element (14) is an eyelet protruding from the closing plate (15). 50
9. The lock according to any of the preceding claims, wherein the hooking element (12) is shaped like a hook, and is pivotable against the force of a torsion spring, adapted to push the hooking element (12) into the second engagement position with the fas-

tening element (14).

10. The lock according to claim 9 when dependent on claim 8, wherein the hooking element (12) comprises a recess into which the eyelet-shaped fastening element (14) is insertable. 55

FIG.1

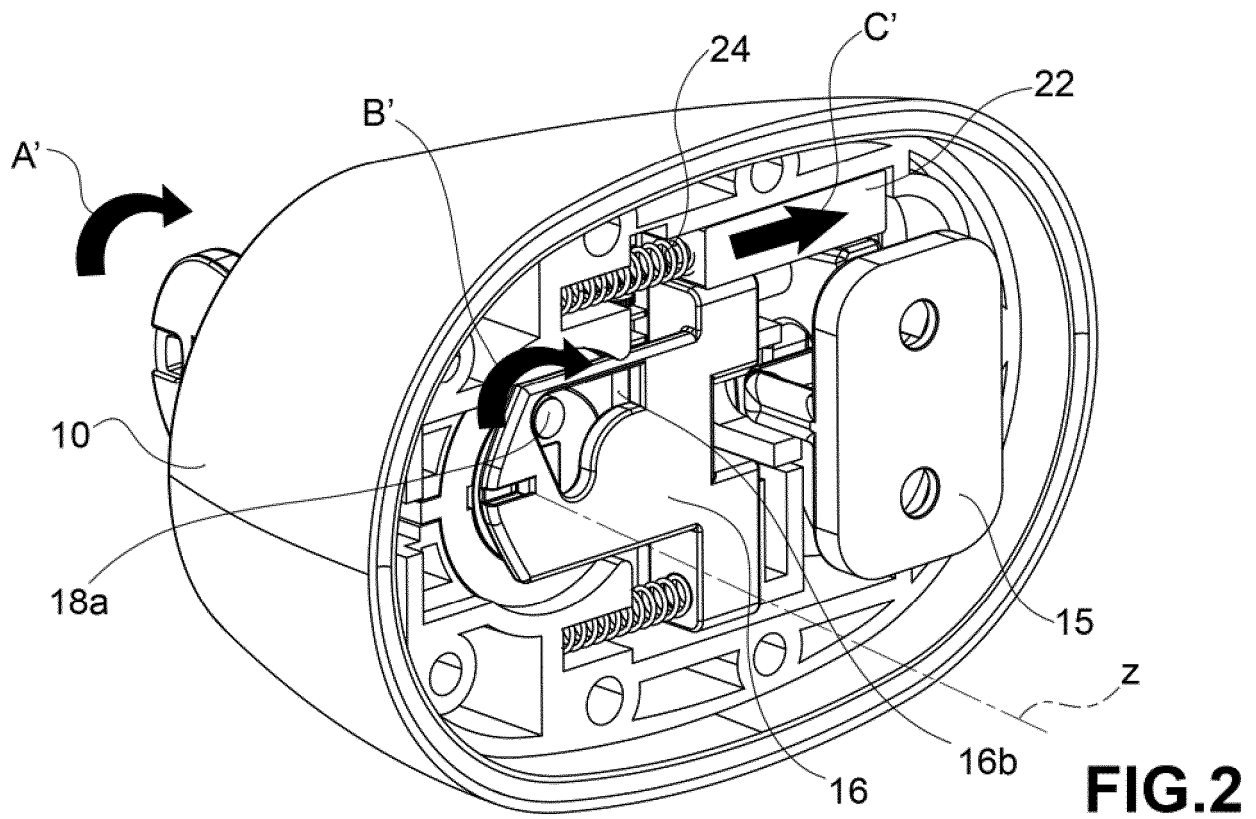
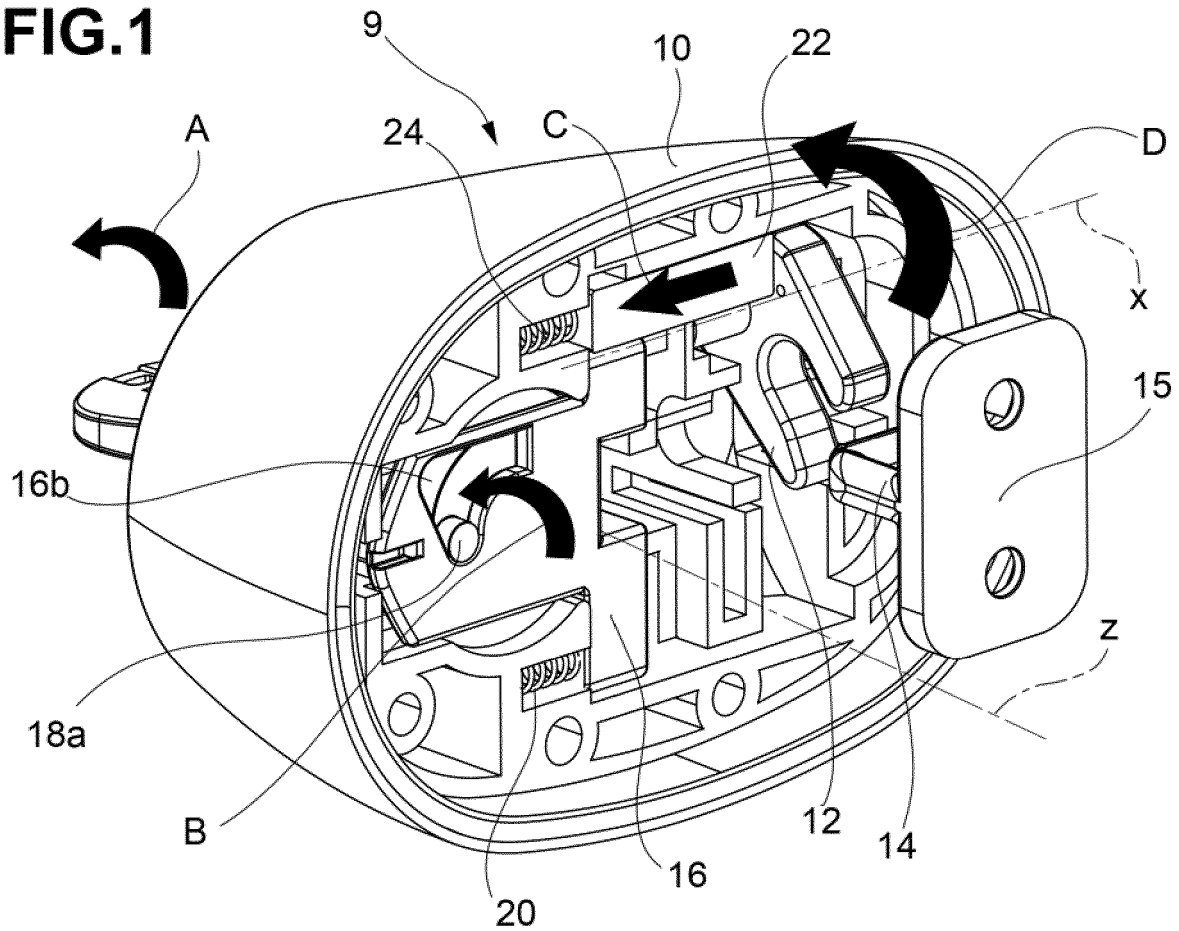


FIG.2

FIG.3

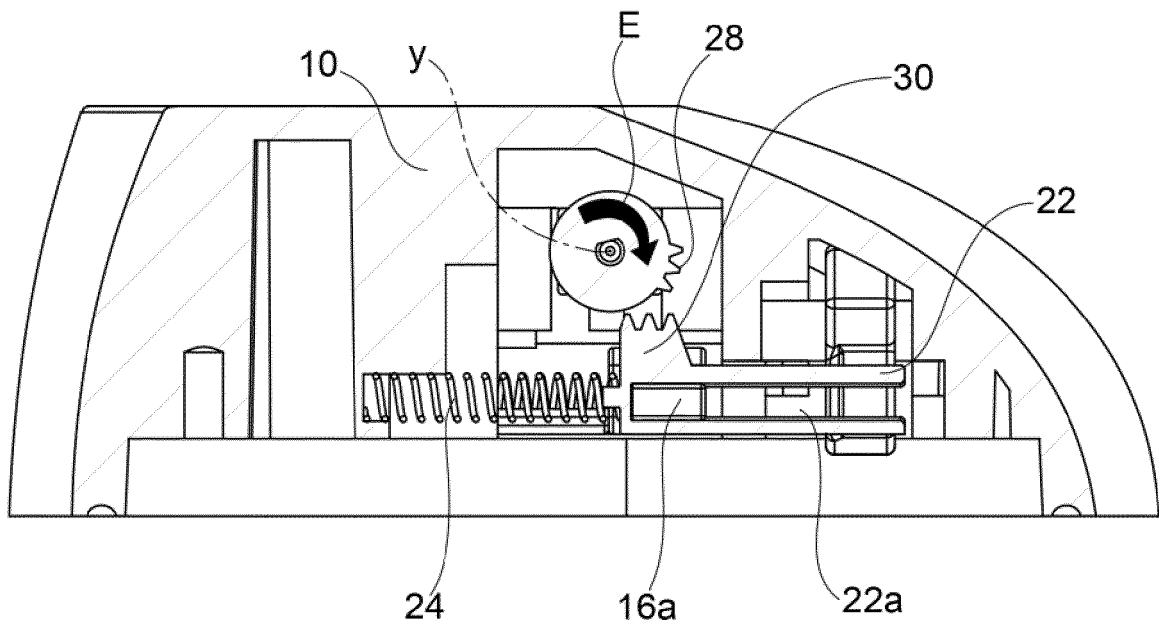
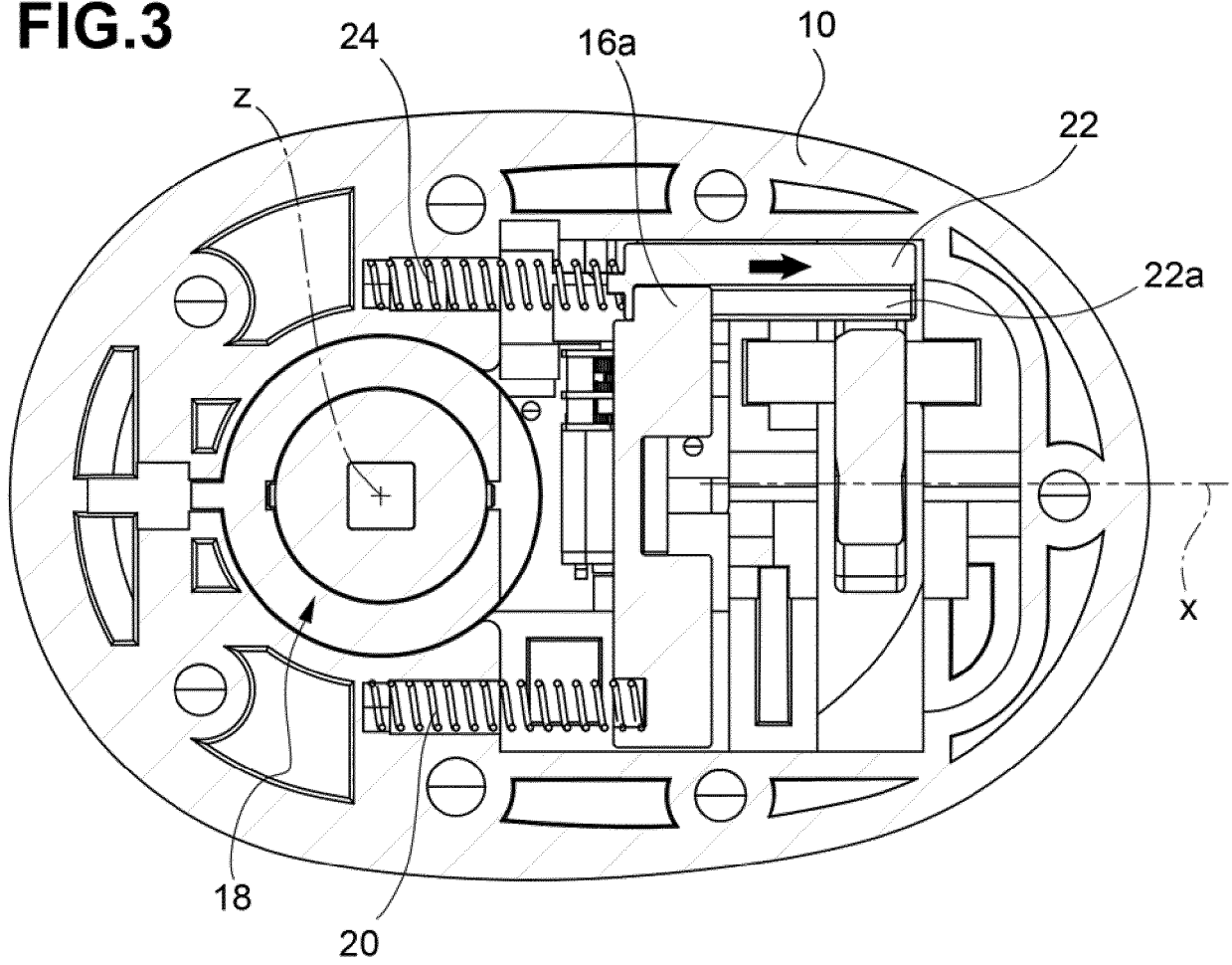


FIG.4

FIG.5

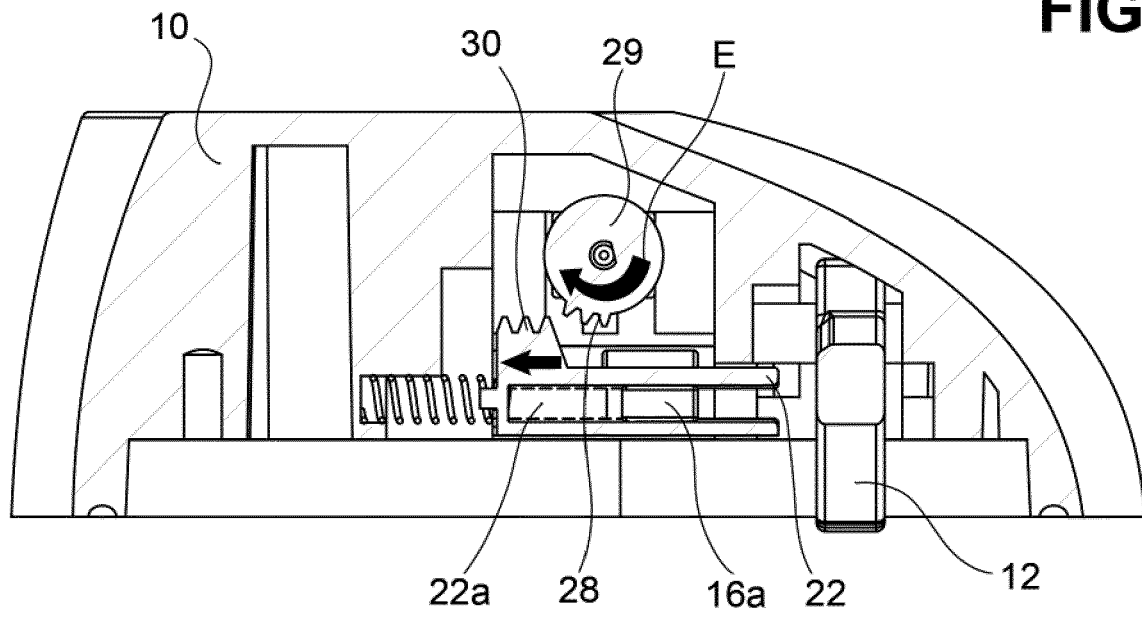
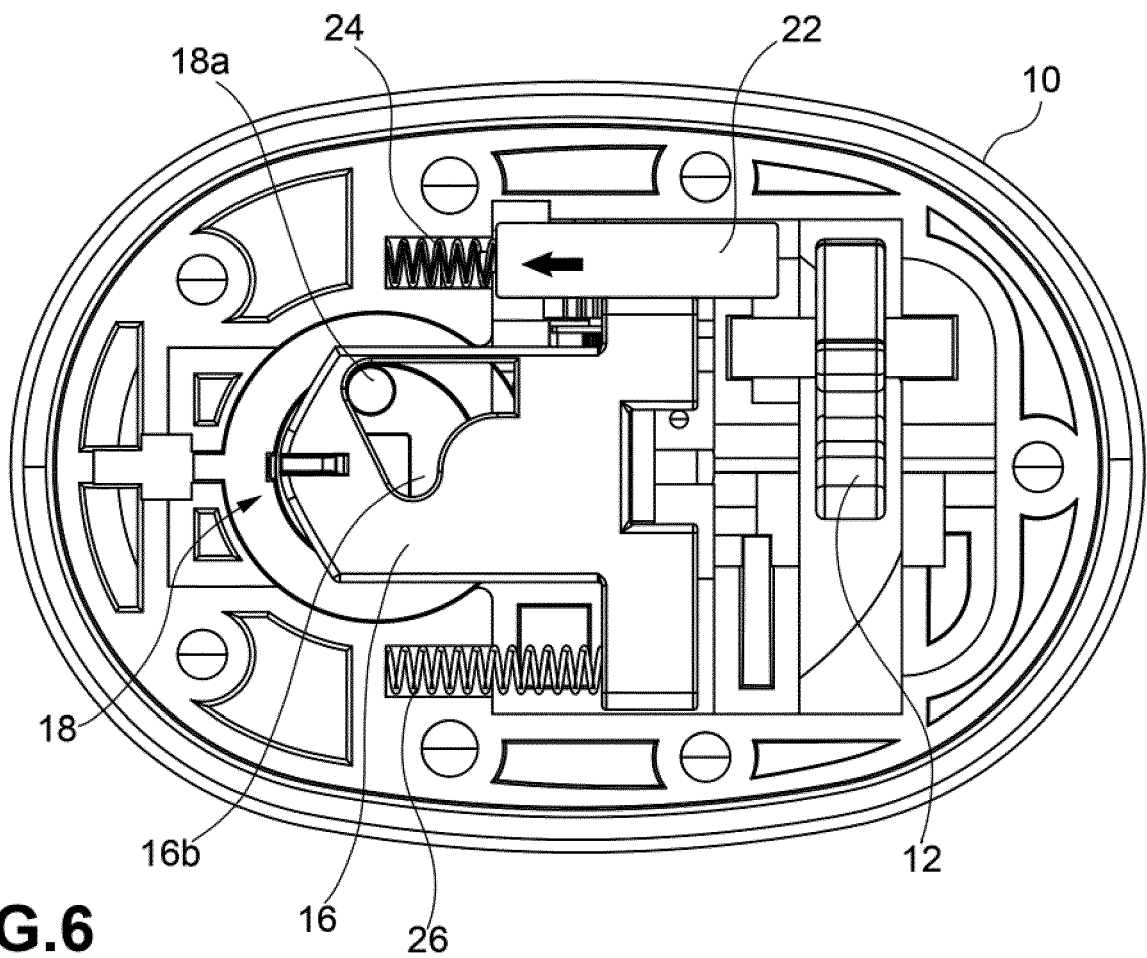


FIG.6





EUROPEAN SEARCH REPORT

Application Number
EP 20 20 7441

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	IT BA20 130 006 U1 (BLOCK SHAFT GROUP SRL) 16 August 2014 (2014-08-16) * the whole document *	1	INV. E05C3/24 E05B83/12 E05B85/24
A	IT 2018 0000 5311 A1 (BERTANA SRL) 14 November 2019 (2019-11-14) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			E05B E05C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 17 March 2021	Examiner Van Beurden, Jason
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 20 20 7441

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17-03-2021

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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