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(54) ASSEMBLY FOR SECURITY LOCKS AND RELATIVE LOCK

(57) Assembly (100, 200) for locks comprising: a case (101) comprising at least one bottom and a front provided with at least one hole, the plane of the front being incident to the plane of the bottom; a bolt comprising at least one cylinder configured to traverse the hole of the front, moving from a first position in which it is retracted inside the case to a second position in which it has exited the case, and vice versa; a slider (106) comprising a plate parallel to the bottom of the case (101), said slider (106) being configured to translate from a first position to a second position and to co-operate with the bolt in such a way that, when the at least one cylinder of the bolt is in its second position, the slider (106) is in its first position, and when the at least one cylinder of the bolt is in its first position, the slider (106) is in its second position; a cylinder (102) for key provided with a first toothed cam (102'), said first toothed cam (102') being rotatable by means of a key; a second toothed cam (105) configured to co-operate with said first toothed cam (102') in such a way that when the first toothed cam (102') rotates in a first direction, the second toothed cam (105) rotates in a second direction, opposite to the first direction; a cogged wheel (103) provided with a first pin (103') and with a second pin (103"), said cogged wheel (103) being hinged to a fixed pin (110) integral with the bottom of the case and being configured to co-operate with the second toothed cam (105), in such a way that, when the first toothed cam (102') rotates through a first angle (α) smaller than or equal to 200°, the cogged wheel (103) also rotates through a second angle (β) in a first direction; a transmission lever (107) hinged to the fixed pin (110) and rotatable around the fixed pin (110), said transmission lever (107) being configured to co-operate with the cogged wheel (103) and the slider (106), in such a way that, when the cogged wheel (103) rotates through the second angle (β), the transmission lever (107) also rotates in the first direction and the slider (106) translates from its first to its second position.

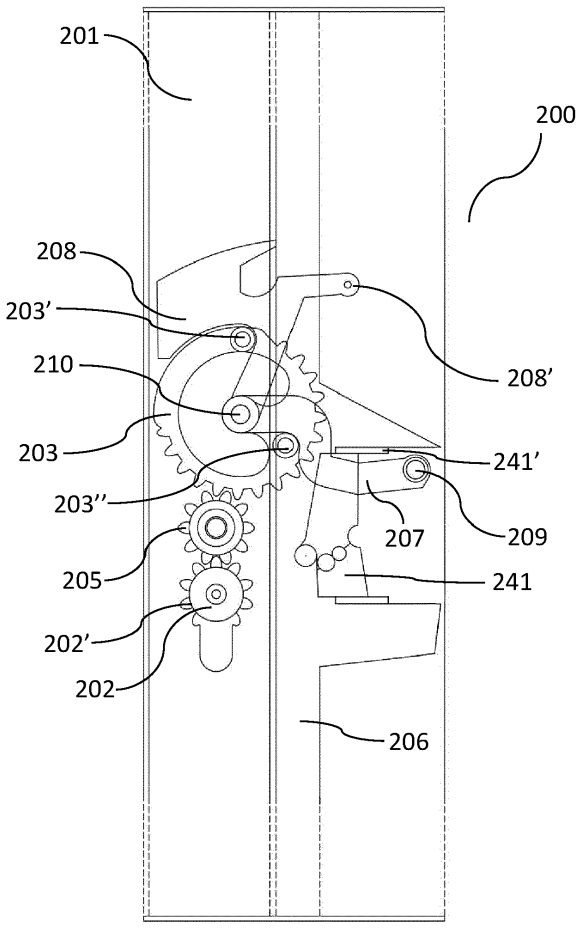

Fig.5

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Description

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates to an assembly for security locks, such as those mounted on reinforced doors, as well as to a lock comprising this assembly. It is specified herein that the assembly of the present invention may be part of either an automatic closure security lock or a fully manual closure security lock. It is further specified herein that the assembly of the present invention may be part of both a fully mechanical security lock and a fully motorised security lock and, in particular, of a lock with opening driven by an electric motor.

STATE OF THE ART

[0002] Known security locks comprise a casing formed by a bottom and a front with at least one hole, a bolt, at least one latch and a slider. The bolt usually consists of a plurality of metal cylinders and a plate with a slot, inside whereof a pin of the case is engaged. The plate of the bolt is, in turn, also provided with its own pin capable of co-operating with the slider. The slider is instead generally made up of a metal plate provided with at least one slot or recess which allows the slider to co-operate with the bolt and with a slot or recess which allows the slider to co-operate with the latch. As described in EP4023841A1, this slot, or recess, is made up of at least one oblique section, in which the pin of the bolt can translate, and a vertical section for the end stroke of the pin itself. Known locks are configured to change from a configuration of opening, in which the cylinders of the bolt are retracted inside the case, to a configuration of closure, in which the cylinders are at least partially protruded from the holes in the case, and vice versa. Thanks to the presence of the slot of the slider described above, assuming a start from a closed lock condition, when the slider translates upwards (considering being in a door fitted condition), the cylinders of the bolt retract into the case. Conversely, assuming a start from an open lock condition, when the slider translates downwards (again in a door fitted condition), the cylinders of the bolt exit the case.

[0003] The passage from the configuration of closure to the configuration of opening, and therefore the upward translation of the slider, can be carried out manually, by means of a key, or by the use of a handle, or, again, electrically through the action of a motor suitable for the purpose. For the purpose of opening by means of a key, known locks are equipped with a cylinder for key that co-operates directly, or indirectly, by means of a toothed cam, with a cogged wheel, which in turn interacts with the slider, usually by means of a special pin with which it is provided, in such a way that its rotary motion is transformed into a translation of the slider itself. The latter, therefore, will translate upwards when the key is made to rotate in the appropriate direction (for example clockwise for door opening to the left). In the locks of the prior art made in this way, the interaction of the cogged wheel and of the slider being direct, it is necessary for the cogged wheel to rotate through at least 360°, and usually also more than 360°, in order for an upward translation of the slider to take place, of such an extent as to cause the cylinders of the bolt to come out. A rotation of the key of this amplitude implies that the user must perform this rotation in two stages, releasing the grip of the keys between the first and the second movement of rotation. When this happens, the keys usually hit the door and, since this happens repeatedly, each time the lock is opened, damage can be caused to the door itself, or to the panel.

[0004] The passage from the configuration of opening to that of closure can, instead, take place automatically, thanks to the presence of a pressure-switch latch, as described in IT2016000103226A1, which on contact with the jamb of a door is pushed into the case. The pressure-switch latch is, in particular, provided with a pin that co-operates with a special recess in the slider and, in rest conditions, blocks the downward translation thereof. When the pressure-switch latch is pushed towards the inside of the case, the pin of said latch also translates and, consequently, protrudes from the recess of the slider. The latter in this way becomes free to slide downwards vertically. The descent of the slider causes the pin of the bolt that co-operates with the slot of the slider to translate horizontally, causing the horizontal translation of the bolt towards the outside of the case and, therefore, the exiting of the cylinders of the bolt from the case with the consequent closure of the lock. What can happen, however, in common locks with automatic closure, is that this mechanism becomes jammed due to the inevitable friction that can be created, for example, as a consequence of the lock not being perfectly fitted in the door. In this case, while awaiting the appropriate maintenance, it becomes impossible to close the door, with consequent considerable inconvenience to the user.

[0005] A further disadvantage of common automatic locks of the prior art derives from the fact that, in order to test the closure mechanism, it is necessary to mount on the frame the door in which the lock in question is installed. Only in this way, in fact, is the contact possible between the pressure-switch latch and jamb that actuates the mechanism of closure to be tested.

[0006] Furthermore, automatic security locks of the prior art are provided with a handle pawl configured to co-operate with the slider in order to retract the cylinders of the bolt and be able to perform the opening of the lock. In order to be able to block the operation of the handle pawl and prevent unwanted openings of the lock by means of this pawl, known security locks are often provided with a mechanism for blocking the slider, which is different and independent from the one that performs the opening by means of the key. The presence of this additional blocking mechanism, however, increases the number of lock components by a not inconsiderable

amount. A high number of components is, however, a possible source of malfunctioning due to the inevitable friction created by imperfections in assembly or simply wear and tear. The problem of reducing the number of components as far as possible, using the same mechanisms to perform several functions, is therefore always felt in the industry.

[0007] Finally, automatic security locks of the electric type are also known in the window and door sector. The latter comprise an electric motor together with a unit for its power supply. The motor in particular has the function of opening the lock and it is often possible to activate it also remotely via appropriate applications on smartphones. One of the possible disadvantages that can occur in locks with electric opening is that, due to voltage fluctuations, the motor activates, resulting in unwanted opening. Similarly, it is also possible that the user accidentally activates the motor activation commands via the software applications controlling the motor itself, resulting in an unwanted opening of the lock.

OBJECTS AND SUMMARY OF THE INVENTION

[0008] The object of the present invention is, therefore, to provide an assembly of components for security locks which is such as to allow the opening of the lock by means of a key, with a movement occurring in a single time, without the need to release the grip of the keys during this movement.

[0009] This object is achieved by the assembly for security locks of the present invention, in that comprising:

- a case comprising at least one bottom and a front provided with at least one hole, the plane of the front being incident to the plane of the bottom;
- a bolt comprising at least one cylinder configured to traverse the hole of the front by moving from a first position in which it is retracted into the case to a second position in which it has exited from the case, and vice versa;
- a slider comprising a plate parallel to the bottom of the case, said slider being configured to move from a first position to a second position and to co-operate with the bolt in such a way that, when the at least one cylinder of the bolt is in its second position the slider is in its first position and when the at least one cylinder of the bolt is in its first position the slider is in its second position;
- a cylinder for key provided with a first toothed cam, said first toothed cam being rotatable by means of a key;
- a second toothed cam configured to co-operate with said first toothed cam in such a way that when the first toothed cam rotates in a first direction, the second toothed cam rotates in a second direction, opposite to the first direction;
- a cogged wheel provided with a first pin and with a second pin, said cogged wheel being hinged to a fixed pin integral with the bottom of the case; and
- a transmission lever hinged to the fixed pin and rotatable around the fixed pin.

[0010] The cogged wheel is configured to co-operate with the second toothed cam, in such a way that, when the first toothed cam rotates through a first angle (a) smaller or equal to 200°, the cogged wheel also rotates through a second angle (β) in a first direction. The transmission lever is, then, configured to co-operate with the cogged wheel and the slider, in such a way that, when the cogged wheel rotates through the second angle, the transmission lever also rotates in the first direction, the slider translates from its first to its second position and the cylinders of the bolt re-enter the case.

[0011] Thanks to the presence of the transmission lever and, therefore, to the fact that the contact between cogged wheel and slider is not a direct contact, the amplitude of the rotation that is necessary to make the key carry out in order for opening to occur is reduced. In this way, i.e. with a rotation smaller than 200°, it is no longer necessary to interrupt the rotation by releasing the grip of the key, and to divide the operation of opening into two stages, but it becomes possible to carry out the opening with an uninterrupted movement of the user's hand. This solves the problem of collisions between key and door, which can aesthetically damage the latter.

[0012] A second object of the present invention is then to provide an assembly of components for security locks with automatic closure which also allows for an emergency manual closure to be used in the event of malfunctions of the automatic closure mechanism. A third object of the present invention is then also to provide an assembly of components for security locks with automatic closure which allows for testing, in particular on the closure, also before fitting of the door on the intended frame.

[0013] In order to achieve the second and the third object, the assembly for security locks of the present invention includes a locking pawl configured to co-operate with the cogged wheel and the slider, in such a way that when the cogged wheel rotates in a second direction opposite to the first direction, the locking pawl also rotates in the second direction, moving from a first position to a second position, and the slider translates from its second position to its first position. The translation of the slider from its second to its first position causes the cylinders of the bolt to exit from the case and, therefore, thanks to the presence of the locking pawl, should there be malfunctions in the automatic closing mechanisms, it is always possible to perform an emergency closing of the assembly, as well as a closure test even without mounting the door on the frame.

[0014] A fourth object of the present invention is, finally, to reduce in this way the number of components of the assembly and, therefore, of possible friction which may cause malfunctions.

[0015] To this end, the locking pawl is further configured to co-operate with the same cogged wheel of the

opening mechanism by means of a key described above, in such a way as to prevent the translation of the slider from its first position to its second position, when the locking pawl is in its second position. For this co-operation to take place, the slider can be provided with a protuberance, which is essentially a plate perpendicular to the plate of the slider. Alternatively, the abovementioned protuberance, instead of being an integral part of the slider, can be part of another element, in the shape of a letter C with two arms parallel one to the other and one perpendicular to the other two, which is often present in automatic security locks. This element has the function of blocking the upward translation of the slider and therefore the opening of the lock, in the event of break-in attempts. Here below, therefore, this element is referred to as the 'anti-break-in element'. This element is mobile and is configured to interact with a rack (or more simply a linear element provided with teeth) fixed to the case. For this purpose, the anti-break-in element is hinged on the slider and is therefore rotatable around the point of hinging. In the event of a break-in, a possible attempt to make the slider translate upwards causes the rotation of the anti-break-in element, in such a way that one of the two parallel arms gets caught between the teeth of the rack, thus preventing further upward translation of the slider. To summarise, the protuberance that co-operates with the locking pawl can be either an integral part of the slider or an integral part of the anti-break-in element.

[0016] The locking pawl is mounted in such a way as to co-operate with the upper surface of the protuberance, while the transmission lever and the optional handle pawl are mounted so as to co-operate with the lower surface of this protuberance. In this way, when the locking pawl finds itself being rotated into its second position, it will be in contact with the upper surface of the abovementioned protuberance and any attempt to make the slider translate upwards, acting on the lower surface of the protuberance, will be blocked. Thanks to this feature of the locking pawl, it is, therefore, possible to block the lock so as to prevent opening thereof, without using an additional mechanism with a large number of components.

[0017] A fifth object of the present invention is, finally, to provide an assembly of components for security locks with motorised opening which allows accidental openings of the lock itself to be avoided.

[0018] The assembly for locks of the present invention can, in fact, also comprise some elements configured for the electric opening of the assembly. In particular, the assembly that is the subject of the present description may comprise:

- an electric motor configured to make the cylinders of the bolt retract into the case, performing the passage of the assembly from the configuration of closure to the configuration of opening;
- a unit for powering the motor; and
- a microswitch configured to co-operate with the locking pawl, in such a way that, when the locking pawl is in contact with the microswitch, the electric motor is capable of making the cylinders of the bolt retract into the case, whereas when the locking pawl has no contact with the microswitch, the electric motor is prevented from making the cylinders of the bolt retract into the case.

[0019] The microswitches can be of the 'lever', 'roller' or 'proximity sensor' type. In order to better achieve the fifth object, the microswitch of the present invention is preferably, of the "lever" type. More particularly, such a microswitch is provided with a main body and with a flexible tab configured to be reversibly pressed on the main body by the locking pawl in such a way that when the flexible tab is pressed on the main body of the microswitch, the electric motor is able to make the cylinders of the bolt retract into the case, whereas when the flexible tab is not pressed on the main body of the microswitch, the electric motor is prevented from making the cylinders of the bolt retract into the case. In this way, the locking pawl, when actuated, i.e. rotated into its second position, is able to block the functioning of the motor and, therefore, any openings caused by unintended actuation of the motor itself.

[0020] These and further features of the present invention will be made clearer from the reading of the following detailed description relating to some preferred embodiments of the present invention, to be considered by way of a non-limiting example of the more general concepts claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The following description refers to the accompanying drawings, in which:

- Figure 1 is a front view of a detail of a first embodiment of the assembly of the present invention in the configuration of closure;
- Figure 2 is a front view of a detail of a first embodiment of the assembly of the present invention in the configuration of opening;
- Figure 3 is a front view of a detail of a first embodiment of the assembly of the present invention in the configuration of closure, with the locking pawl in its second position;
- Figure 4a is a front view of a detail comprising the handle pawl, of a first embodiment of the assembly of the present invention, in the configuration of closure;
- Figure 4b is a front view of a detail comprising the handle pawl, of a first embodiment of the assembly of the present invention, in the configuration of opening;
- Figure 5 is a front view of a detail of a second embodiment of the assembly of the present invention in the configuration of closure;
- Figure 6 is a front view of a detail of a second em-

bodiment of the assembly of the present invention in the configuration of opening;

- Figure 7 is a front view of a detail of a second embodiment of the assembly of the present invention in the configuration of closure, with the locking pawl in its second position;
- Figure 8a is a front view of a detail comprising the handle pawl, of a second embodiment of the assembly of the present invention, in the configuration of closure;
- Figure 8b is a front view of a detail comprising the handle pawl, of a second embodiment of the assembly of the present invention, in the configuration of opening;
- Figure 9 is a front view of a detail of a third embodiment of the assembly of the present invention, in the configuration of closure, with the locking pawl in its second position and with the microswitch engaged;
- Figure 10 is a front view of a detail of a third embodiment of the assembly of the present invention, in the configuration of closure, with the locking pawl in its first position and with the microswitch free;
- Figure 11 is a front view of a detail of a fourth embodiment of the assembly of the present invention, in the configuration of closure, with the locking pawl in its second position and with the microswitch engaged;
- Figure 12 is a front view of a detail of a fourth embodiment of the assembly of the present invention, in the configuration of closure, with the locking pawl in its first position and with the microswitch free;
- Figure 13 is a front view of some elements of a third embodiment of the assembly of the present invention;
- Figure 14a is a front view of a front view of a detail of the first and third embodiments of the assembly of the present invention made up of the slider;
- Figure 14b is a front view of a detail of the second and fourth embodiments of the assembly of the present invention made up of the slider together with the anti-break-in element;
- Figure 14c is a front view of a detail of the second and fourth embodiments of the assembly of the present invention made up of the anti-break-in element;
- Figure 15a is a front view of a detail of the second and fourth embodiments of the assembly of the present invention together with a rack configured to interact with the anti-break-in element, said anti-break-in element being in a rest configuration; and
- Figure 15b is a front view of a detail of the second and fourth embodiments of the assembly of the present invention together with a rack configured to interact with the anti-break-in element, said anti-break-in element being in an actuation configuration.

DETAILED DESCRIPTION OF THE INVENTION

[0022] Referring to Figures 1, 2 and 3, 4a, 4b, 13 and 14a, a first embodiment of an assembly (100) for locks according to the present invention comprises:

- a case (101) comprising at least one bottom and a front having at least one hole, the plane of the front being incident to the plane of the bottom;
- a bolt comprising at least one cylinder configured to traverse the hole of the front moving from a first position in which it is retracted inside the case to a second position in which it has exited from the case, and vice versa;
- a slider (106) configured to translate from a first position to a second position, said slider (106) comprising a plate parallel to the bottom of the case (101);
- a cylinder (102) for key provided with a first toothed cam (102');
- a second toothed cam (105) configured to co-operate with said first toothed cam (102') in such a way that when the first toothed cam (102') rotates in a first direction, the second toothed cam (105) rotates in a second direction, opposite to the first direction;
- a cogged wheel (103) provided with a first pin (103') and with a second pin (103') both integral with said cogged wheel (103);
- a transmission lever (107);
- a locking pawl (108); and
- a handle pawl (120).

[0023] The slider (106) also comprises a protuberance (106') that extends from the plate, said protuberance (106') being, in turn, a plate perpendicular to the plate of the slider (106). The protuberance (106') is, therefore, a parallelepiped having a lower surface, an upper surface, a front surface and two side surfaces. A further surface of the protuberance (106') is in common with the plate of the slider (106). For the purposes of the present description, the terms "lower" and "upper" referred to the surfaces of the protuberance are intended to be referred to the condition of assembly installed on a door already mounted on a frame.

[0024] The cogged wheel (103) is configured to co-operate with the second toothed cam (105) which, as mentioned above, is in turn configured to co-operate with the first toothed cam (103). The first toothed cam (102) is rotatable by means of a key. The second toothed cam (105) is optional, in that the cogged wheel (103) can also co-operate directly with the first toothed cam (102).

[0025] The cogged wheel (103) is then hinged to a fixed pin (110), around which the cogged wheel (103) is rotatable, said fixed pin (110) being integral with the bottom of the case (101). To the same fixed pin (110) is also hinged a first end (107') of the transmission lever (107), which is also rotatable around the fixed pin (110).

[0026] The transmission lever (107) is configured to co-operate with the cogged wheel (103) and the slider

(106) and, in particular, to transform a rotary motion of the cogged wheel (103) into a translatory motion of the slider (106). For this purpose, the transmission lever (107) is provided with a concavity (117) configured to reversibly accommodate the second pin (103') of the cogged wheel (103) and of a pin (109) which is placed at a second end (107') of the transmission lever (107) and is configured to co-operate with the lower surface of the protuberance (106') of the slider (106) in such a way that, when the transmission lever (107) rotates in a first direction, or anticlockwise direction (with reference to the accompanying drawings), the slider (106) translates from its first position to its second position and, consequently, the at least one cylinder of the bolt moves from its second position to its first position. In fact, when the cogged wheel (103) rotates in the first direction, the transmission lever (107), pushed by the second pin (103") of the cogged wheel (103), also rotates in the first direction, or anticlockwise direction, moving from a first position to a second position, and the pin (109) of the transmission lever (107), interacting with the lower surface of the protuberance (106") of the slider (106), pushes the slider (106) itself upwards.

[0027] The locking pawl (108) is instead configured to co-operate with the cogged wheel (103) and the slider (106) and, in particular, to transform a rotary motion in a second direction, opposite to the first direction, of the cogged wheel (103) into a translatory motion of the slider (106). For this purpose, the locking pawl (108) is provided with a concavity (118) configured to reversibly accommodate the first pin (103') of the cogged wheel (103) and with a tooth (108') configured to co-operate with the upper surface of the protuberance (106') of the slider (106), in such a way that, when the locking pawl (108) rotates in a second direction (clockwise direction, with reference to the accompanying drawings) opposite to the first direction (anticlockwise direction, with reference to the accompanying drawings), the slider (106) is made to translate from its second position to its first position. More particularly, when the cogged wheel (103) rotates in the second direction (or clockwise direction, with reference to the accompanying drawings), the locking pawl (108), pushed by the first pin (103') of the cogged wheel (103), also rotates in the second direction, passing from a first position to a second position, and the tooth (108') of the locking pawl (108), interacting with the upper surface of the protuberance (106') of the slider (106), makes the slider translate downwards to its first position and, consequently, the at least one cylinder of the bolt passes from its first position to its second position, exiting the case.

[0028] The locking pawl (108) is further configured to block the translatory motion of the slider (106), should a rotational motion of the cogged wheel (103) take place, in a second direction opposite to the first direction. In fact, once the slider (106) has reached its first position, the tooth (108') of the locking pawl (108) prevents a new translation upwards thereof, i.e. it prevents the translation of the slider (106) from its first position to its second position and, therefore, the translation of the at least one cylinder of the bolt from its second position to its first position.

[0029] The handle pawl (120) is then configured to co-operate with the slider (106) in such a way that the slider (106) translates from its first position to its second position, when the handle pawl (120) rotates in the first direction (or anticlockwise direction, with reference to the accompanying drawings). For this purpose, the handle pawl (120) is provided with a tooth (121), configured to co-operate with the lower surface of the protuberance (106') of the slider (106). The translation of the slider (106) takes place, therefore, when, as a result of the rotation of the handle pawl (120), the tooth (121) of the handle pawl (120), interacting with the lower surface of the protuberance (106') of the slider (106), pushes the slider (106) itself upwards and, consequently, makes the at least one cylinder of the bolt retract into the case. The handle pawl (120) can be made to rotate by means of a classic handle and, for this purpose, the handle pawl (120) comprises an aperture (122) for the housing of the handle.

[0030] On the basis of what is described above and of the terminology introduced so far, the functioning of the first embodiment (100) of the assembly for locks of the present invention is described here below.

[0031] The passage of the first embodiment of the assembly (100) from the configuration of closure to the configuration of opening may take place by means of the use of a key or of a handle. More particularly, by turning a key in the first direction (anticlockwise direction with reference to the accompanying drawings), inside the cylinder (102), through a first angle (a) smaller than or equal to 200°, the toothed cam (102') of the cylinder for key also rotates, consequently, in the first direction (anticlockwise direction in the accompanying drawings). The first angle (a) is, preferably, comprised between 110° and 150° and, even more preferably, is 126°. The rotation of the toothed cam (102') of the cylinder (102) for key causes the rotation in the second direction (or clockwise direction in the accompanying drawings) of the second toothed cam (105), which, in turn, causes the rotation in the first direction (or anticlockwise direction in the accompanying drawings) of the cogged wheel (103) through a second angle (β), said second angle (β) being smaller than or equal to 60°. Said second angle (β) is preferably equal to one third of the first angle (a). When the cogged wheel (103) rotates in the first direction (or anticlockwise direction with reference to the accompanying drawings), its second pin (103"), which is received by the cavity (117) of the transmission lever (107), causes the rotation of the latter in the first direction, or anticlockwise direction, making it move from its first position to its second position. The tooth (109) of the transmission lever (107), interacting with the upper surface of the protuberance (106') of the slider (106), then pushes the slider (106) upwards, making it translate from its first position to its second po-

sition. The at least one cylinder of the bolt, as a result, retracts into the case, moving from its second to its first position thereby causing the opening of the assembly (100) and of the lock of which the assembly (100) is a part.

[0032] The passage of the assembly (100) from the configuration of closure to the configuration of opening by means of the use of a handle instead takes place in the following manner. By means of a classic handle housed in the aperture (122) of the same handle pawl (122), the handle pawl (120) can be rotated in the first direction (or anticlockwise with reference to the accompanying drawings), from its first to its second position. The tooth (121) of the handle pawl (120), interacting with the lower surface of the protuberance (106') of the slider (106), pushes the slider (106) itself upwards, making it pass from its first to its second position. As already described above, as a result of the translation of the slider (106), the at least one cylinder of the bolt (106) re-enters the case passing from its second to its first position thereby causing the opening of the assembly (100) and of the lock of which the assembly (100) is a part. By means of the action of a key, as well as thanks to the presence of the locking pawl (108), it is also possible to effect the change from the configuration of opening to the configuration of closure. More particularly, by turning a key in a second direction, i.e. clockwise with reference to the accompanying drawings, inside the cylinder (102), through a first angle (*a*) smaller than or equal to 200°, the toothed cam (102') of the cylinder for key also rotates, accordingly, in the second direction. The first angle (*a*) is, preferably, between 110° and 150° and, even more preferably, is 126°. The rotation in the second direction of the toothed cam (102') of the cylinder (102) for key causes the rotation in the first direction (or anticlockwise direction in the accompanying drawings) of the second toothed cam (105) which, in turn, causes the rotation in the second direction (or clockwise direction in the accompanying drawings) of the cogged wheel (103) through a second angle (β), said second angle (β) being smaller than or equal to 60°. Said second angle (β) is preferably equal to one third of the first angle (*a*). When the cogged wheel (103) rotates in the second direction, its first pin (103'), which is received by the cavity (118) of the locking pawl (108), causes the rotation of the latter in the second direction, or clockwise with reference to the accompanying drawings, making it pass from its first to its second position. The tooth (108') of the locking pawl (108), interacting with the upper surface of the protuberance (106') of the slider (106), pushes the slider (106) itself downwards, causing it to move from its second to its first position. As a result, the at least one cylinder of the bolt exits the case, moving from its first to its second position. Once the slider (106) is in its first position, the tooth (108') of the locking pawl (108) then blocks the upward movement of the slider (106), preventing translation thereof from its first to its second position, also if an attempt is made to perform this translation by means of the handle pawl (120).

[0033] Referring to Figures 5, 6 and 7, 8a, 8b, 13,14b, 14c, 15a and 15b, a second embodiment of an assembly (200) for locks according to the present invention comprises:

- a case (201) comprising at least one bottom and a front provided with at least one hole, the plane of the front being incident to the plane of the bottom;
- a bolt comprising at least one cylinder configured to traverse the hole of the front by moving from a first position in which it is retracted inside the case to a second position in which it has exited the case, and vice versa;
- a slider (206) configured to translate from a first position to a second position, said slider (206) comprising a plate parallel to the bottom of the case (201);
- a cylinder (202) for key provided with a first toothed cam (202');
- a second toothed cam (205) configured to co-operate with said first toothed cam (202') in such a way that when the first toothed cam (202') rotates in a first direction, the second toothed cam (205) rotates in a second direction, opposite to the first direction;
- a cogged wheel (203) provided with a first pin (203') and with a second pin (203') both integral with said cogged wheel (203);
- an anti-break-in element (240) provided with a first arm (241) hinged on the slider (206), and with a second and third arm (241', 241"), preferably parallel one to the other and which extend from said first arm and are, preferably, perpendicular to said first arm (241);
- a transmission lever (207);
- a locking pawl (208); and
- a handle pawl (220).

[0034] The anti-break-in element (240) is configured to interact with a rack (250) fixed to the case (201). For this purpose, the anti-break-in element (240) is hinged on the slider (206) and is therefore rotatable around the point of hinging. In the event of a break-in, a possible attempt to make the anti-break-in element (240) translate upwards causes the rotation of the anti-break-in element (240) from its rest configuration shown in Fig. 15a to its activation configuration, shown in Fig. 15b, in such a way that one (241') of its second (241') and third (241") arms (241') jams between the teeth (251, 251') of the rack (250), thereby preventing a further upward translation of the slider (206).

[0035] The parallel arms (241', 241') of the anti-break-in element (240) are, therefore, two parallelepipeds having a lower surface, an upper surface, a front surface and two lateral surfaces. A further surface of the second and third arms (241', 241") of the anti-break-in element (240) is in common with the first arm (241). For the purpose of this description, the terms "lower" and "upper" referred to the surfaces of the second and third arms (241', 241") of the anti-break-in element (240) are intended to be re-

ferred to the condition of assembly installed on a door already mounted on a frame.

[0036] The cogged wheel (203) is configured to co-operate with the second toothed cam (205), which, as mentioned above is in turn configured to co-operate with the first toothed cam (203). The first toothed cam (202) is rotatable by means of a key. As already stated for the first embodiment, also in the second embodiment the second toothed cam (205) is optional, in that the cogged wheel (203) can also co-operate directly with the first toothed cam (202).

[0037] The cogged wheel (203) is then hinged to a fixed pin (210), around which the cogged wheel (203) is rotatable, said fixed pin (210) being integral with the bottom of the case (201). Hinged to the same fixed pin (210) is also a first end (207') of the transmission lever (207), which is also therefore rotatable around the fixed pin (210).

[0038] The transmission lever (207) is configured to co-operate with the cogged wheel (203) and, via the anti-break-in element (240), with the slider (206) and, in particular, to transform a rotary motion of the cogged wheel (203) into a translatory motion of the slider (206). For this purpose, the transmission lever (207) is provided with a concavity (217) configured to reversibly accommodate the second pin (203") of the cogged wheel (203) and with a pin (209) positioned at a second end (207") of the transmission lever (207) and is configured to co-operate with the lower surface of the second arm (241") of the anti-break-in element (240) in such a way that, when the transmission lever (207) rotates in a first direction, or anticlockwise direction (with reference to the accompanying drawings), the anti-break-in element translates upwards (206), causing, in turn, the slider (206) to translate from its first position to its second position. As a consequence of the translation of the slider (206), then, the at least one cylinder of the bolt moves from its second to its first position. In fact, when the cogged wheel (203) rotates in the first direction, the transmission lever (207), pushed by the second pin (203") of the cogged wheel (203), also rotates in the first direction, or anticlockwise direction, moving from a first position to a second position, and the pin (209) of the transmission lever (207), interacting with the lower surface of the second arm (241') of the anti-break-in element (240), pushes the anti-break-in element (240) itself upwards and, consequently, the slider (206) to which said anti-break-in element (240) is hinged. The locking pawl (208) is instead configured to co-operate with the cogged wheel (203) and, via the anti-break-in element (240), with the slider (206) and, in particular, to transform a rotary motion in a second direction, opposite to the first direction, of the cogged wheel (203) into a translatory motion of the slider (206). For this purpose, the locking pawl (208) is provided with a concavity (218) configured to reversibly accommodate the first pin (203') of the cogged wheel (203) and with a tooth (208') configured to co-operate with the upper surface of the second arm (241') of the anti-break-in element (240), in such a way that, when the locking pawl (208) rotates in a second direction (clockwise direction, with reference to the accompanying drawings), opposite to the first direction (anticlockwise direction, with reference to the accompanying drawings), the anti-break-in element (240) is made to translate downwards. Consequently, the slider (206) is made to translate from its second position to its first position. More particularly, when the cogged wheel (203) rotates in the second direction (or clockwise direction, with reference to the accompanying drawings), the locking pawl (208), pushed by the first pin (203') of the cogged wheel (203), also rotates in the second direction, moving from a first position to a second position, and the tooth (208') of the locking pawl (208), interacting with the upper surface of the second arm (241') of the anti-break-in element (240), makes the anti-break-in element (240) itself translate downwards and therefore the slider (106) which in this way moves into its first position. The downward translation of the slider (206) then causes the at least one cylinder of the bolt to move from its first position to its second position, and i.e. the removal of said cylinder of the bolt from the case (201).

[0039] The locking pawl (208) is further configured to block the translatory motion of the slider (206), should a rotational motion of the cogged wheel (203) take place, in a second direction opposite to the first direction. In fact, once the slider (206) has reached its first position, the tooth (208') of the locking pawl (208) prevents a further upward translation of the anti-break-in element (240) and, therefore, of the slider (206) to which the anti-break-in element (240) is hinged. By preventing the movement of the slider (206) from its first position to its second position, the translation of the at least one cylinder of the bolt from its second to its first position is, accordingly, also prevented. The handle pawl (220) is, then, configured to co-operate, indirectly, and i.e. by means of the anti-break-in element (240), with the slider (106), in such a way that the slider (206) translates from its first position to its second position, when the handle pawl (220) rotates in the first direction (or anticlockwise direction, with reference to the accompanying drawings). For this purpose, the handle pawl (220) is provided with a tooth (221), configured to co-operate with the lower surface of the second arm (241') of the anti-break-in element (240). The translation of the anti-break-in element (240) and therefore of the slider (206) takes place when, as a consequence of the rotation of the handle pawl (220), the tooth (221) of the handle pawl (220) interacts with the lower surface of the second arm (241) of the anti-break-in element (240) and pushes the anti-break-in element (240) itself upwards. As a result of this, the slider (206) is also pushed upwards and, consequently, causes the at least one cylinder of the bolt to retract into the case (201). The handle pawl (220) can be made to rotate by means of a classic handle and, for this purpose, the handle pawl (220) comprises an aperture (222) for the housing of the handle.

[0040] On the basis of what is described above and of the terminology introduced hitherto, the functioning of the

second embodiment (200) of the assembly for locks of the present invention is described here below.

[0041] The passage of the first embodiment of the assembly (200) from the configuration of closure to the configuration of opening can take place by means of the use of a key or of a handle. More particularly, by turning a key in the first direction (anticlockwise direction with reference to the accompanying drawings), inside the cylinder (202), through a first angle (*a*) smaller than or equal to 200°, the toothed cam (202') of the cylinder for key also rotates, accordingly, in the first direction (anticlockwise direction in the accompanying drawings). The first angle (*a*) is, preferably, comprised between 110° and 150° and even more preferably is 126°. Rotation of the toothed cam (202') of the cylinder (202) for key causes rotation in the second direction (or clockwise direction in the accompanying drawings) of the second toothed cam (205), which in turn causes rotation in the first direction (or anticlockwise direction in the accompanying drawings) of the cogged wheel (103) through a second angle (β), said second angle (β) being smaller than or equal to 60°. Said second angle (β) is preferably equal to one third of the first angle (*a*). When the cogged wheel (203) rotates in the first direction (or anticlockwise direction, with reference to the accompanying drawings), its second pin (203"), received by the cavity (217) of the transmission lever (207), causes rotation of the latter in the first direction, or anticlockwise direction, causing it to move from its first position to its second position. The tooth (209) of the transmission lever (207), interacting with the upper surface of the second arm (241) of the anti-break-in element (240) pushes, therefore, the anti-break-in element (240) itself upwards. As a result, the slider (206) translates from its first to its second position. The at least one cylinder of the bolt retracts, therefore, into the case, moving from its second to its first position thereby causing the opening of the assembly (200) and of the lock of which the assembly (200) is a part.

[0042] The passage of the assembly (100) from the configuration of closure to the configuration of opening by means of the use of a handle takes place instead in the following manner. By means of a classic handle housed in the aperture (222) of the same handle pawl (220), the handle pawl (220) can be rotated in the first direction (or anticlockwise, with reference to the accompanying drawings) from its first to its second position. The tooth (221) of the handle pawl (220), interacting with the lower surface of the second arm (241') of the anti-break-in element (240), pushes the anti-break-in element (240) itself upwards and the slider (206) moves from its first to its second position. As already described above, as a result of the translation of the slider (206), the at least one cylinder of the bolt retracts into the case passing from its second to its first position thereby causing the opening of the assembly (200) and of the lock of which the assembly (200) is a part.

[0043] By means of the action of a key, as well as thanks to the presence of the locking pawl (208), it is also possible to carry out the passage from the configuration of opening to the configuration of closure. More particularly, by turning a key in a second direction, i.e. clockwise with reference to the accompanying drawings, inside the cylinder (202), through a first angle (*a*) smaller than or equal to 200°, the toothed cam (202') of the cylinder for key also rotates, accordingly, in the second direction. The first angle (*a*) is, preferably, between 110° and 150° and, even more preferably, is 126°. The rotation in the second direction of the toothed cam (202') of the cylinder (202) for key causes the rotation in the first direction (or anticlockwise direction in the accompanying drawings) of the second toothed cam (205), which in turn causes the rotation in the second direction (or clockwise direction in the accompanying drawings) of the cogged wheel (203) through a second angle (β), said second angle (β) being smaller than or equal to 60°. Said second angle (β) is, preferably, equal to one third of the first angle (*a*). When the cogged wheel (203) rotates in the second direction, its first pin (203'), received by the cavity (218) of the locking pawl (208), causes the rotation of the latter in the second direction or clockwise with reference to the accompanying drawings, causing it to move from its first to its second position. The tooth (208') of the locking pawl (208), interacting with the upper surface of the second arm (241') of the anti-break-in element (240), pushes the anti-break-in element (240) itself downwards and the slider (206) moves from its second to its first position. As a result, the at least one cylinder of the bolt exits the case, moving from its first to its second position. Once the slider (206) is in its first position, the tooth (208') of the locking pawl (208) blocks, then, the upward movement of the anti-break-in element (240) and, therefore, of the slider (206), preventing its translation from its first to its second position, even if an attempt is made to carry out this translation by means of the handle pawl (220).

[0044] Referring to Figures 9, 10 and 13, a third embodiment (200) of the assembly for locks of the present invention comprises all the components of the first embodiment described above with the addition of an electric motor, a unit for powering said motor and a microswitch (130). The electric motor, not shown in the drawing, is configured to make the cylinders of the bolt retract and in this way perform the passage of the assembly (300) from the configuration of closure to the configuration of opening. In the third embodiment of the assembly (300), there is provided the presence of a microswitch (130) configured to co-operate with the locking pawl (108), in such a way that, when said locking pawl (108) is in contact with the microswitch (130), the electric motor can act, causing the cylinders of the bolt to retract. Whereas, when the locking pawl (108) has no contact with the microswitch (130), the functioning of the motor is inhibited and it cannot therefore carry out the opening of the assembly. For this purpose, the microswitch (130) is provided with a main body (132) and with a flexible tab (131) configured to be pressed reversibly on the main body by the locking pawl (108). In other words, when the locking

pawl (108) is in its first position, i.e., is in contact with the microswitch (130), the latter is not free, in that the flexible tab (131) is pressed on the main body (132) of the microswitch, as shown in Figure 9. In this situation, i.e. when the microswitch is fixed, the motor can freely perform its function of opening of the assembly (300) for locks and, therefore, of the lock itself. When, instead, the locking pawl (108) is in its second position, i.e., it is not in contact with the microswitch (130), the latter is free in that the flexible tab (131) is not pressed against the main body (132) of the microswitch, as shown in Figure 10. In this situation, i.e. when the microswitch is free, the functioning of the motor itself is inhibited, which, therefore, cannot freely perform its function of opening of the assembly (300) and, therefore, of the lock itself of which the assembly is part.

[0045] Referring to Figures 11, 12, 13, 14b, 14c, 15a and 15b, a fourth embodiment of an assembly (400) for locks according to the present invention comprises all the components of the first embodiment described above with the addition of an electric motor configured to perform, therefore, the passage of the assembly (300) from the configuration of closure to the configuration of opening, of a unit for supplying power to said motor and a microswitch (230). The passage from the configuration of opening to the configuration of closure can take place either by directly pushing the anti-break-in element (240) as described in relation to the second embodiment, or indirectly by means of an extension or a drive. In a wholly similar manner to what is described in the third embodiment of the assembly (300), the microswitch (230) is, then, configured to co-operate with the locking pawl (208), in such a way that, when said locking pawl (208) is in contact with the microswitch (230), the electric motor can act, making the cylinders of the bolt retract. Whereas, when the locking pawl (208) has no contact with the microswitch (130), the functioning of the motor is inhibited and it cannot therefore perform the opening of the assembly. For this purpose, the microswitch (230) is provided with a main body (232) and a flexible tab (231) configured to be pressed reversibly on the main body by the locking pawl (208). In other words, when the locking pawl (208) is in its first position, i.e., it is in contact with the microswitch (230), the latter is not free, in that the flexible tab (231) is pressed on the main body (232) of the microswitch, as shown in Figure 11. In this situation, i.e. when the microswitch is fixed, the motor can freely perform its function of opening the assembly (400) for locks and, therefore, the lock itself. When, instead, the locking pawl (208) is in its second position, i.e., it is not in contact with the microswitch (230), the latter is free, in that the flexible tab (231) is not pressed on the main body (232) of the microswitch, as shown in Figure 12. In this situation, i.e. when the microswitch is free, the functioning of the motor itself is inhibited, which, therefore, cannot freely perform its function of opening the assembly (400) and, therefore, the lock itself of which the assembly is part.

[0046] The assembly (100, 200, 300, 400) for locks of the present invention, in both its embodiments, may comprise bolts of different types and can thus form part of different types of security locks. The bolt of the lock assembly (100, 200, 300, 400) of the present invention can, in particular, be like that described in the patent application EP4023841A1, wherein the cylinders are hollow and their lateral surface is provided with two longitudinal slots diametrically opposed one to the other and configured in such a way that the plate of the slider (106) can slide therein, or like that described in the patent IT201600103226A.

[0047] Finally, the assembly (100, 200, 300, 400) for locks, in both of its embodiments, can be used in a so-called "automatic" lock, such as for example that described in the patent IT201600103226A, in which the passage from the configuration of opening to the configuration of closure takes place automatically, following the interaction with the door jamb, thanks to the presence of a pressure-switch latch. In the case of automatic locks, as already mentioned above, the presence of the locking pawl (108, 208) is particularly advantageous since, should malfunctions of the mechanism that determines the automatic closure occur, it is always possible to manually perform the closure of the lock, thanks to the activation of said locking pawl (108, 208) by means of a key. Again with reference to automatic locks, the presence of the locking pawl (108, 208) is advantageous in that it is possible to carry out tests on the locking of the lock even before mounting. Such a test would instead be impossible if the closure were to take place only exclusively in automatic mode via contact of the pressure-switch latch with the door jamb.

Claims

1. Assembly (100, 200, 300, 400) for locks comprising:

- a case (101, 201) comprising at least one bottom and a front provided with at least one hole, the plane of the front being incident to the plane of the bottom;
- a bolt comprising at least one cylinder configured to pass through the hole of the front moving from a first position in which it is retracted into the case to a second position in which it has exited the case, and vice versa;
- a slider (106, 206) comprising a plate parallel to the bottom of the case (101, 201), said slider (106, 206) being configured to translate from a first position to a second position and to co-operate with the latch in such a way that, when the at least one cylinder of the bolt is in its second position, the slider (106, 206) is in its first position and, when the at least one cylinder of the bolt is in its first position, the slider (106) is in its second position;

- a cylinder (102, 202) for key provided with a first toothed cam (102', 202'), said first toothed cam (102', 202') being rotatable by means of a key; and
- a second toothed cam (105, 205) configured to co-operate with said first toothed cam (102', 202') such that when the first toothed cam (102', 202') rotates in a first direction, the second toothed cam (105, 205) rotates in a second direction, opposite to the first direction;

said assembly (100, 200, 300, 400) being **characterised in that** it comprises:

- a cogged wheel (103, 203) provided with a first pin (103', 203') and with a second pin (103", 203"), said cogged wheel (103, 203) being hinged to a fixed pin (110, 210) integral with the bottom of the case and being configured to co-operate with the second toothed cam (105, 205) in such a way that, when the first toothed cam (102', 202') rotates through a first angle (a) smaller than or equal to 200°, the cogged wheel (103, 203) also rotates through a second angle (β) in a first direction; and
- a transmission lever (107, 207) hinged to the fixed pin (110, 210) and rotatable around the fixed pin (110, 210), said transmission lever (107, 207) being configured to co-operate with the cogged wheel (103, 203) and the slider (106, 206), in such a way that when the cogged wheel (103, 203) rotates through the second angle (β), the transmission lever (107, 207) also rotates in the first direction and the slider (106, 206) moves from its first to its second position.

2. Assembly (100, 200, 300, 400) according to claim 1, wherein the second angle (β) is equal to one third of the first angle (a).

3. Assembly (100, 200, 300, 400) according to any one of the preceding claims, wherein the first angle (a) is comprised between 110° and 150°.

4. Assembly (100, 200, 300, 400) according to the preceding claim, wherein the first angle (a) is 126°.

5. Assembly (100, 300) according to any one of the preceding claims, wherein the slider (106) comprises a protuberance (106') that extends from the plate, said protuberance (106') being, in turn, a plate (106') perpendicular to the plate of the slider (106).

6. Assembly (100, 200, 300, 400) according to any one of the preceding claims, comprising a handle pawl (120, 220) configured to co-operate with the slider (106, 206) in such a way that the slider (106, 206) translates from its first position to its second position when the handle pawl (120, 220) rotates in the first direction.

7. Assembly (100, 300) according to claim 5 and 6, wherein the handle pawl (120) is provided with a tooth (121), configured to co-operate with the lower surface of the protuberance (106') of the slider (106), in such a way that, when the handle pawl (120) rotates in the first direction, the tooth (121) of the handle pawl (120), interacting with the lower surface of the protuberance (106') of the slider (106), causes the translation of the slider (106) from its first to its second position.

8. Assembly (100, 300) according to any one of claims 5 to 7, wherein the transmission lever (107) is provided:

- with a concavity (117) configured to reversibly accommodate the second pin (103") of the cogged wheel (103); and
- with a pin (109) configured to co-operate with the lower surface of the protuberance (106') of the slider (106) in such a way that, when the transmission lever (107) rotates in the first direction, the pin (109) of the transmission lever (107), interacting with the lower surface of the protuberance (106') of the slider (106), causes the translation of the slider (106) from its first to its second position.

9. Assembly (100, 200, 300, 400) according to any one of the preceding claims, comprising a locking pawl (108, 208) configured to co-operate with the cogged wheel (103, 203) and the slider (106, 206) in such a way that when the cogged wheel (103, 203) rotates in a second direction opposite to the first direction, the locking pawl (108, 208) also rotates in the second direction, moving from a first position to a second position, and the slider (106, 206) translates from its second position to its first position.

10. Assembly (100, 200, 300, 400) according to the preceding claim, wherein the locking pawl (108, 208) is further configured to co-operate with the cogged wheel (103, 203) so as to prevent the translation of the slider (106, 206) from its first position to its second position, when the locking pawl (108, 208) is in its second position.

11. Assembly (100, 300) according to claims 5 and 9, wherein the locking pawl (108) is provided with:

- a concavity (118) configured to reversibly accommodate the first pin (103') of the cogged wheel (103); and
- a tooth (108') configured to co-operate with the upper surface of the protuberance (106') of the

slider (106) in such a way that, when the locking pawl (108) rotates in the second direction, the tooth (108') of the locking pawl (108), interacting with the upper surface of the protuberance (106') of the slider (106), causes the translation of the slider (106) from its second position to its first position.

12. Assembly (100, 300) according to claims 5 and 10, wherein the tooth (108') of the locking pawl (108) is further configured to co-operate with the upper surface of the protuberance (106') of the slider (106) in such a way that, when the locking pawl (108) is in its second position, translation of the slider (106) from its first to its second position is prevented.

13. Assembly (200, 400) according to any one of the preceding claims 9 to 12, comprising:

- an electric motor configured to make the cylinders of the bolt retract into the case, performing the passage of the assembly (200, 400) from the configuration of closure to the configuration of opening;
- a unit to power the motor;
- a microswitch (130, 230) configured to co-operate with the locking pawl (108, 208), in such a way that, when the locking pawl (108, 208) is in contact with the microswitch (130, 230), the electric motor is capable of making the cylinders of the bolt retract into the case (101, 201), whereas, when the locking pawl (108, 208) has no contact with the microswitch (130, 230), the electric motor is prevented from making the cylinders of the bolt retract into the case (101, 201).

14. Assembly (200, 400) according to the preceding claim, wherein the microswitch (130, 230) is provided with a main body (132, 232) and with a flexible tab (131, 231) configured to be reversibly pressed on the main body (132, 232) by the locking pawl (108, 208) in such a way that, when the flexible tab (131, 231) is pressed onto the main body (132, 232) of the microswitch (130, 230), the electric motor is capable of making the cylinders of the bolt retract into the case (101, 201), whereas, when the flexible tab (131, 231) is not pressed on the main body (132, 232) of the microswitch (130, 230), the electric motor is prevented from making the cylinders of the bolt retract into the case (101, 201).

15. Security lock comprising an assembly (100, 200, 300, 400) according to any one of the preceding claims.

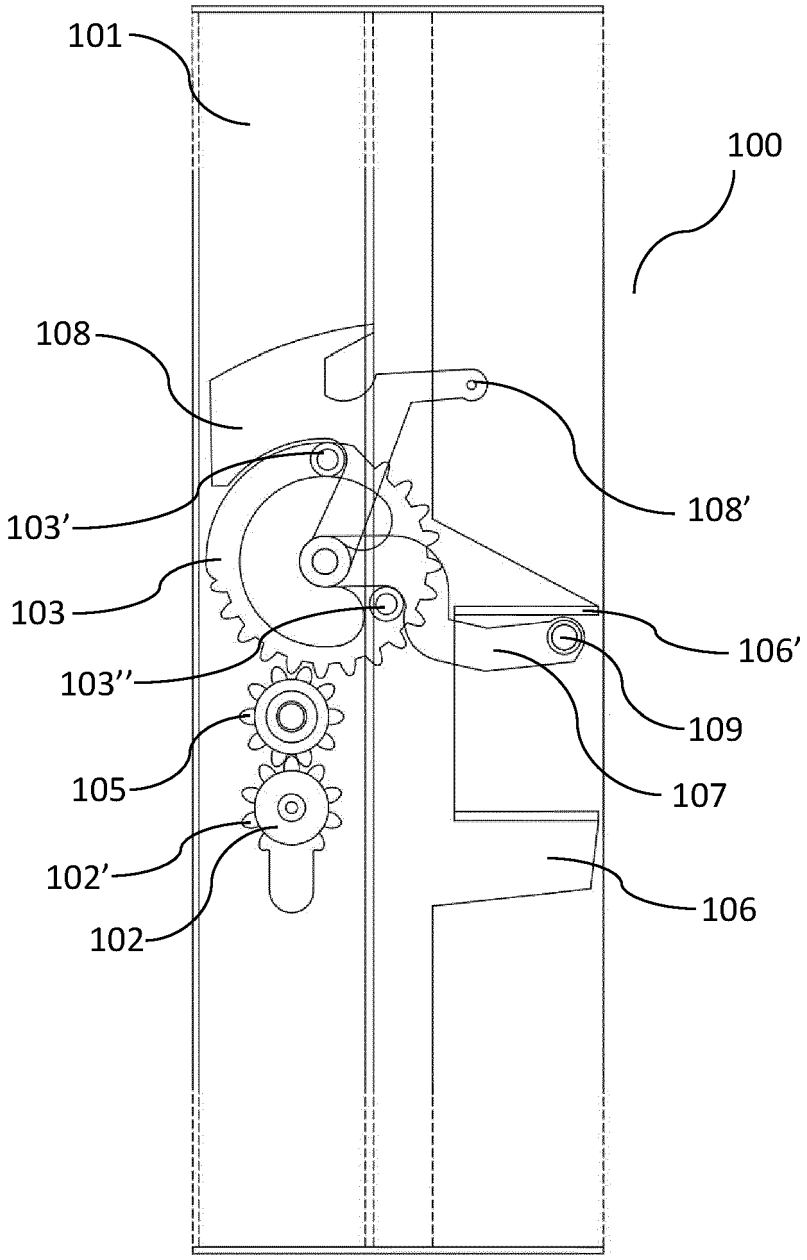


Fig.1

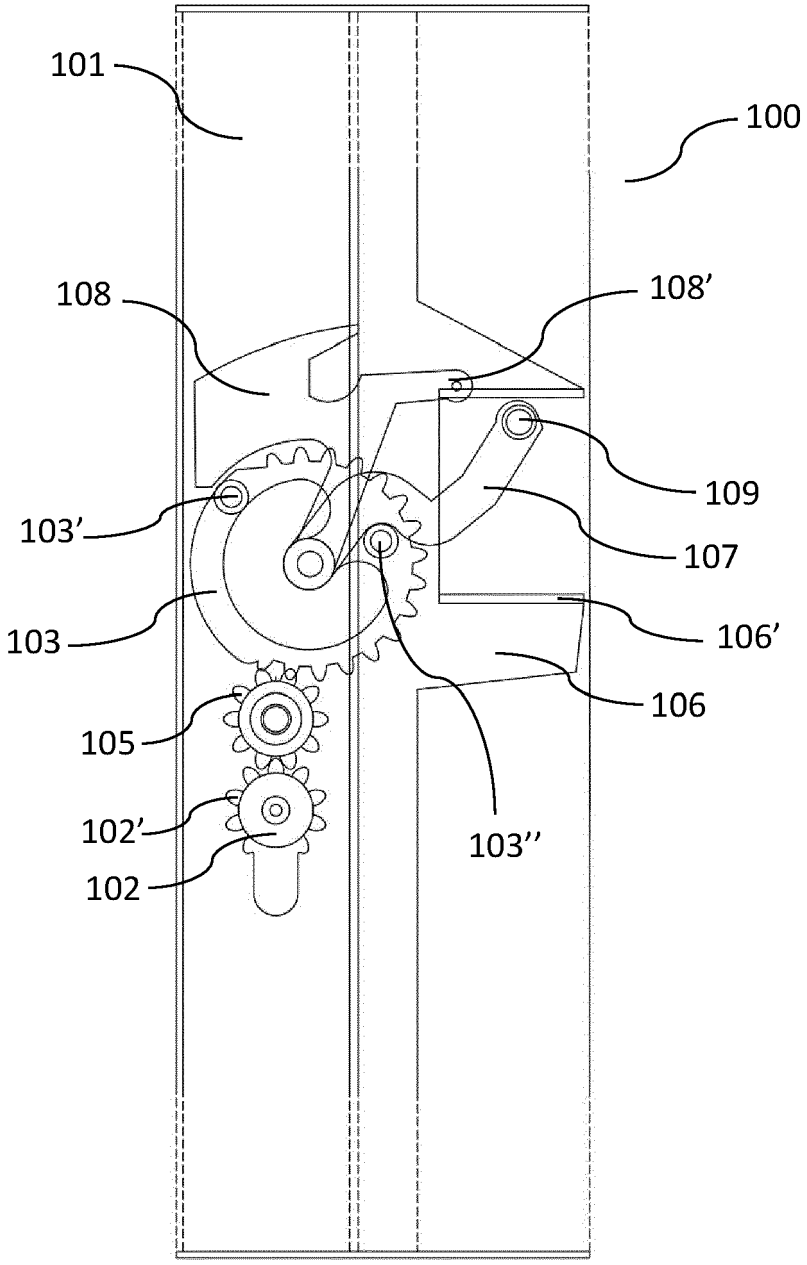


Fig.2

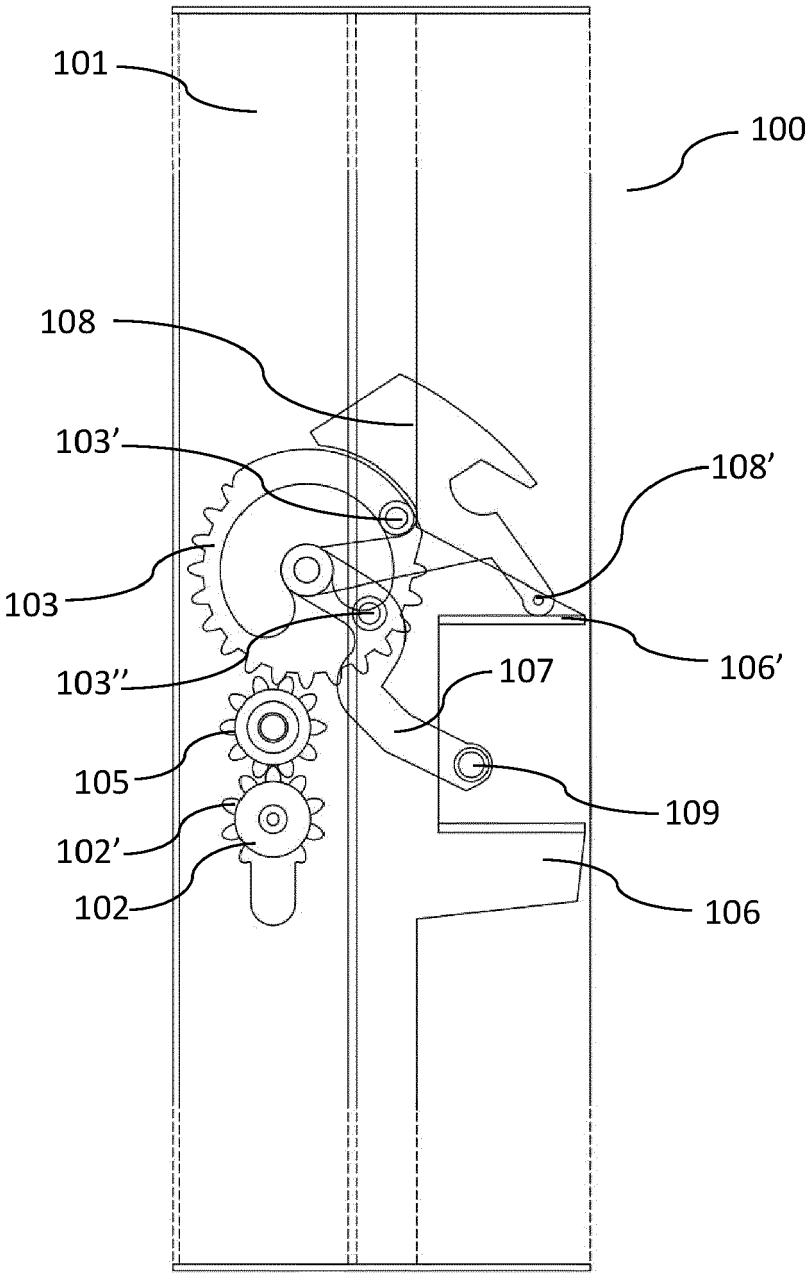


Fig.3

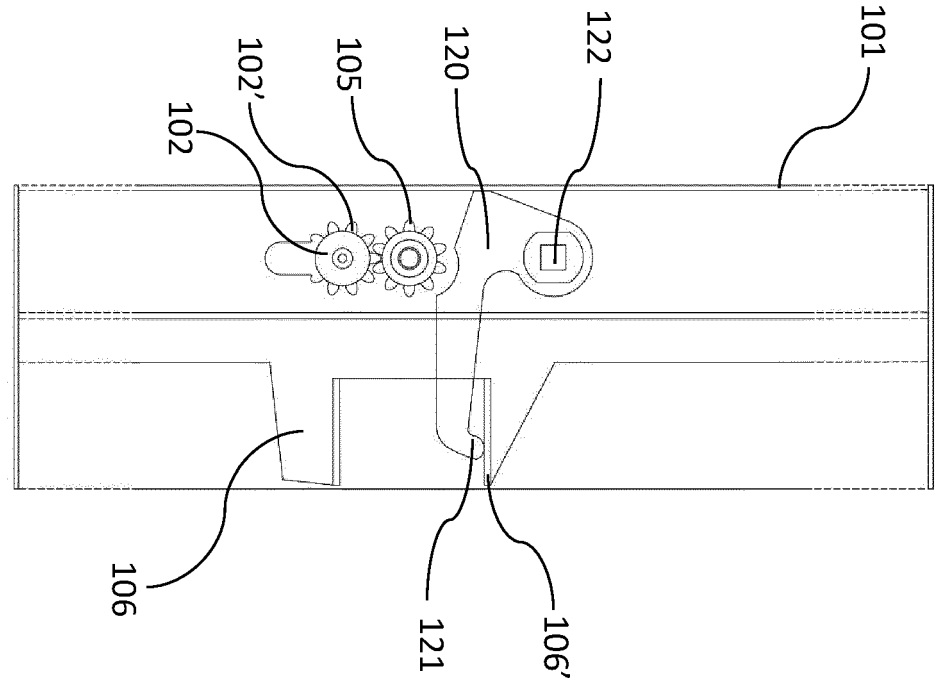

101
122
120
105
102'
102
106
121
106'

Fig.4a

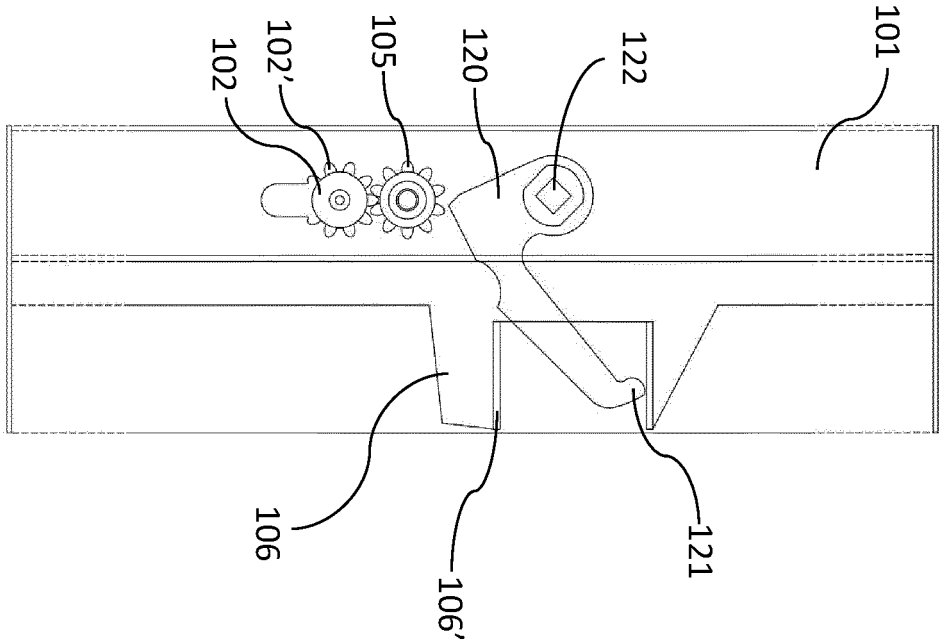

101
122
120
105
102'
102
106
106'
121

Fig.4b

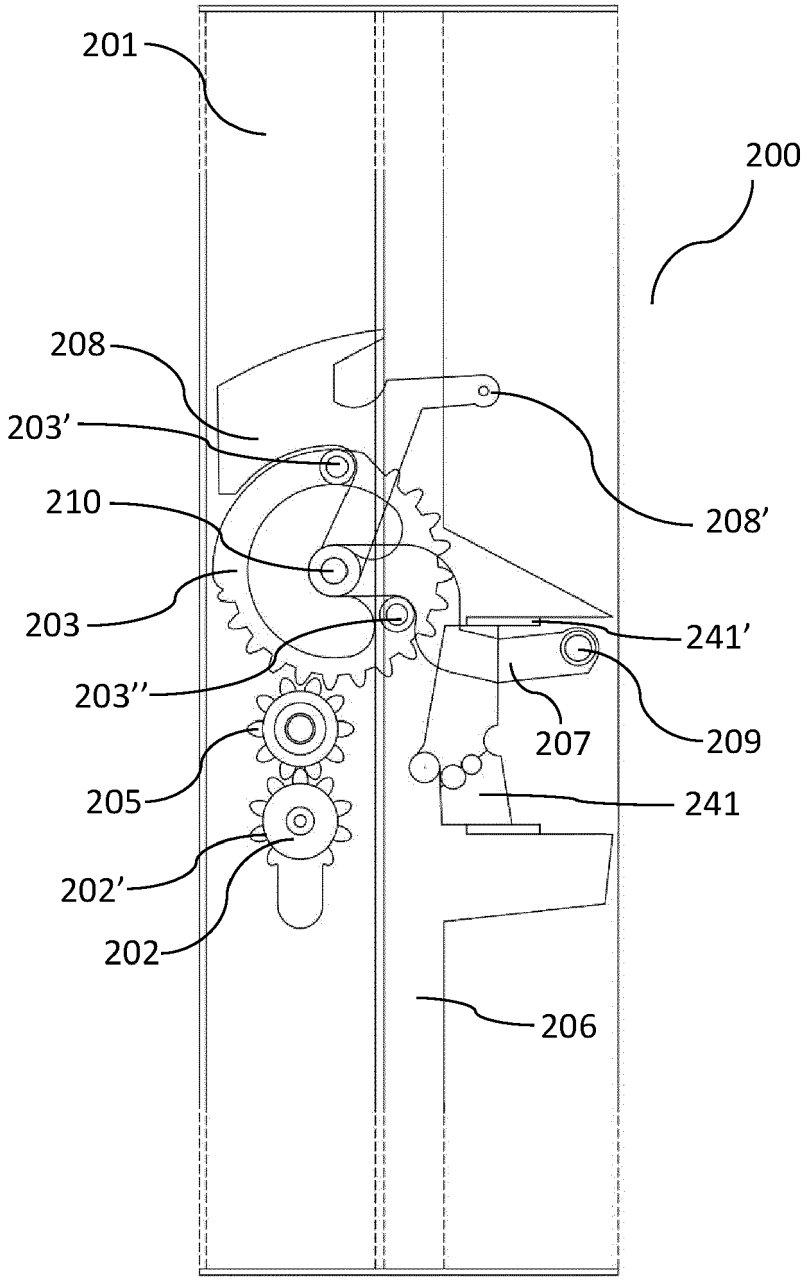


Fig.5

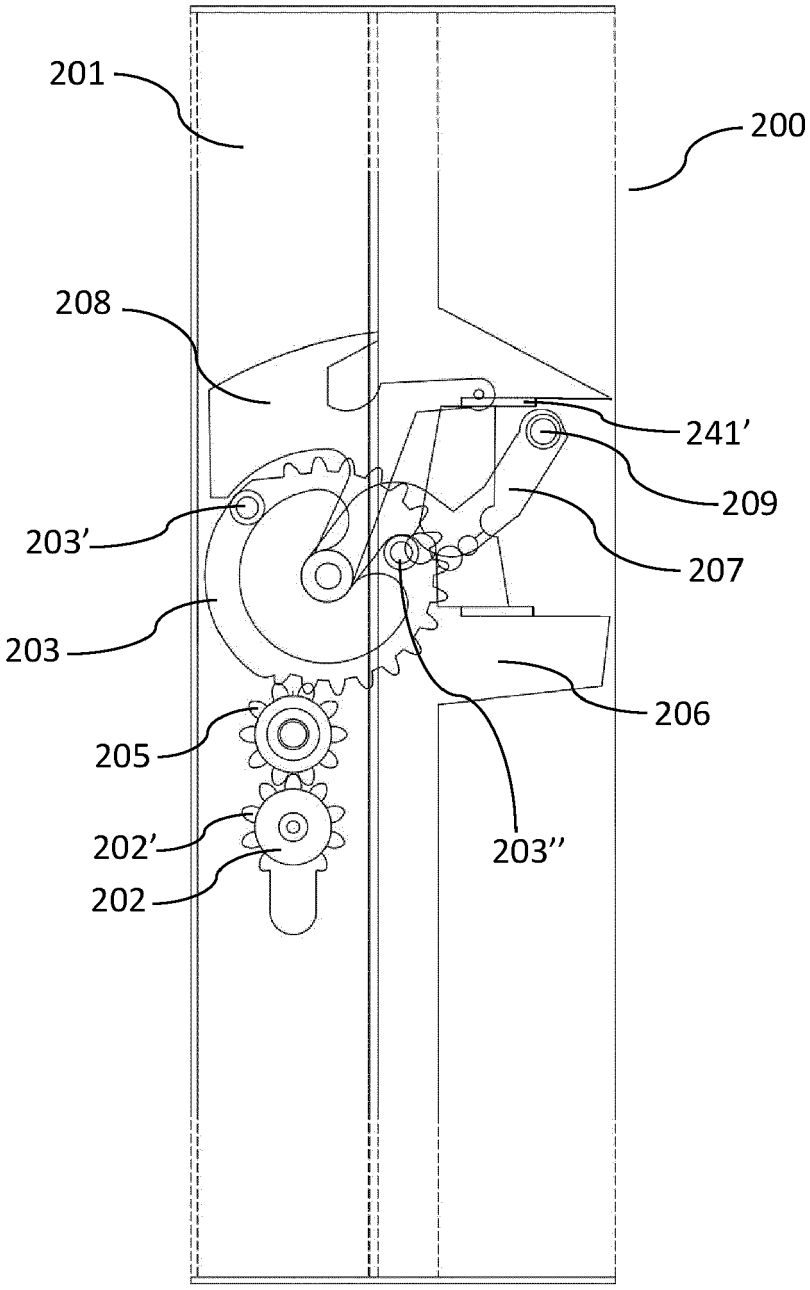


Fig.6

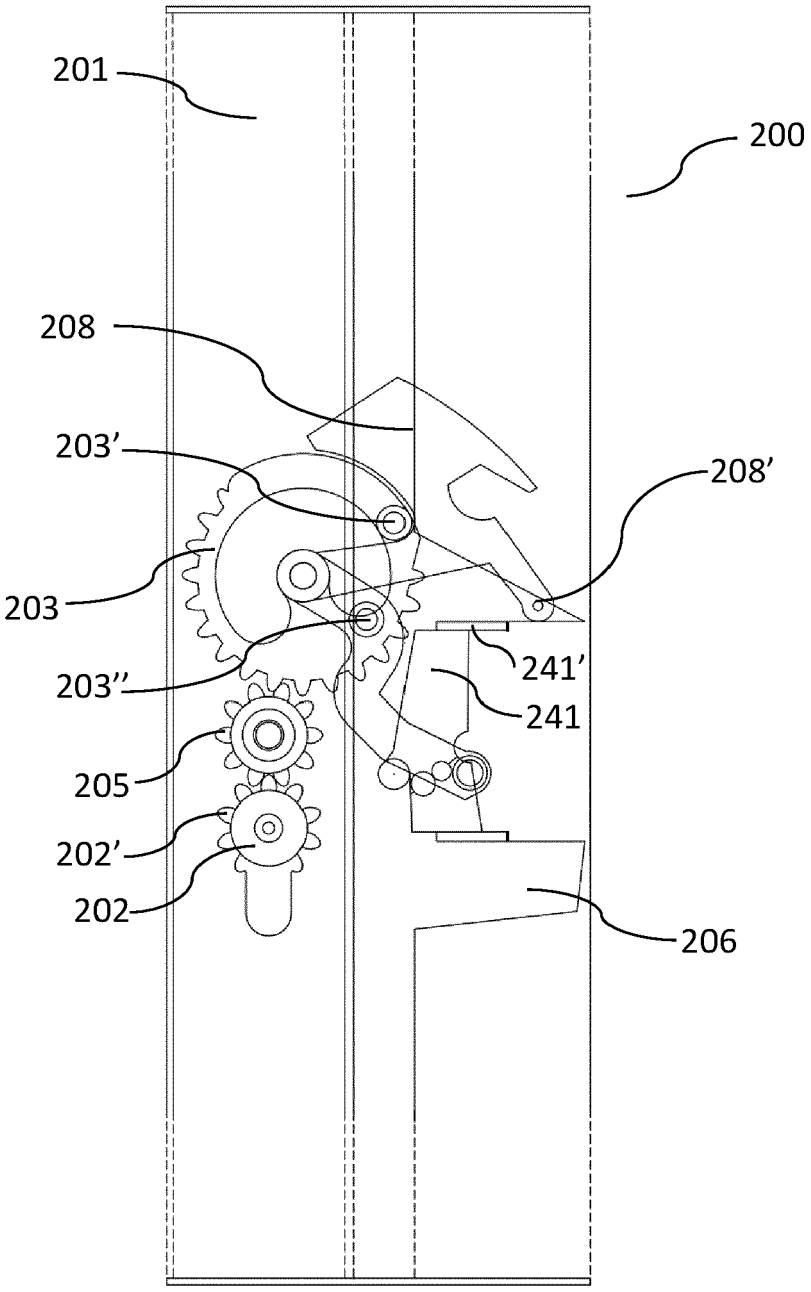


Fig.7

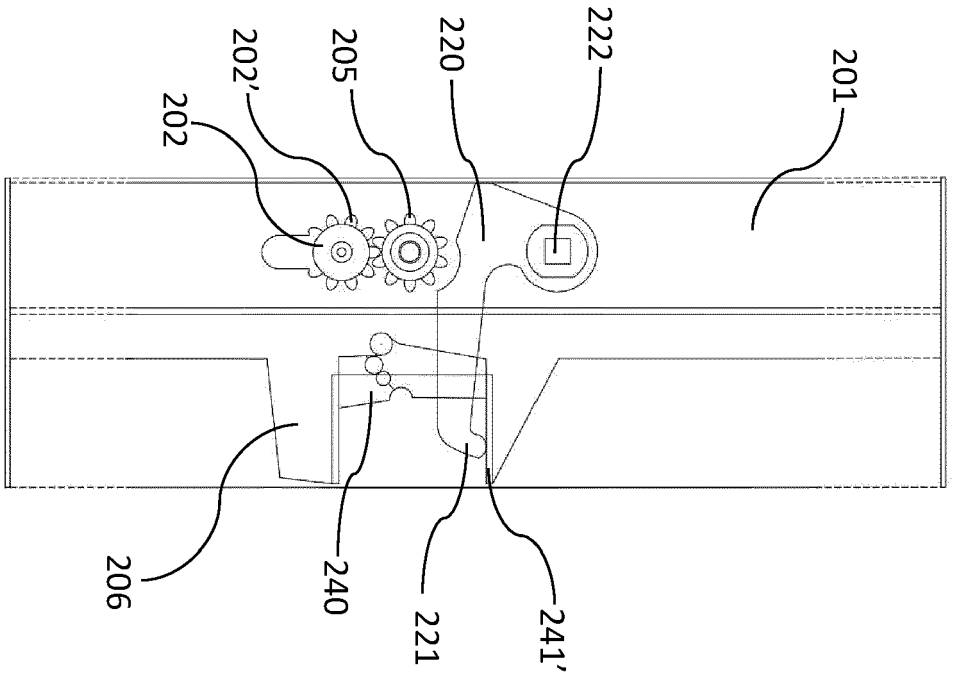

201
222
220
205
202'
202
206
240
221
241'

Fig.8a

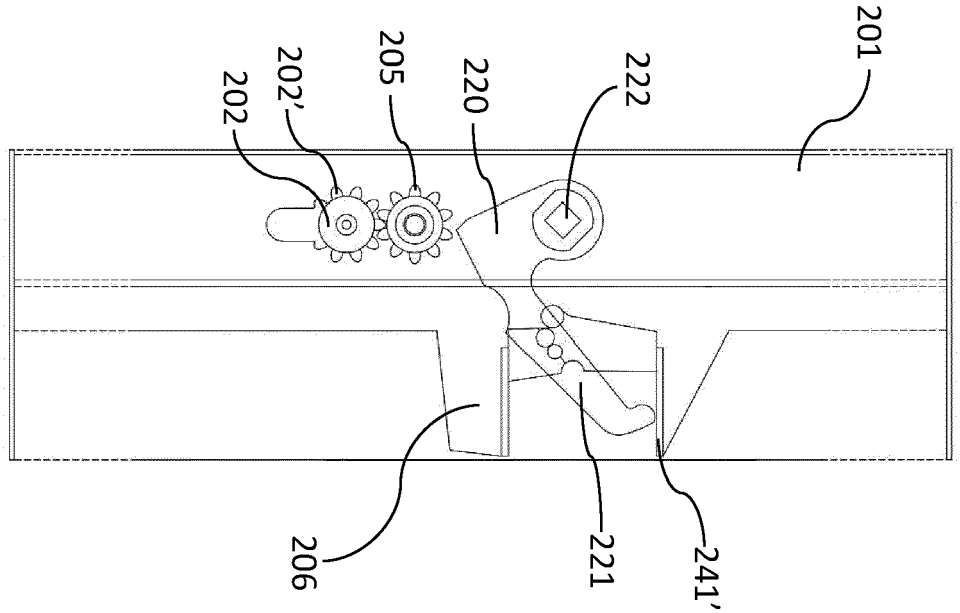

201
222
220
205
202'
202
206
221
241'

Fig.8b

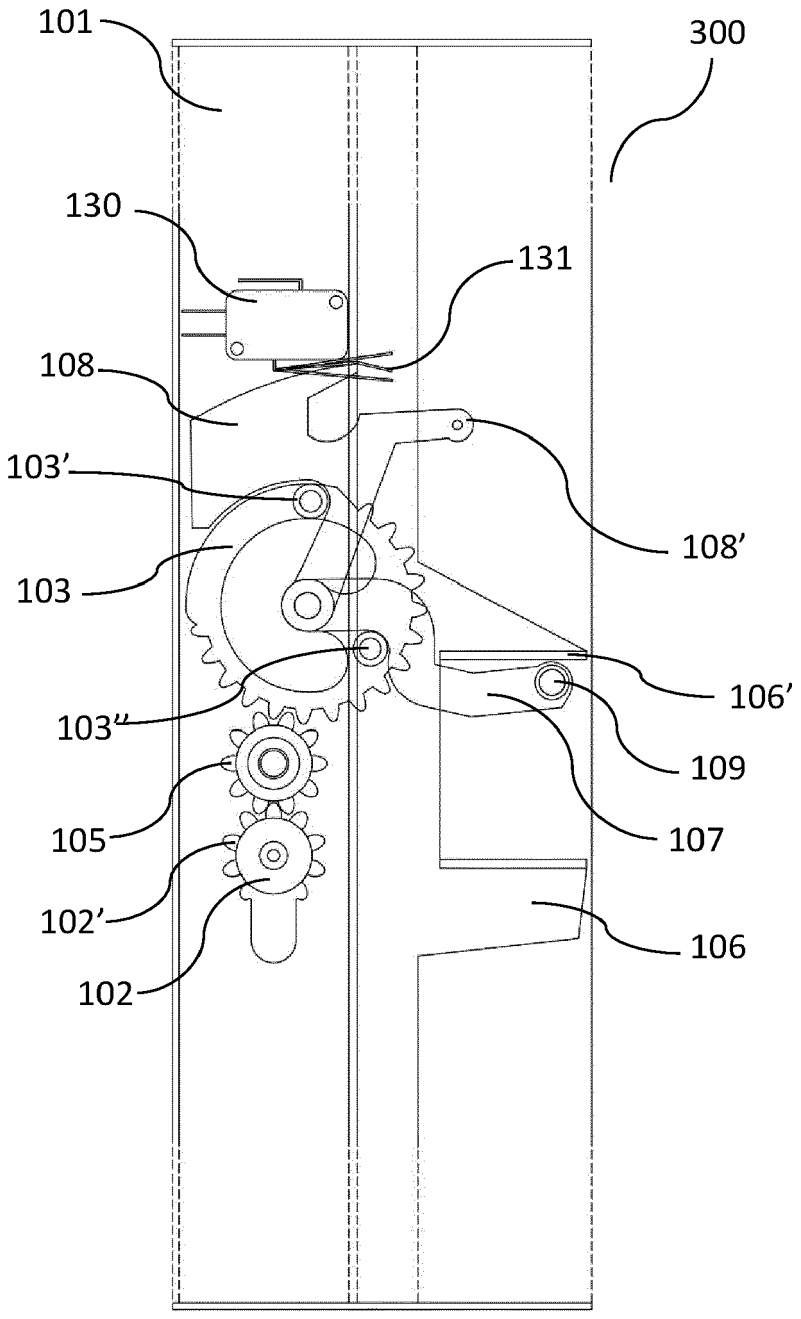


Fig.9

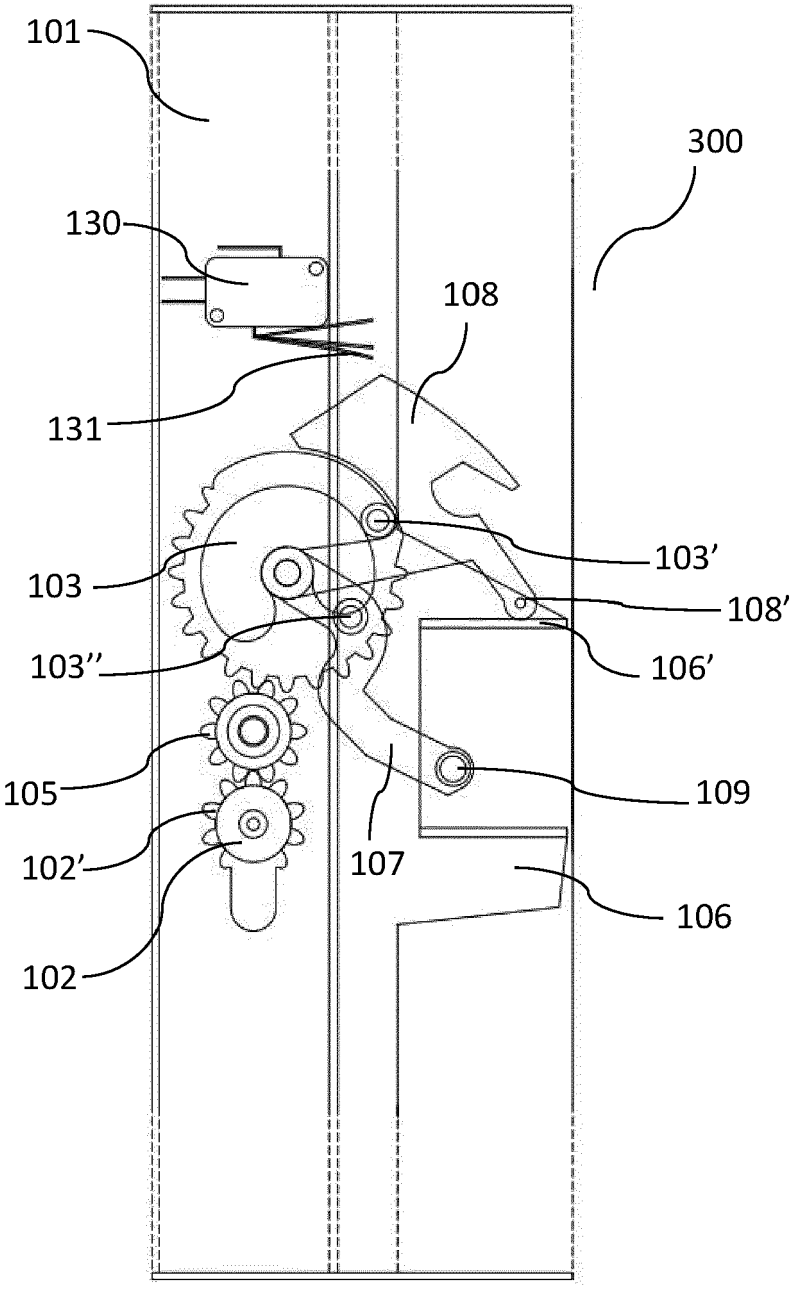


Fig.10

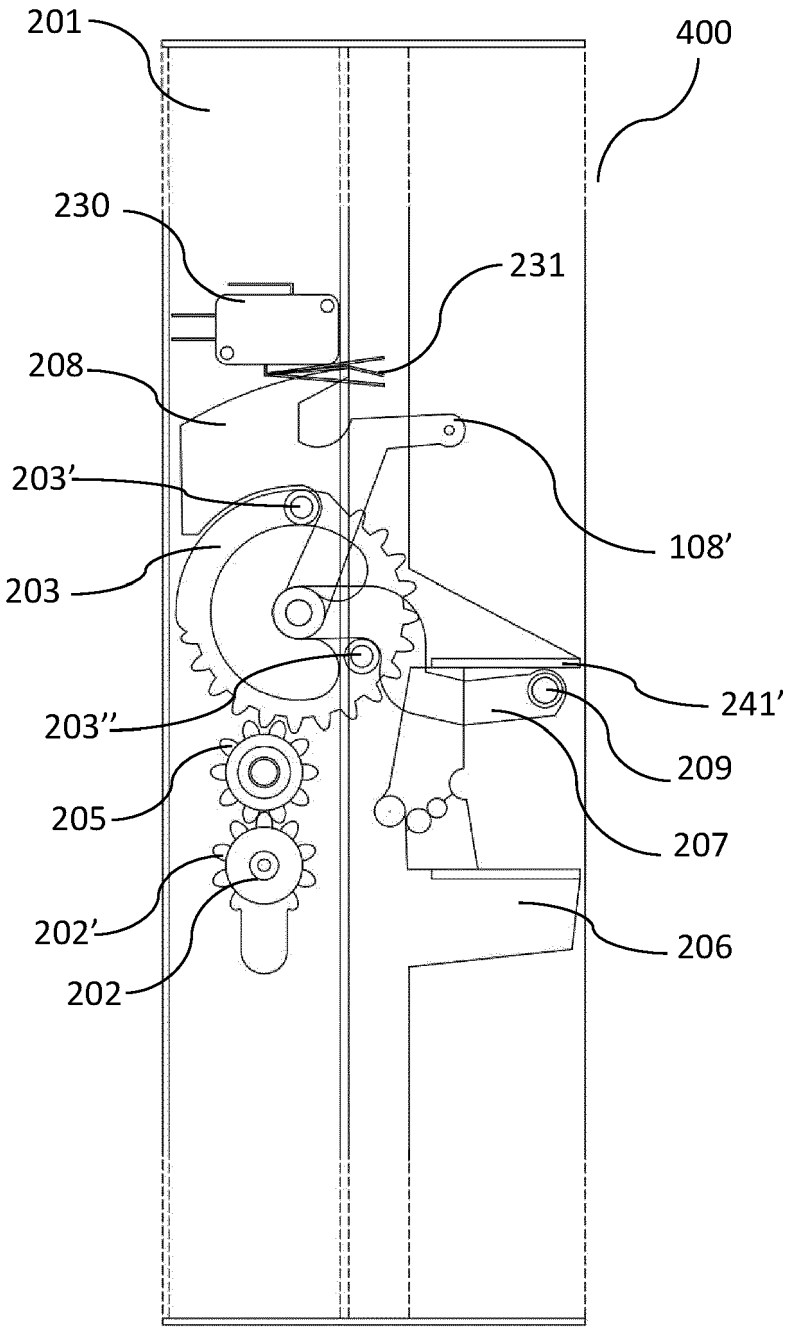


Fig.11

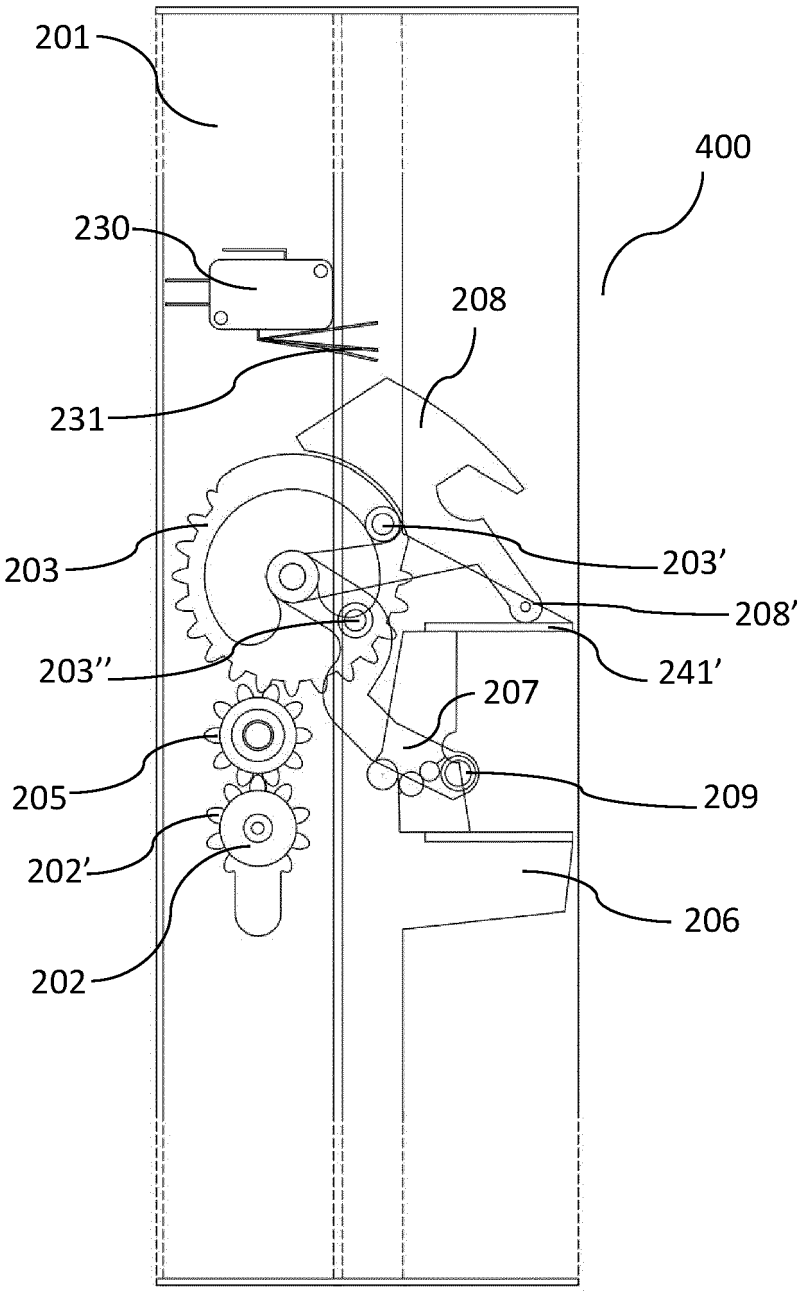


Fig.12

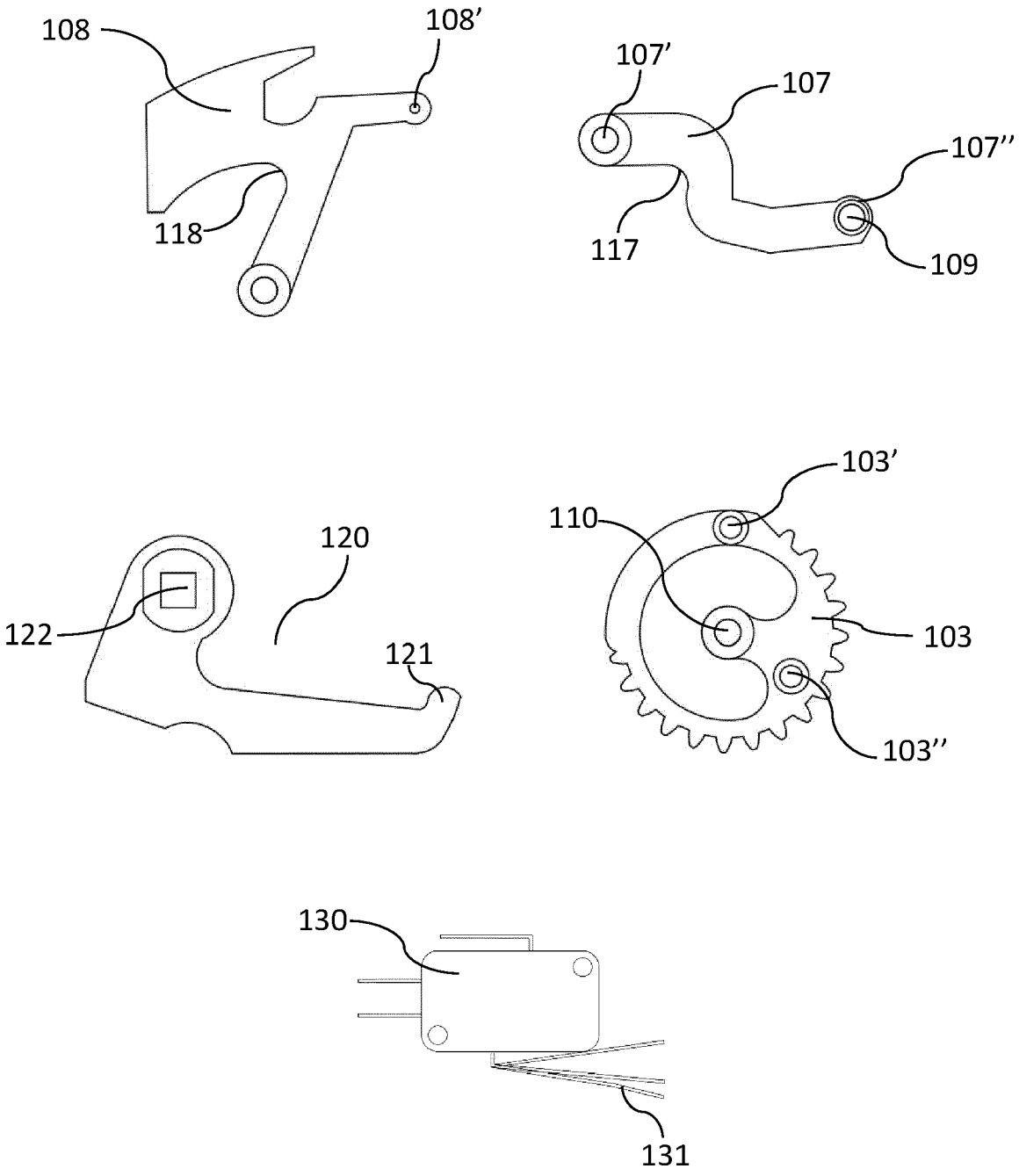

108
108'
118
107'
107
107''
117
109
120
122
121
103'
110
103
103''
130
131

Fig.13

Fig.14a

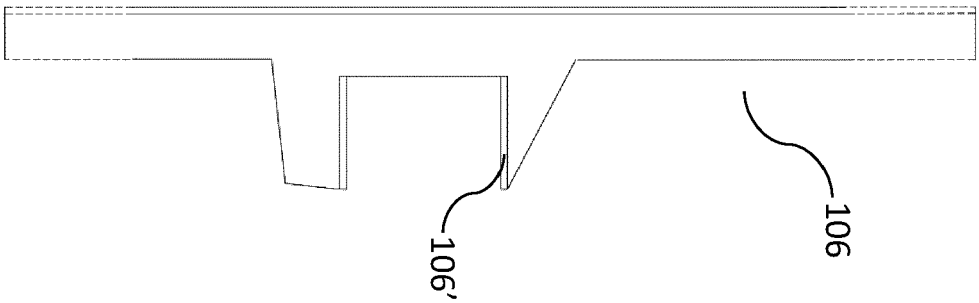


Fig.14b

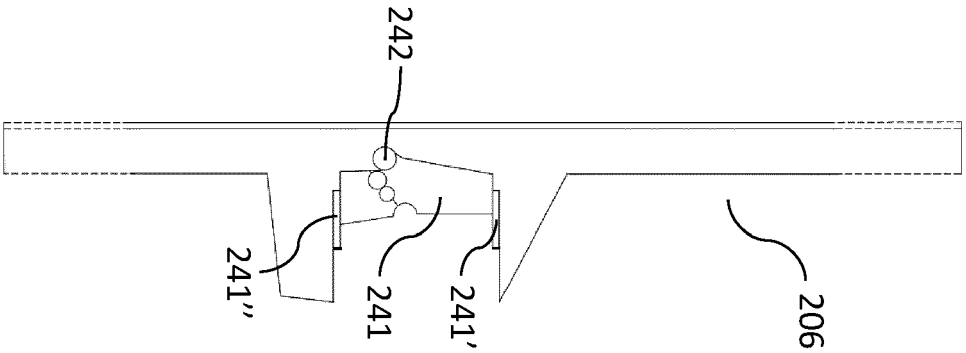


Fig.14c

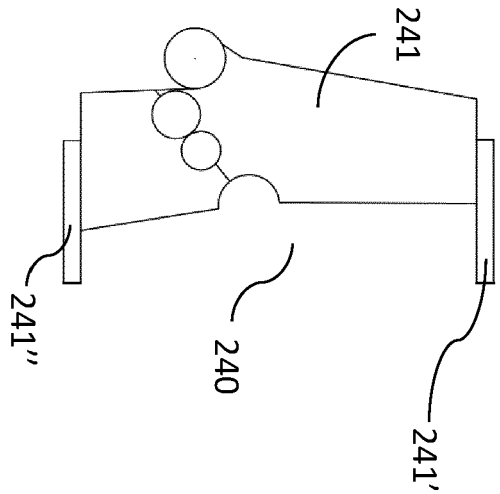


Fig.15a

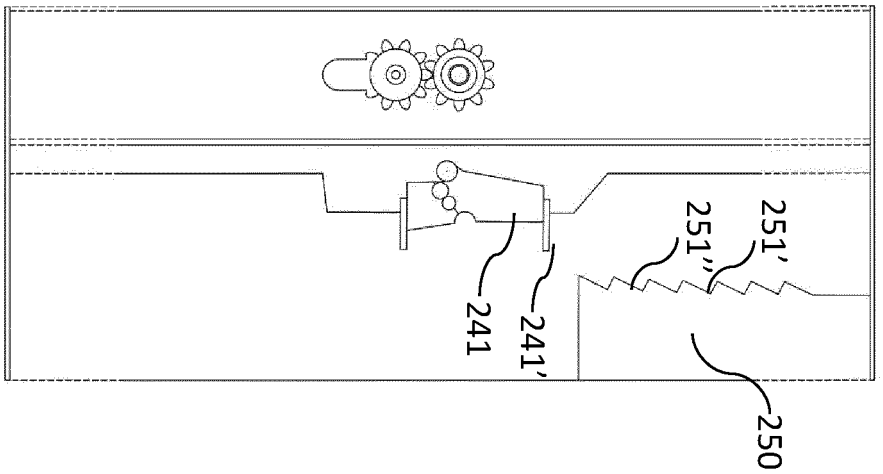
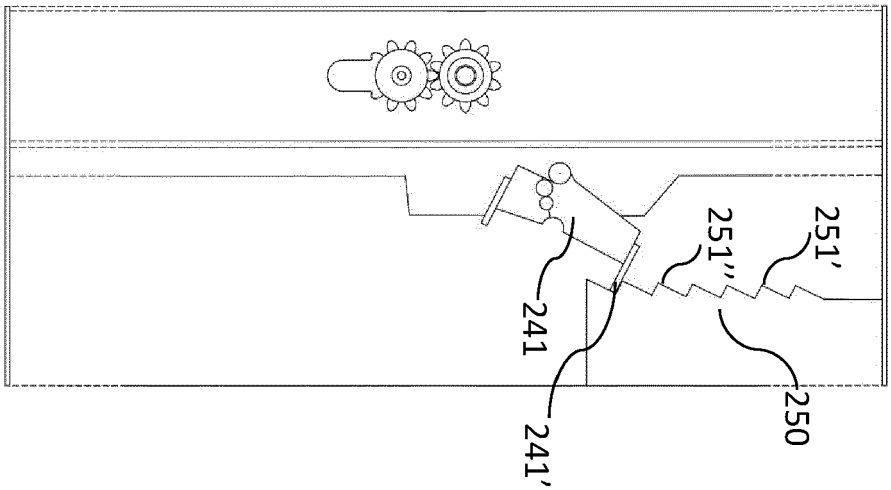


Fig.15b



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EUROPEAN SEARCH REPORT

Application Number
EP 22 19 8149

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* the whole document *	9-14	ADD. E05B17/20
A	EP 1 857 617 A2 (TALLERES ESCORIAZA SA [ES]) 21 November 2007 (2007-11-21) * paragraph [0004] * * paragraph [0029] - paragraph [0034]; figures 1-17 *	1-15	
A,D	IT 2016 0010 3226 A1 (MARSILII FRANCO [IT]) 14 April 2018 (2018-04-14) * the whole document *	1,5-12, 15	

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E05C
E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	10 March 2023	Koster, Michael

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10-03-2023

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