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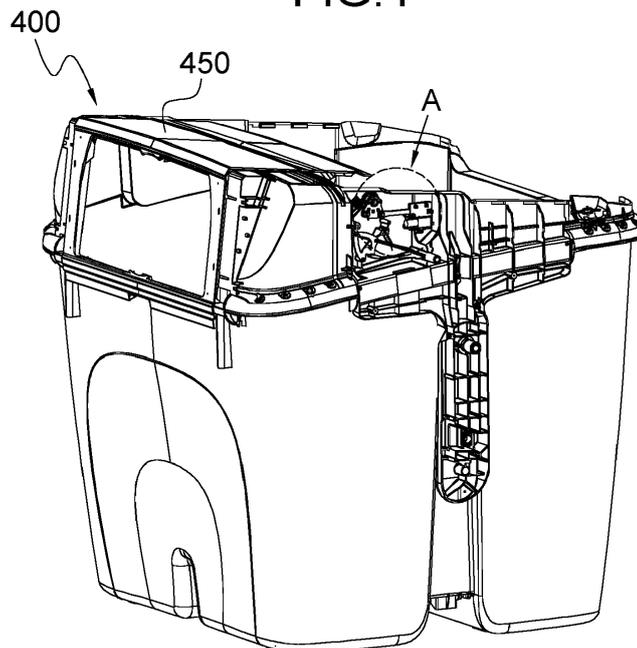
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(54) **UNLOCKING AND LOCKING MECHANISM FOR URBAN WASTE CONTAINER SWING LID**

(57) The unlocking and locking mechanism (100) comprises a moving member (110; 310) that is hinged to the lid (450) of the container (400) and a restraining mechanism (200) intended to lock the moving member (110; 310) for preventing the container lid (450) to be swung. The restraining mechanism (200) comprises a

rotating control arm (220) arranged to be rotated into at least an unlocking position where the moving member (110; 310) is allowed to move and thus unlocking of the lid (450), and a locking position where the moving member (110; 310) is prevented from being moved and thus locking of the lid (450).

FIG.1



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Description**TECHNICAL FIELD**

[0001] The present disclosure relates to a mechanism for unlocking and locking a swing lid of an urban waste container that allows or prevents swing of the container lid so as to control access to the interior of the container. The present disclosure further relates to an urban waste container comprising such mechanism for unlocking and locking the container lid.

[0002] The unlocking and locking mechanism disclosed herein is also applicable to a wide range of other different types of containers.

BACKGROUND

[0003] Urban waste containers known to date comprise a body whose interior is adapted to receive urban waste therein and at least one swing lid mounted thereon to prevent or allow access to the interior of the container. The lid in known containers can be operated manually or by means of a pedal and/or a lever that is arranged outside of the container which acts on an actuating mechanism that causes the lid to swing to gain access to the inside of the container. In known urban waste containers, a mechanism for unlocking and locking the lid may be also provided.

[0004] ES1213884 discloses an actuating mechanism for a swing lid of a waste container. The lid of the container is associated with an opening and closing cam that is driven by an electric motor. A control unit, associated with an electric power supply, controls the electric motor which is activated by a push button, a foot pedal, a presence sensor, or a card reader.

[0005] The disadvantage in said mechanisms of the known type is that, when the swing lid is driven, once the container has been emptied into a collection truck, it may reach a resting position without being completely closed on the container body. As a result, the lid may not be completely locked.

[0006] Unfortunately, the above is a common problem in most known waste containers made of plastic. Because of their low rigidity, the position between the lid and the container body, once closed, is not always the same due to deformation of the lid that occurs in its swing movement. As a result, the relative position between a first locking element in the locking mechanism fitted in the container body, such as a hook, and a second locking element in the locking mechanism that is arranged in the lid, such as a ring, may vary significantly, to the extent that the fitting between said locking elements is compromised and the lid may not be locked properly to the container body.

[0007] To compensate for this variation between the locking elements in the locking mechanism, it is usual to provide a certain dimensional play there between. However, such dimensional play, although small, is greatly

amplified at the end of the lid. In many cases, this results in the fact that even if the lid is locked, it can still be at least partially opened.

5 **SUMMARY**

[0008] In order to overcome the drawbacks in current urban waste containers, a mechanism for unlocking and locking an urban waste container swing lid is disclosed herein. Also disclosed herein is an urban waste container comprising said mechanism for unlocking and locking the lid.

[0009] The present mechanism for unlocking and locking an urban waste container swing lid comprises a moving member that is hinged to a container lid. Said moving member may be attached to the container lid through a hinge that may be made integral with or attached to the swing lid.

[0010] A restraining mechanism is also provided intended to lock the moving member for preventing the container lid to be swung. The restraining mechanism comprises a rotating control arm that is arranged to be rotated around a pivot axis into at least an unlocking position where the moving member is allowed to move so that the lid is unlocked, and a locking position where the moving member is prevented from being moved so that the lid is locked. It is to be noted that the rotating control arm can only be driven in rotation, that is, the control arm is restricted to performing a rotational movement in both rotation directions. Rotation of the rotating control arm may be performed by any suitable driving means such as an electric linear actuator or an electric motor. A suitable switchboard may be provided to control said driving means.

[0011] If the driving means comprise an electric linear actuator, this is preferably arranged to act perpendicular to the rotating control arm. However, other angles of attack to the rotating control arm than 90° are possible depending on the architecture of the assembly or other issues as required. As a result, no or almost no radial force is generated such that all or nearly all the acting force is tangential force as a result of which the force required for actuating the rotating control arm to bring the swing lid into the unlocking position is advantageously reduced. More preferably, the electric linear actuator is arranged to directly act on the rotating control arm.

[0012] However, the case may be envisaged in which the rotating control arm is driven in rotation not directly but through a suitable element such as a drive cam. In this case, a drive cam is provided whose rotation results in the rotating control arm to be rotated into at least the unlocking position or into the locking position. That is, rotation of the driving cam may cause the rotating control arm to be rotated into at least said unlocking position where the moving member is allowed to move and thus unlocking of the lid or into said locking position where the moving member is prevented from being moved and thus locking of the lid. In this case, the driving means may

comprise an electric motor suitable for driving the drive cam in rotation for unlocking and locking a waste container swing lid.

[0013] The rotating control arm may have an arm locking area, for example, at one free end thereof. The arm locking area is intended to come into frictional contact with a corresponding locking area formed in the moving member so as to lock it in the locking position. This ensures suitable locking of the swing lid to the container always even in containers where the lid, once closed, does not always remain in the same position relative to the container body, for example, due to a deformation of the lid in its swing movement.

[0014] In combination with any of the above features, the moving member may be a cylinder and the restraining mechanism may comprise said cylinder and a piston arranged inside the cylinder such that the cylinder is divided internally into two chambers. This cylinder and piston mechanism may be a hydraulic and/or pneumatic mechanism that may include therein inert gas or nitrogen and oil. The piston is movable inside the cylinder depending on the state of at least one valve designed to allow or prevent the passage of fluid between both chambers of the cylinder interior depending on the position of the restraining mechanism

[0015] In this case, the cylinder or the piston may be hingedly mounted to the swing lid of the waste container and the other of the cylinder or the piston may be hingedly mounted to the rotating control arm.

[0016] As the drive cam is driven, the rotating control arm is caused to rotate acting on a switch that is adapted to be operated according to the position of the said valve arranged inside the cylinder, allowing or preventing the passage of hydraulic fluid between the chambers inside the cylinder to place the assembly in the unlocked position or in the locked position.

[0017] Biasing means may be provided acting to arrange the rotating control arm in the locking position. In the example where no drive cam is provided, the biasing means may be, for example, a torsion spring. In the example where a drive cam is provided whose rotation results in the rotating control arm to be rotated into said unlocking and locking positions, the biasing means may be, for example, a compression or helical spring. However, many other equally suitable means for bringing the rotating control arm into the locked position.

[0018] Control means may be provided for controlling the restraining mechanism. Such control means may include at least one or more of: a switch adapted to be operated according to the position of the moving member, a switch adapted to be operated according to the position of the rotating control arm, and a switch adapted to be operated according to the position of the drive cam. One or more of said types of switches may be provided depending on the requirements.

[0019] Suitable activation means may be also provided for operating the driving means. Examples of such activation means may include one or more of a push button,

a pedal, a presence sensor, a card reader, a mobile device, or a remote control. Other activation means such as smart mobile devices, for example phones, tablets, etc., Operation of the driving means may be performed by a remote control from a service manager, for example.

[0020] Advantageously, a locking pin may be provided between the moving member and the rotating control arm. Said locking pin is movable so that it can be positioned in a first position and in a second position. In the locking pin first position, when the rotating control arm is the unlocking position where the moving member is allowed to swing the lid, the locking pin prevents the moving member from abutting the rotating control arm, for example, by gravity. In the locking pin second position, the moving member is allowed to abut the rotating control arm thus preventing the rotating control arm from being rotated by the moving member. The locking pin also acts as a guide as the lid is swung avoiding noise that would be generated by the moving member when abutting the rotating control arm.

[0021] A very simple and compact and yet effective mechanism is obtained for unlocking and locking a swing lid in an urban waste container such that it can be swung or not as required. The swing lid unlocking and locking mechanism described above is thus cost-effective and reliable, and requires very low maintenance. In addition, compactness is very advantageous in this case so that the whole mechanism can be easily installed within an isolated compartment located externally at one side of the container body.

[0022] An urban waste container is also disclosed herein comprising at least a swing lid and the unlocking and locking mechanism described above for locking and unlocking the swing lid of the container.

[0023] The unlocking and locking mechanism described above can be suitably controlled by an intelligent control system. Such intelligent control system may be configured to restrict the use of the urban waste container to only those persons who have been previously authorised to do so in order to reliably establish control over who is using the container and to determine whether a user is correctly sorting waste in order to encourage selective waste collection. The intelligent control system may include a reader capable of reading a magnetic card including data associated with a user and/or a community of neighbours, company employees, or any group of people, etc. According to the reading of the information contained in the magnetic card, the intelligent control system outputs a command for actuating the unlocking and locking mechanism described above so that the container lid can only be opened if certain preset conditions are met. Such conditions may include, for example, the identification or recognition of the person(s) using the container. Other conditions are possible. The magnetic card may be replaced with a mobile device such as a smart phone, tablet, smart watch, etc. via a Bluetooth operated mobile application, for example. Other means for storing and transmitting information are possible.

[0024] The waste container described above, provided with the present unlocking and locking mechanism and with the above-mentioned intelligent control system, provides many advantages. In addition to ensuring that the lid is properly locked in a rest position, it makes it more difficult to misuse the container since access is restricted, and encourages the user to sort waste correctly, reducing the proportion of improper waste. The intelligent control system can also collect information on what type of waste is thrown into the container or how often this is performed, as well as recording data on container use, and reporting it at a certain frequency, for example, daily, to a central waste management service. With this, it is possible to have a remote control that allows to determine if neighbours in a community, employees in a company, or any group of people using containers of the type described above are making a correct selective collection. Monitoring the frequency of use of the container enables it to provide information that can be then used to optimize collection routes. This is very advantageous for management and control of preventive maintenance and cleaning services of the containers.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] Non-limiting examples of the present unlocking and locking mechanism for urban waste container swing lid will be described in the following with reference to the appended drawings.

[0026] In the drawings:

Figure 1 is a general perspective view of an urban waste container in which a location where the present unlocking and locking mechanism is installed is shown;

Figure 2 is an enlarged view of the location shown in figure 1 where a clamp-type restraining mechanism is installed;

Figure 3 is an enlarged view of the location shown in figure 1 where a shut-off damper type restraining mechanism, is installed;

Figure 4 is a general perspective view of a first example of the present unlocking and locking mechanism with the clamp-type restraining mechanism;

Figure 5 is an elevational view of the clamp-type restraining mechanism shown in figure 4;

Figure 6 is a general perspective view of a second example of the present unlocking and locking mechanism including the shut-off damper type restraining mechanism;

Figure 7 is an elevational view of the shut-off damper type restraining mechanism shown in figure 6;

Figure 8 is an elevational view of a third example of the unlocking and locking mechanism in a lid locked position including the clamp-type restraining mechanism;

Figure 9 is an elevational view of the unlocking and locking mechanism in figure 8 shown in a lid unlocked

position;

Figure 10 is a perspective view of the unlocking and locking mechanism shown in figures 8 and 9;

Figure 11 is an elevational view of a fourth example of the unlocking and locking mechanism in a lid locked position including the shut-off damper type restraining mechanism;

Figure 12 is an elevational view of the unlocking and locking mechanism in figure 11 shown in a lid unlocked position; and

Figure 13 is a perspective view of the unlocking and locking mechanism shown in figures 11 and 12.

DETAILED DESCRIPTION OF EXAMPLES

[0027] The figures 1-13 of the drawings illustrate examples of the present unlocking and locking mechanism 100 for a swing lid 450 of an urban waste container 400. The unlocking and locking mechanism 100 is intended to be installed within an isolated compartment that is located in a lateral position A of the exterior of the waste container 400, as shown in figure 1 of the drawings.

[0028] In the examples shown in the figures, the unlocking and locking mechanism 100 generally comprises a moving member 110; 310 that is hinged to the swing lid 450 of the waste container 400 through a hinge 700 by means of a shaft 500, as shown in figures 2 and 3. A restraining mechanism 200 is intended to lock the moving member 110; 310 so as to lock the swing lid 450 in position to the waste container 400 as it will be described below.

[0029] The restraining mechanism 200 comprises a rotating control arm 220, that will be described in detail below in the examples. The rotating control arm 220 is restricted to performing a rotational movement around a pivot axis 235 attached to a base plate 610 which is, in turn, fixed within the isolated compartment A of the waste container 400 shown in figure 1 of the drawings. More specifically, the rotating control arm 220 can be rotated in a first rotation direction into an unlocking position where the moving member 110; 310 is allowed to move so that the lid 450 is unlocked and can be swung on the waste container 400. The rotating control arm 220 can be also rotated in a second, opposite rotation direction into a locking position where the moving member 110; 310 is prevented from being moved so that the lid 450 is locked and can not be swung on the waste container 400 as a result of which access to the interior of the waste container 400 is prevented.

First example: clamp-type restraining mechanism with no drive cam

[0030] A first example of the restraining mechanism 200 is shown in figures 4 and 5 of the drawings. This example corresponds to a clamp-type restraining mechanism 200 configured to lock the moving member 110 in position in order to prevent the lid 450 from being swung

on the container 400 a result of which access to the interior of the waste container 400 is prevented.

[0031] As described above, the moving member 110 is hinged to the swing lid 450 of the waste container 400. In particular, the moving member 110 is hinged to the swing lid 450 through a hinge 700 that is attached to the swing lid 450 of the waste container 400, as shown in figure 2 of the drawings, by means of a shaft 500 passing through a bore 105 that is formed at one end of the moving member 110.

[0032] Also as described above, the restraining mechanism 200 comprises a rotating control arm 220 that is rotatably mounted around a pivot axis 235 that is attached to a base plate 610. The rotating control arm 220 is restricted to performing a rotational movement in both rotation directions. The rotating control arm 220 has an arm locking area 230 adapted to come into frictional contact with a first locking area 115a formed in the moving member 110 to frictionally lock as a result of which the lid 450 is locked, prevented from being swung. A complementary locking element 600 is attached to the base plate 610. Said complementary locking element 600 has a complementary locking area 650 opposite the arm locking area 230 of the rotating control arm 220 adapted to come into frictional contact with a corresponding second locking area 115b of the moving member 110. Thus, in the locking position shown in figures 4 and 5 of the drawings, the moving member 110 is frictionally locked between the arm locking area 230 of the control arm 220 and the complementary locking area 650 of the complementary locking element 600.

[0033] A linear actuator 800 is provided having a driving end 810 intended to directly act on the rotating control arm 220 upon activation by a user through a suitable activation device mounted outside the waste container 400. Such activation device may be, for example, a push button, pedal, presence sensor, or card reader. Activation of the electric actuator may be performed remotely by a service manager, etc.

[0034] As the electric linear actuator 800 is operated, the rotating control arm 220 is caused to be driven in rotation around pivot axis 235 in a first rotation direction towards an unlocking position, not shown, where the moving member 110 is outside the space between the arm locking area 230 of the rotating control arm 220 and the locking area 650 of the complementary locking element 600. In this unlocking position the lid 450 is allowed to be swung on the waste container 400. Actuation of the electric linear actuator 800 in an opposite direction causes the control arm 220 to be driven in rotation around pivot axis 235 in a second rotation direction around pivot axis 235 towards a locking position shown in figures 4 and 5 of the drawings where the moving member 110 is disposed between the arm locking area 230 of the control arm 220 and the locking area 650 of the complementary locking element 600, preventing the lid 450 from being swung on the container 400.

[0035] In this first example shown in figures 4 and 5, a

locking pin 130 is attached to the base plate 610. The locking pin 130 is arranged between the moving member 110 and the rotating control arm 220. The locking pin 130 is movable into a first position such that when the swing control arm 220 is the unlocking position in which the moving member 110 allows the lid 450 to be swung, the locking pin 130 prevents the moving member 110 from abutting the rotating control arm 220, for example, by gravity. The locking pin 130 is also movable into a second position in which the moving member 110 is allowed to abut the rotating control arm 220 preventing the rotating control arm 220 from being rotated by the moving member 110 as a result of which the lid 450 is locked and thus prevented from being swung. Said locking pin 130 acts as a guide as the lid 450 is swung avoiding noise that would be generated by the moving member 110 when abutting the rotating control arm 220 in operation.

[0036] A switch S2 is provided in this example of figures 4 and 5 adapted to be operated according to the position of the rotating control arm 220.

[0037] A torsion spring 120 is also provided in this example. The torsion spring 120 tends to place the rotating control arm 220 in the locking position of the lid 450 in the container 400 shown in figures 4 and 5. Thus, in operation, the electric linear actuator 800 acts against the force of the helical spring 240.

Second example: shut-off damper type restraining mechanism with no drive cam

[0038] A second example of the restraining mechanism 200 is shown in figures 6 and 7 of the drawings. As in the example above, the restraining mechanism 200 in this second example is configured to lock the moving member 110 in position to prevent the lid 450 from being swung on the container 400 a result of which access to the interior of the waste container 400 is prevented.

[0039] In this example shown in figures 6 and 7 of the drawings no drive cam is provided, in contrast with the first example described above regarding figures 4 and 5. Instead, a shut-off damper type restraining mechanism 310, 320 is provided in this case. Here, the moving member is a hydro-pneumatic cylinder shown at 310 that is pivotally attached by one end 315, see figures 3, 6, 7, and 13, to a hinge 700 shown in figure 3. The hinge 700 is in turn attached to the swing lid 450 of the container 400. Attachment of the pneumatic cylinder 310 to the hinge 700 is carried out by means of a shaft 500, shown in figure 3, passing through a bore 550 formed in said end 315 of the pneumatic cylinder 310, as shown in figures 6 and 7.

[0040] The hydro-pneumatic cylinder 310 is filled with inert gas or nitrogen and oil. A piston 320, having an end 325 hinged to base plate 610, is allowed to slide at least partially inside the cylinder 310. The cylinder 310 and the piston 320 form the restraining mechanism 200 in this second example of figures 6 and 7, as stated above. The piston 320 divides the interior of the hydro-pneumatic

cylinder 310 into two chambers, not shown. The flow of inert gas or nitrogen and oil within the chambers of the hydro-pneumatic cylinder 310 in a sliding direction of the piston 320 is adjusted by means of a valve (not shown). Such valve is configured for allowing or preventing the passage of hydraulic fluid between said chambers in the interior of the hydro-pneumatic cylinder 310 depending on the position of the restraining mechanism 200.

[0041] In this second example, an electric linear actuator 800 is provided having a driving end 810 intended to directly act on the rotating control arm 220 to drive the piston 320 to the hydro-pneumatic cylinder 310 upon activation by a user through a suitable activation device fitted outside the waste container 400. Non-limiting examples of the activation device are a push button, a pedal, a presence sensor, or a card reader. Activation of the linear actuator 800 may be performed remotely by a service manager, etc.

[0042] A first switch S1 is provided adapted to be operated according to the position of the cylinder 310. A second switch S2 is also provided adapted to be operated according to the position of the rotating control arm 220.

[0043] A helical spring 240 is provided as shown in figure 7. The helical spring 240 tends to place the rotating control arm 220 in the locking position of the lid 450 of the container 400. Thus, in operation, the electric linear actuator 800 acts against the force of the helical spring 240.

Third example: clamp-type restraining mechanism with drive cam

[0044] A third example is shown in figures 8-10 of the drawings. This example corresponds to a clamp-type restraining mechanism 200 as in the first example, but including a drive cam 210 that is pivotally mounted around a shaft 215 that is, in turn, attached to the base plate 610. The drive cam 210 is arranged to be driven by an electric motor 900 which is controlled by a control unit, to act on the rotating control arm 220 as it will be described below.

[0045] As in the examples above, this restraining mechanism 200 is configured to lock the moving member 110 in position to prevent the lid 450 from being swung on the container 400 a result of which access to the interior of the waste container 400 is prevented.

[0046] The moving member 110 is hinged to a hinge 700 that is attached to the swing lid 450 of the waste container 400, as shown in figure 2 of the drawings, by means of a shaft 500 (see again figure 2) passing through a bore 105 formed at one end of the moving member 110 as shown in said figures 8-10 of the drawings.

[0047] The rotating control arm 220 is rotatably mounted around a pivot axis 235 that is attached to a base plate 610. The rotating control arm 220 has an arm locking area 230 adapted to come into frictional contact with a first locking area 115a in the moving member 110 to frictionally lock it and prevent the lid 450 from being swung (lock position of lid 450). In this example, a complemen-

tary locking element 600 is attached to the base plate 610. Said complementary locking element 600 has a complementary locking area 650 opposite the arm locking area 230 of the rotating control arm 220 adapted to come into frictional contact with a corresponding second locking area 115b of the moving member 110. Thus, in the locking position shown in figure 8 of the drawings, the moving member 110 is frictionally locked between the arm locking area 230 of the control arm 220 and the complementary locking area 650 of the complementary locking element 600.

[0048] In operation, the electric motor 900 is activated by a user through a suitable activation device fitted outside the waste container 400, such as a push button, a pedal, a presence sensor, a card reader, or remotely by a service manager, etc. Operation of the electric motor 900 causes rotation of drive cam 210 around shaft 215 in a first rotation direction causing the rotating control arm 220 to be driven in rotation around pivot axis 235 in a first rotation direction towards an unlocking position shown in figure 9 of the drawings where the moving member 110 is outside the space between the arm locking area 230 of the rotating control arm 220 and the locking area 650 of the complementary locking element 600. In this unlocking position the lid 450 is allowed to be swung on the waste container 400. Actuation of the electric motor 900 in an opposite direction causes the control arm 220 to be driven in rotation around pivot axis 235 in a second rotation direction towards a locking position shown in said figure 8 where the moving member 110 is disposed between the arm locking area 230 of the control arm 220 and the locking area 650 of the complementary locking element 600, preventing the lid 450 from being swung on the container 400.

[0049] As shown in figures 8 and 9, a locking pin 130 is attached to the base plate 610. The locking pin 130 is arranged between the moving member 110 and the rotating control arm 220. The locking pin 130 is movable into a first position such that when the swing control arm 220 is the unlocking position in which the moving member 110 allows the lid 450 to be swung, the locking pin 130 prevents the moving member 110 from abutting the rotating control arm 220, for example, by gravity. The locking pin 130 is also movable into a second position in which the moving member 110 is allowed to abut the rotating control arm 220 preventing the rotating control arm 220 from being rotated by the moving member 110 as a result of which the lid 450 is locked and thus prevented from being swung. Said locking pin 130 acts as a guide as the lid 450 is swung avoiding noise that would be generated by the moving member 110 when abutting the rotating control arm 220 in operation.

[0050] A first switch S1 is provided adapted to be operated according to the position of the cylinder 310 and a second switch S2 is also provided adapted to be operated according to the position of the rotating control arm 220. A third switch S3 is provided adapted to be operated according to the position of the drive cam 210.

[0051] A helical spring 240 is also provided which tends to place the rotating control arm 220 in the locking position of the lid 450 of the container 400. Thus, in operation, the electric motor 900 acts against the force of the helical spring 240.

Fourth example: shut-off damper type restraining mechanism with drive cam

[0052] A fourth example shown in figures 11-13 of the drawings corresponds the shut-off damper type restraining mechanism comprising a hydro-pneumatic cylinder 310 as in the second example described above but including a drive cam 210 as in the third example described above.

[0053] The moving member is a hydro-pneumatic cylinder 310 that is pivotally attached by one end 315, see figures 3, 6, 7, and 13, to a hinge 700 shown in figure 3. The hinge 700 is in turn attached to the swing lid 450 of the container 400. Attachment of the pneumatic cylinder 310 to the hinge 700 is carried out by means of a shaft 500, shown in figure 3, passing through a bore 550 formed in said end 315 of the pneumatic cylinder 310, as shown in figure 13.

[0054] The hydro-pneumatic cylinder 310 is filled with inert gas or nitrogen and oil. A piston 320, having an end 325 hinged to base plate 610, is allowed to slide at least partially inside the cylinder 310. The cylinder 310 and the piston 320 form the restraining mechanism 200 in this fourth example of figures 11-13 as stated above. The piston 320 divides the interior of the hydro-pneumatic cylinder 310 into two chambers, not shown. The flow of inert gas or nitrogen and oil within the chambers of the hydro-pneumatic cylinder 310 in a sliding direction of the piston 320 is adjusted by means of a valve (not shown). Such valve is configured for allowing or preventing the passage of hydraulic fluid between said chambers in the interior of the hydro-pneumatic cylinder 310 depending on the position of the restraining mechanism 200.

[0055] In this fourth example shown in figures 11-13, an electric motor 900 is provided, shown in figure 13, suitable for driving the rotating control arm 220 in rotation as it will be explained below. The electric motor 900 may be activated by a user through a suitable activation device fitted outside the waste container 400, such as a push button, a pedal, a presence sensor, a card reader, or remotely by a service manager, etc.

[0056] As stated above, operation of the electric motor 900 causes rotation of drive cam 210 around shaft 215 in a first rotation direction which in turn causes the rotating control arm 220 to be driven in rotation around pivot axis 235 in a first rotation direction towards an unlocking position where the swing lid 450 is allowed to be swung on the waste container 400. Actuation of the electric motor 900 in an opposite direction causes the control arm 220 to be driven in rotation around pivot axis 235 in a second rotation direction towards a locking position where the lid 450 is prevented from being swung on the container 400.

[0057] A first switch S1 is provided adapted to be operated according to the position of the cylinder 310, a second switch S2 is also provided adapted to be operated according to the position of the rotating control arm 220, and a third switch S3 is provided adapted to be operated according to the position of the drive cam 210.

[0058] A helical spring 240 is provided which tends to place the rotating control arm 220 in the locking position of the lid 450 of the container 400. Thus, in operation, the electric motor 900 acts against the force of the helical spring 240.

[0059] In all the examples described above, the unlocking and locking mechanism 100 can be controlled by an intelligent control system configured to allow operation of mechanism 100 only by authorized persons. Such intelligent control system may include a magnetic card reader arranged in the aforementioned position A on the outside of the waste container 400, as shown in figure 1 of the drawings. Validating data on a magnetic card when placing it near the reader in the container 400 allows or prevents the activation of the unlocking and locking mechanism 100.

[0060] The unlocking and locking mechanism 100 is effective in protecting access to the waste container 400. Even if the lid 450 of the waste container 400 does not reach the closed position, the position in which the lid 450 is located is detected by position sensors which detect the position of the moving member 110 or the cylinder 310 indicating that the lid 450 has not reached its closed position and the control system can software-decide that the drive cam 210 should also be operated to lock the lid 450, even if it is not completely closed. Means for monitoring the status of the unlocking and locking mechanism 100 and the position of the lid 450 may be provided in cooperation with the above-mentioned switches S1, S2, S3 to determine whether the lid 450 is closed or not. If the lid 450 is not completely closed, even though it is locked in the container 400, an alarm may be output to a control or maintenance centre.

[0061] With a waste container 400 having the above described unlocking and locking mechanism 100, the problem that the position between the lid 450, once closed, and the body of the container 400 is not always the same is safely and efficiently solved since locking of the lid 450 does not depend on the relative position between the lid 450 and the body of the container 400.

[0062] Furthermore, since the unlocking and locking mechanism 100 is located in the area A, outside the loading area of the container 400 and the waste therein, waste is prevented from being deposited in the area of the unlocking and locking mechanism 100 which could compromise unlocking and, above all, locking of the lid 450. As it is not visible, the unlocking and locking mechanism 100 is protected from vandalism, external agents and impacts from pressurised water and chemicals during washing process of the container 400.

[0063] Although only a number of examples of the mechanism for unlocking and locking an urban waste

container swing lid have been disclosed herein, other alternatives, modifications, uses and/or equivalents thereof are possible.

[0064] For example, although several parts have been described as being attached to the base plate 610, such as the locking pin 130, the cam shaft 215, the pivot axis 235, or the complementary locking element 600, these parts may however be rigidly or releasably connected to the base plate 610. Furthermore, other parts such as any of the switches S1, S2, S3 may be also connected to the base plate 610 in any suitable way.

[0065] On the other hand, different springs 120, 240 have been described to place the rotating control arm 220 in the locking position of the lid 450 in the container 400 so that, in operation, the electric linear actuator 800 or the electric motor 900 acts against the force of said spring 120 240. Specifically, a torsion spring has been described for the first example of the restraining mechanism 200 while a helical spring 240 has been described for the second, third, and fourth examples of the restraining mechanism 200. However, it will be understood that any kind of biasing or spring means may be employed in any of the examples described herein.

[0066] All possible combinations of the described examples are thus covered.

[0067] The scope of the present disclosure should not be limited by particular examples, but should be determined only by a fair reading of the claims that follow. Reference signs related to drawings in a claim are solely for attempting to increase the intelligibility of the claim, and shall not be construed as limiting the scope of the claim.

Claims

1. Unlocking and locking mechanism (100) for a swing lid (450) of urban waste container (400), the mechanism (100) comprising:

- a moving member (110; 310) that is hinged to the lid (450) of the waste container (400); and
- a restraining mechanism (200) intended to lock the moving member (110; 310) for preventing the container lid (450) to be swung,

wherein the restraining mechanism (200) comprises a rotating control arm (220) arranged to be rotated around a pivot axis (235) into at least an unlocking position where the moving member (110; 310) is allowed to move and unlocking the lid (450), and a locking position where the moving member (110; 310) is prevented from being moved and thus locking the lid (450).

2. The mechanism (100) of claim 1, wherein it further includes a drive cam (210) whose rotation results in the rotating control arm (220) to be rotated around

pivot axis (235) into at least the unlocking position or into the locking position.

3. The mechanism (100) of claim 1 or 2, wherein the rotating control arm (220) has an arm locking area (230) intended to come into frictional contact with a corresponding locking area (115a) formed in the moving member (110) locking it in the locking position.

4. The mechanism (100) of claim 1 or 2, wherein the moving member is a cylinder (310), and the restraining mechanism (200) comprises said cylinder (310) and a piston (320) arranged inside the cylinder (310) such that the cylinder (310) is divided internally into two chambers, the piston (320) being movable inside the cylinder (310) depending on the state of at least one valve designed to allow or prevent the passage of fluid between both chambers of the cylinder interior depending on the position of the restraining mechanism

5. The mechanism (100) of claim 4, wherein one the cylinder (310) or the piston (320) is hingedly mounted to the swing lid (450) of the waste container (400) and the other of the cylinder (310) or the piston (320) is hingedly mounted to the rotating control arm (220).

6. The mechanism (100) of any of the preceding claims, wherein it further includes biasing means (240) acting to arrange the rotating control arm (220) in the locking position.

7. The mechanism (100) of any of the preceding claims, wherein it comprises control means for controlling the restraining mechanism (200) including at least one of a switch (S1) adapted to be operated according to the position of the moving member (110), and a switch (S2) adapted to be operated according to the position of the rotating control arm (220).

8. The mechanism (100) of claim 7 when depending on any of the claims 2-6, wherein the control means comprises a switch (S3) adapted to be operated according to the position of the drive cam (210).

9. The mechanism (100) of claim 1, wherein it includes driving means for driving the rotating control arm (220) comprising an electric linear actuator (800).

10. The mechanism (100) of claim 9, wherein the electric linear actuator (800) is arranged to act perpendicular to the rotating control arm (220).

11. The mechanism (100) of any of the claims 2-8, wherein it includes driving means for driving the drive cam (210) comprising an electric motor (900).

- 12. The mechanism (100) of any of the claims 9-11, wherein it further includes activation means for operating the driving means comprising one or more of a push button, a pedal, a presence sensor, a card reader, a mobile device, or a remote control. 5

- 13. The mechanism (100) of any of the preceding claims, wherein the moving member (110; 310) is attached to said lid (450) of the container (400) through a hinge (700). 10

- 14. The mechanism (100) of any of the preceding claims, wherein it further includes a locking pin (130) capable of being arranged in an unlocking position preventing the member (110; 310) from abutting the rotating control arm (220) and in a locking position allowing the member (110; 310) to abut the rotating control arm (220) and thus preventing the rotating control arm (220) from being rotated by the moving member (110; 310). 15
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- 15. Urban waste container (400) comprising at least one swing lid (450) and an unlocking and locking mechanism (100) of any of the preceding claims. 25

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FIG. 1

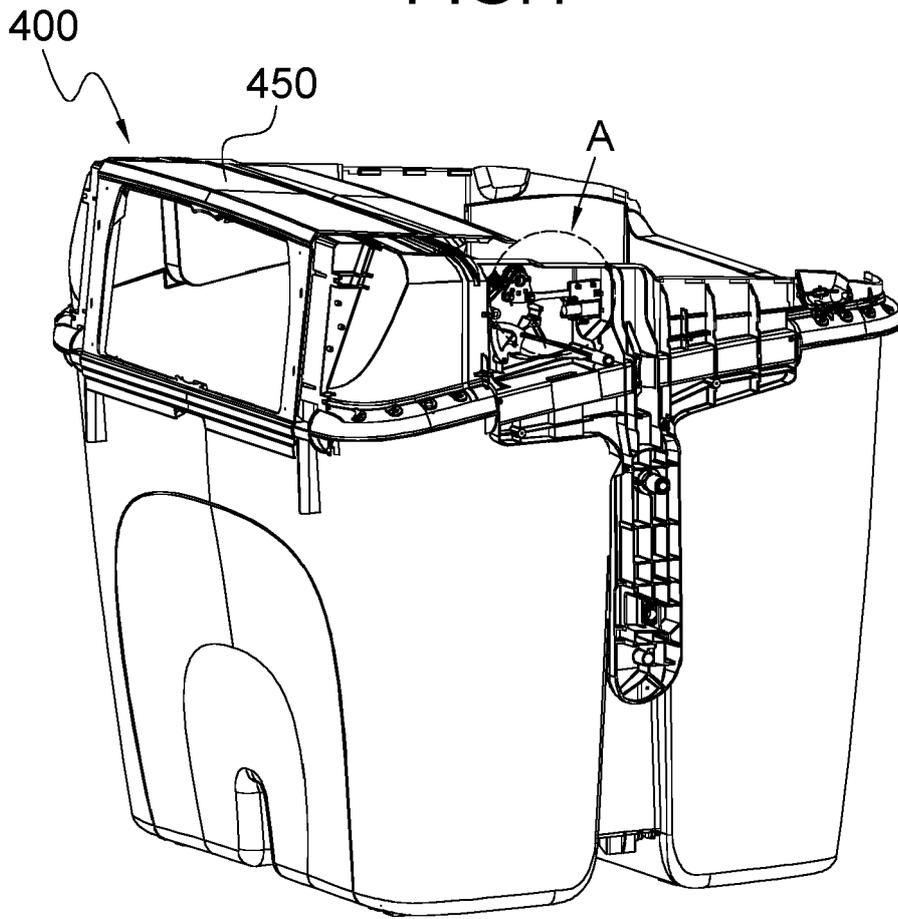


FIG.2

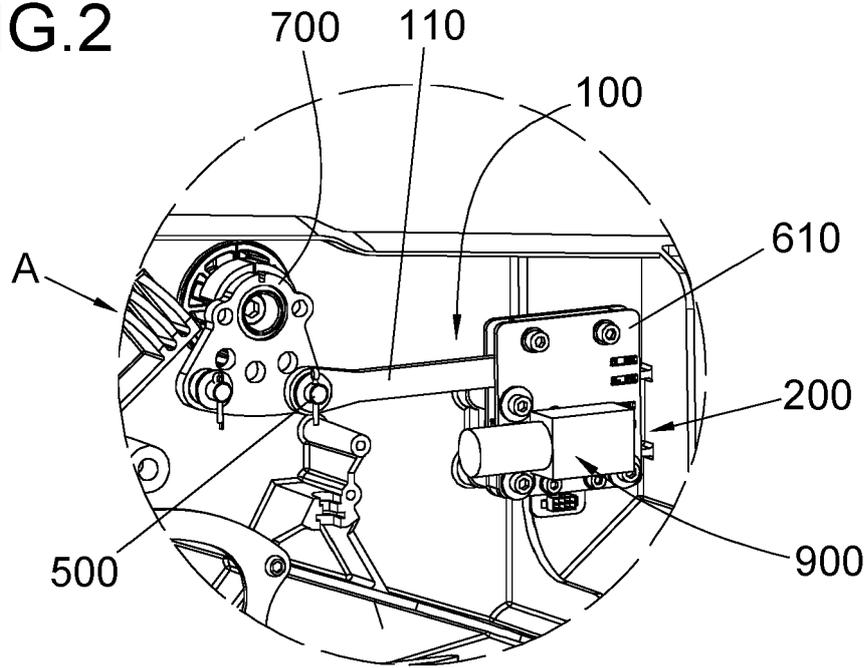
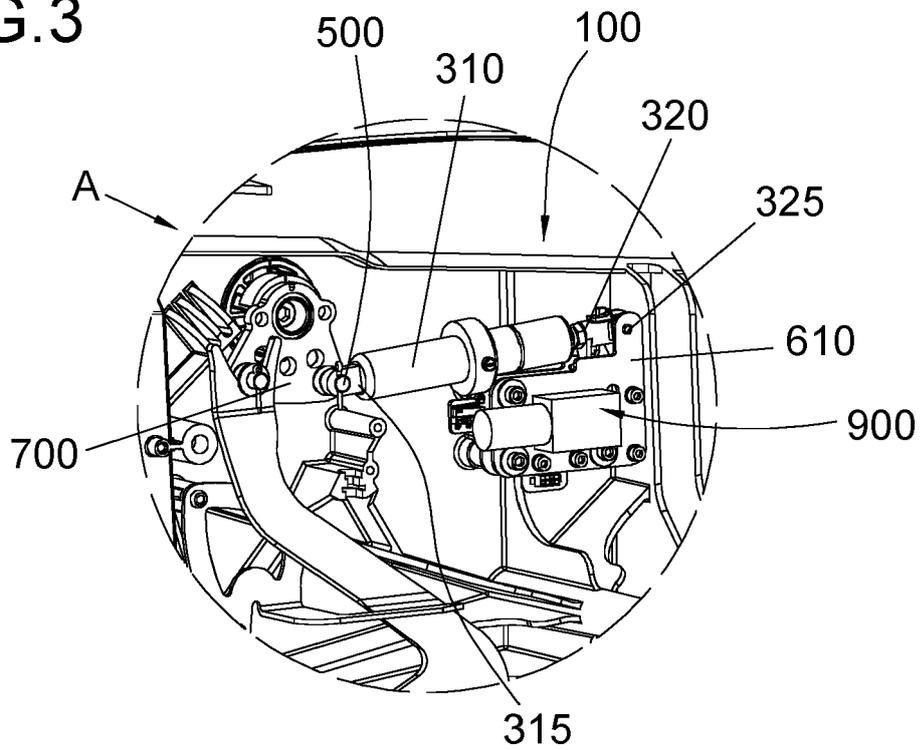
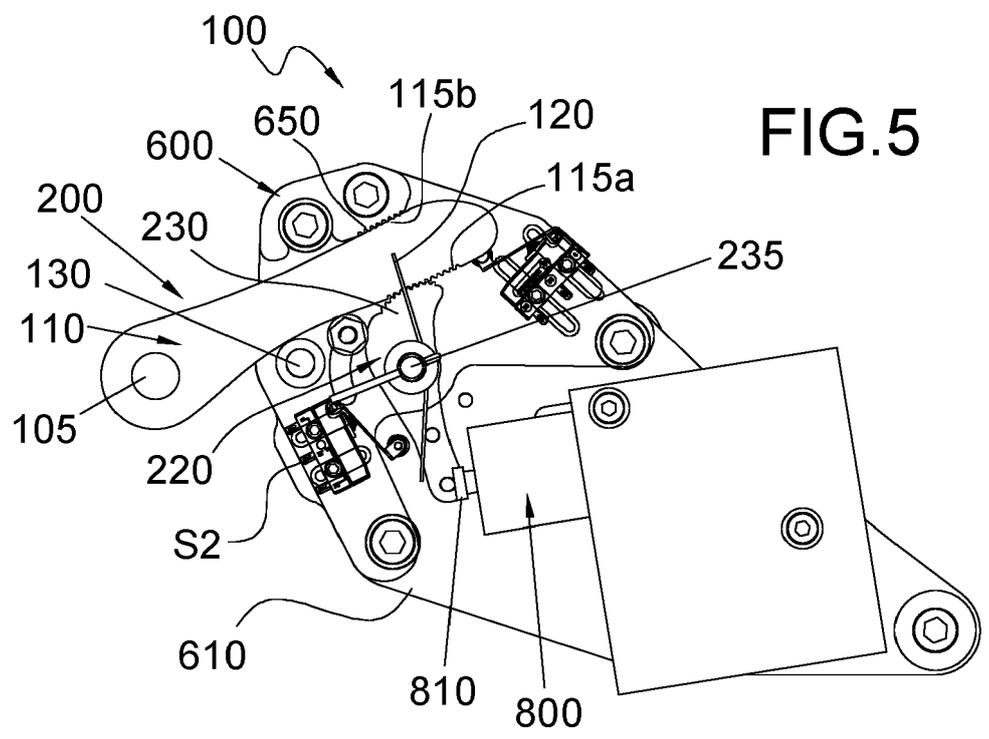
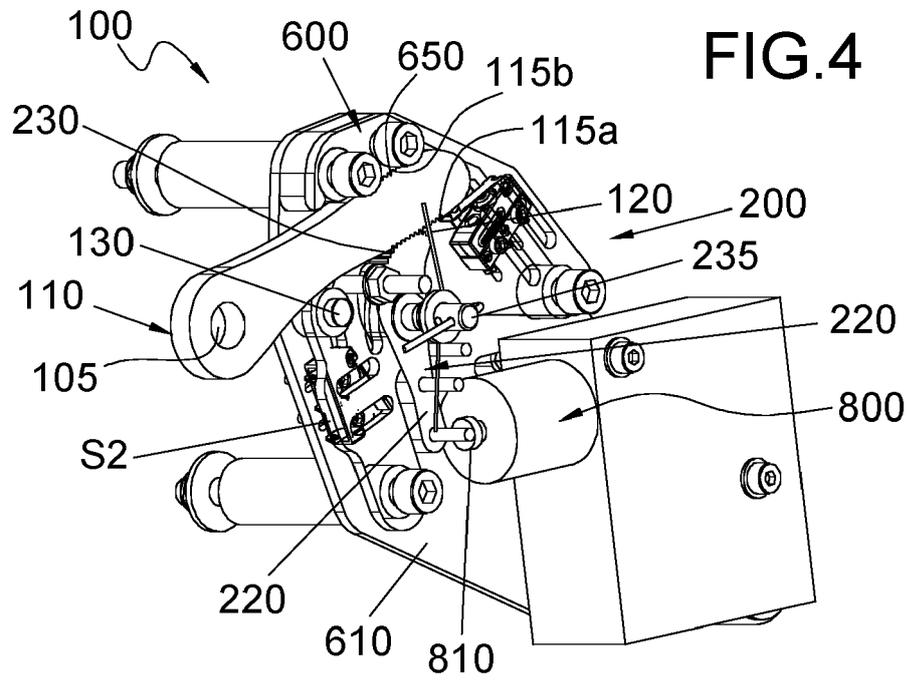


FIG.3





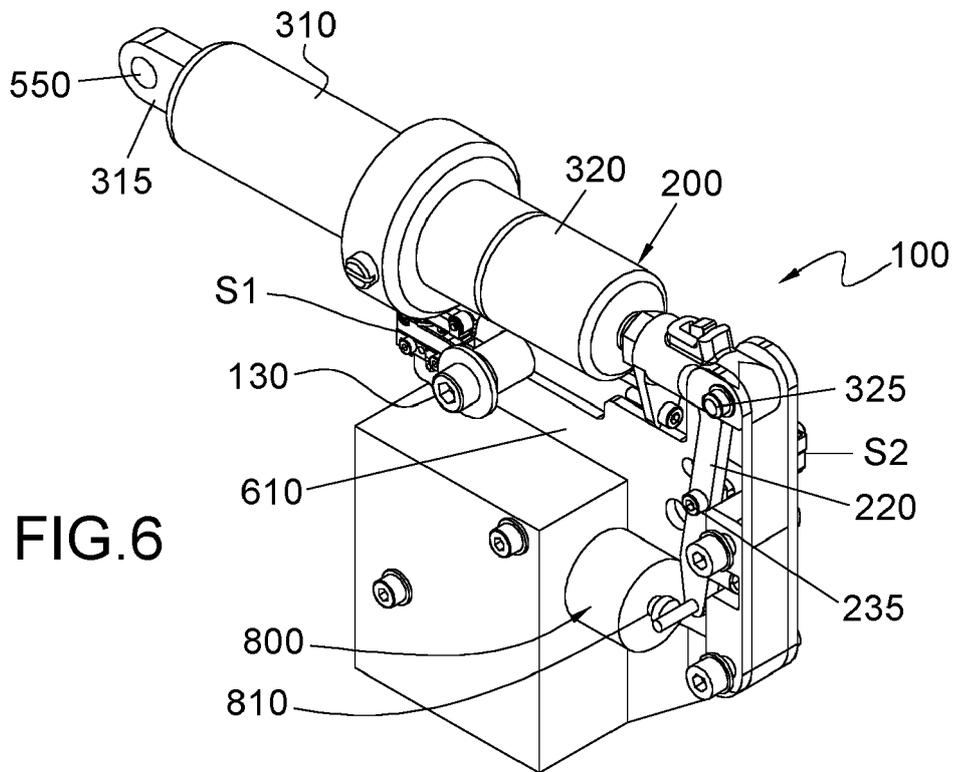


FIG. 6

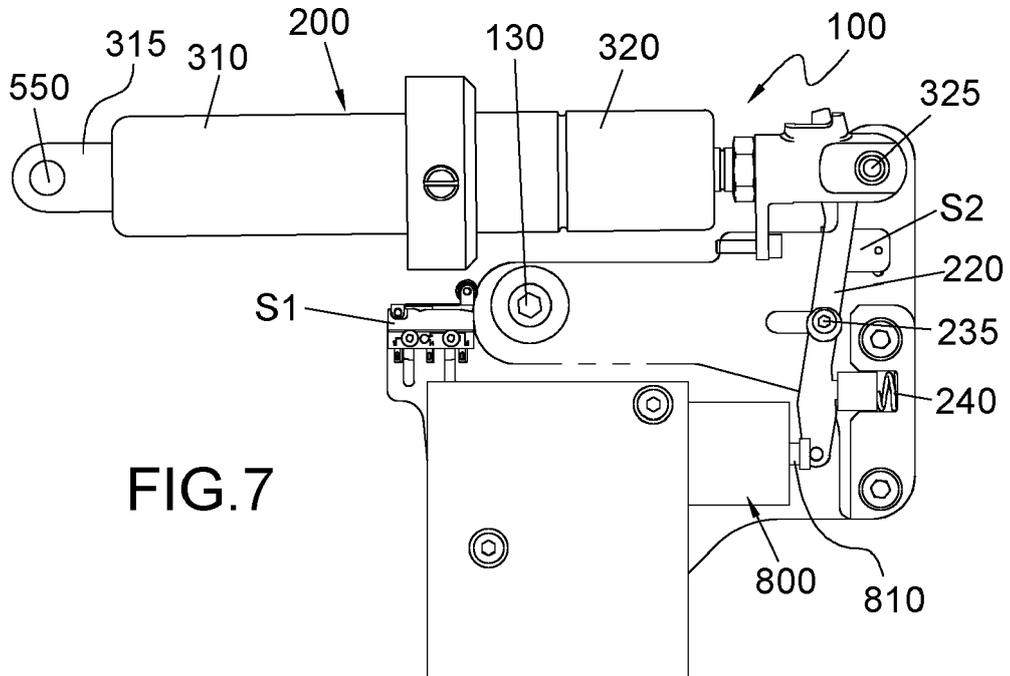
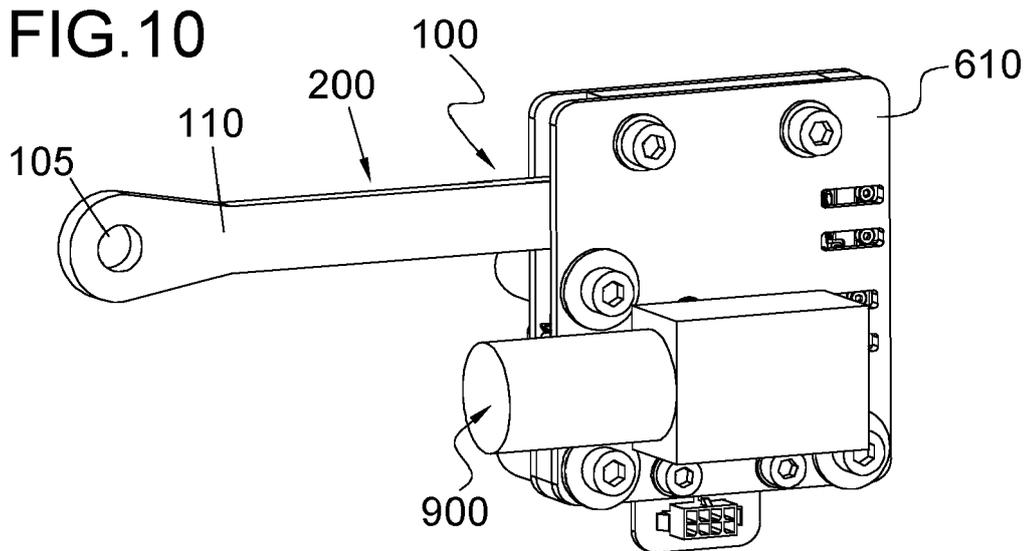
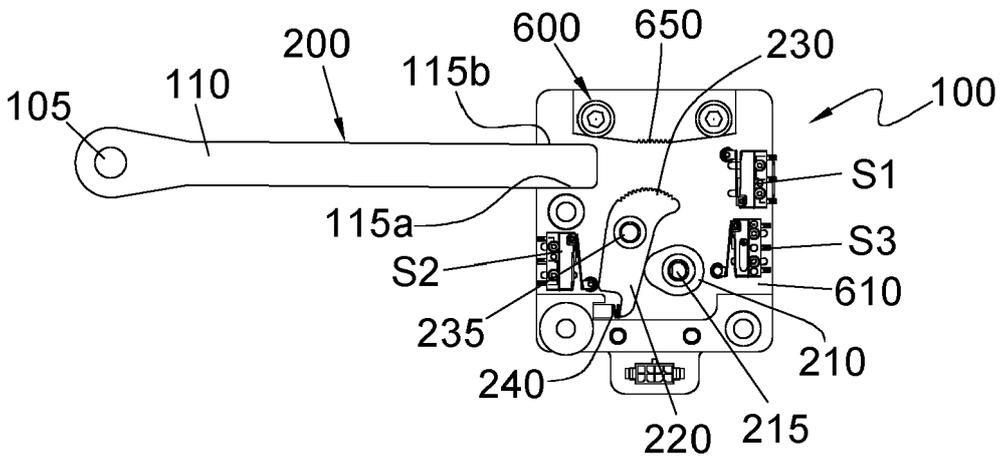
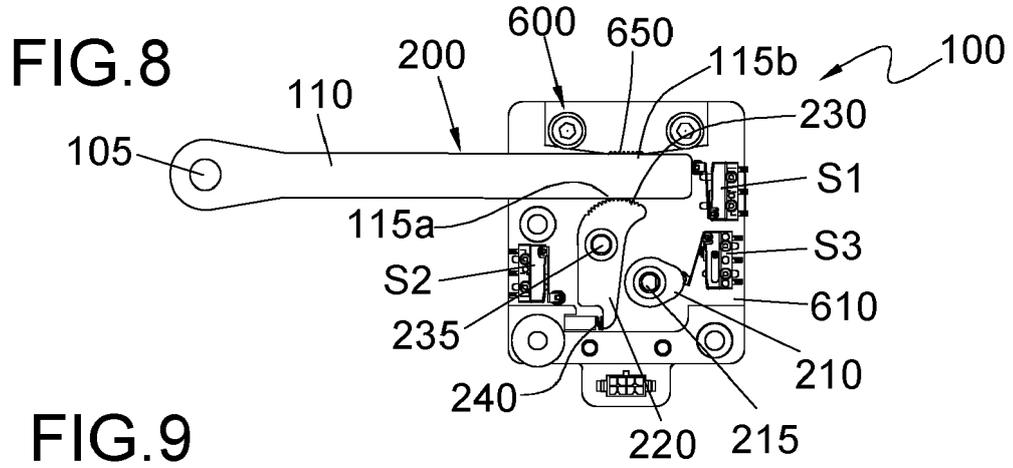
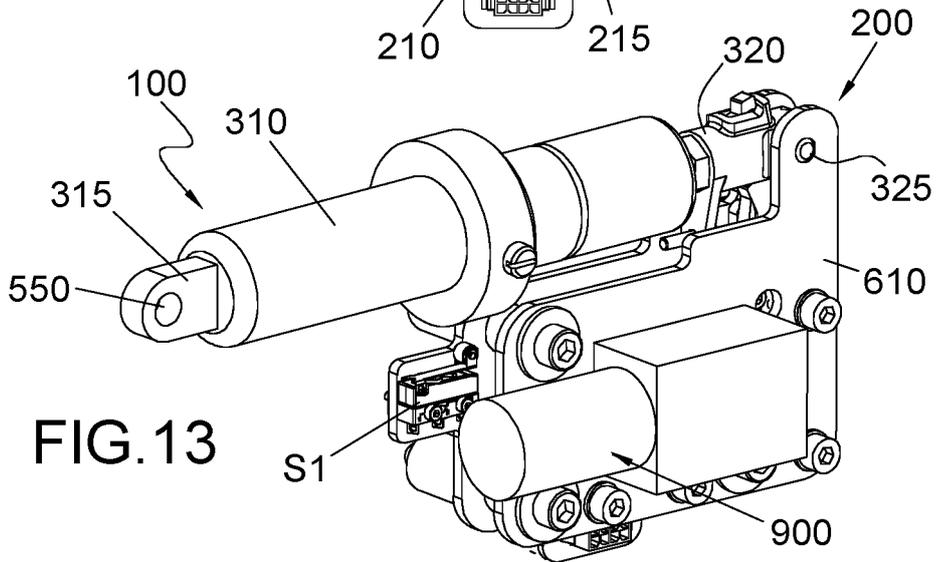
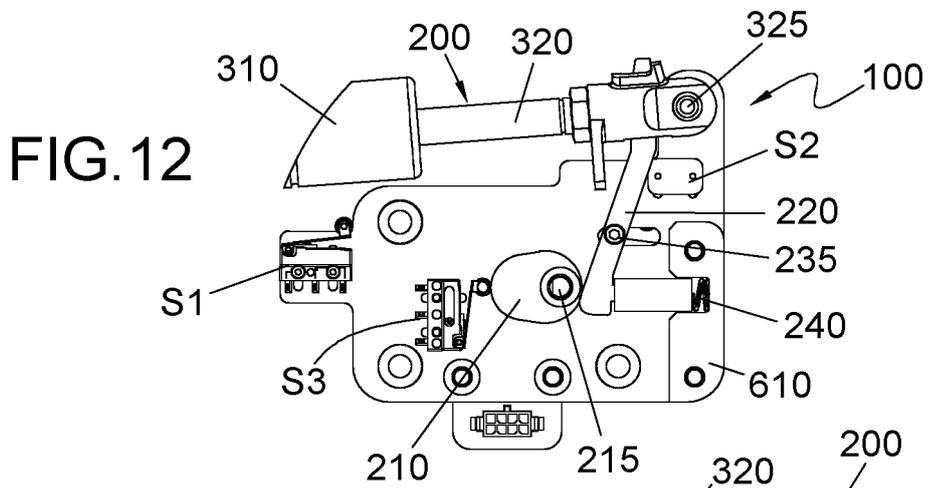
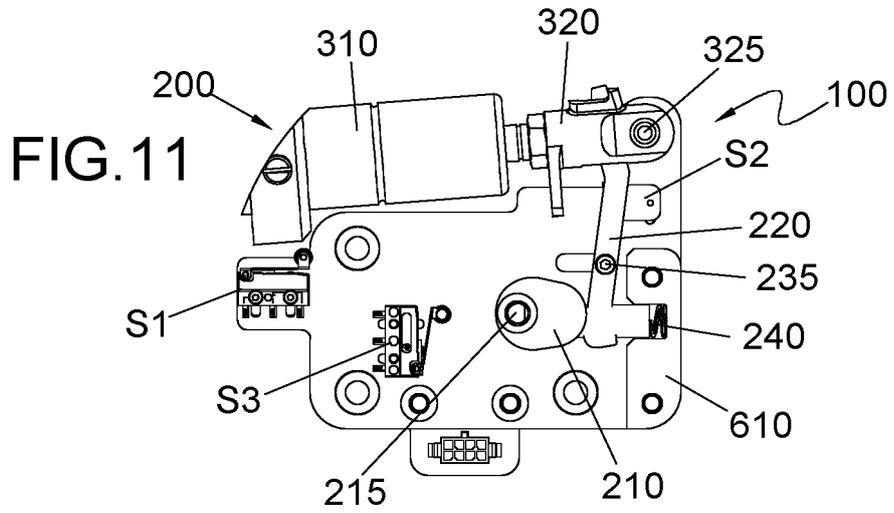


FIG. 7







EUROPEAN SEARCH REPORT

Application Number
EP 20 38 2601

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Place of search The Hague		Date of completion of the search 14 December 2020	Examiner Sommer, Jean
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