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(54) Safety device for securing an appliance

(57) A solution for securing an appliance (100) is proposed; the appliance includes a cabinet (105), a door (110) for closing the cabinet, a latching mechanism (215) for maintaining the door closed and allowing opening the door. A corresponding safety device (115) includes a first locking block (215), a first mounting module (310) for mounting the first locking block on the cabinet, a second locking block (220), and a second mounting module (370) for mounting the second locking block on the door. The first and second locking blocks are independent of the latching mechanism. In the solution according to an embodiment of the invention, the safety device further includes a command member (325,340) for selectively switching the safety device between an active condition and an inactive condition being both stable to be maintained in the absence of external actions, in the active condition the first locking block and the second locking block interfering to prevent the opening of the door, and in the inactive condition the first locking block and the second locking block not interfering to allow the opening of the door.

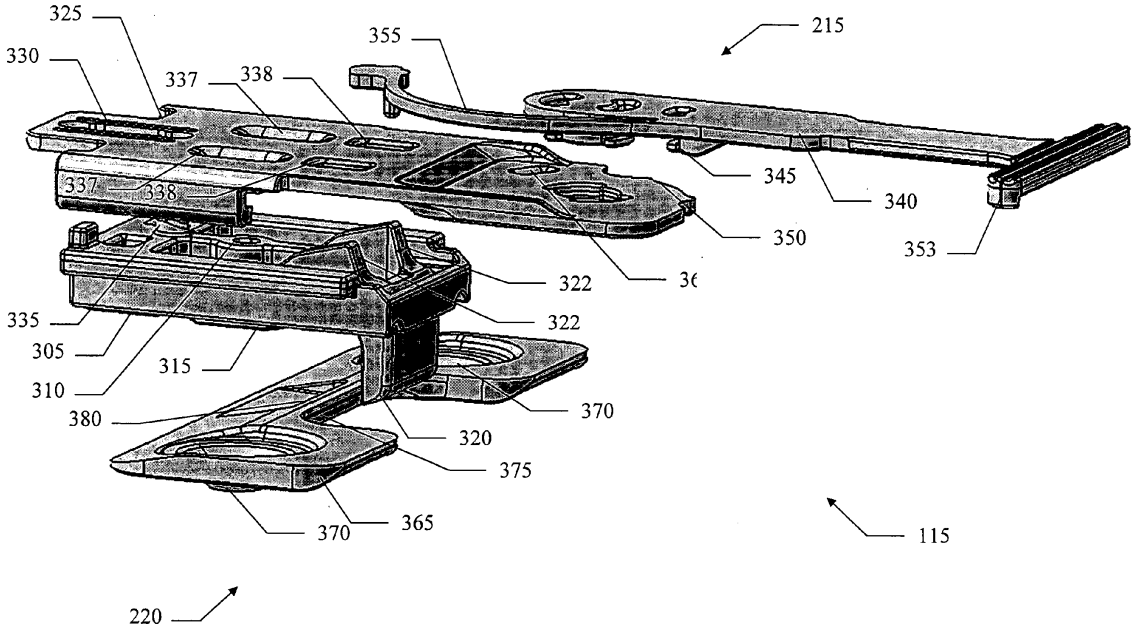

FIG.3B

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Description

[0001] The solution according to one or more embodiments of the present invention relates to the field of appliances. More specifically, this solution relates to safety devices for appliances.

[0002] Appliances are routinely used to accomplish a number of household functions; examples of widespread appliances are dishwashers, ovens, fridges, washing machines, tumble dryers, and the like.

[0003] However, some of the most common appliances may pose risks of injuries for young children that are not under an adult supervision (even for a very short period). With reference in particular to a dishwasher, indeed, a child may accidentally open its door (by simply pulling it down); in this case, the child may have access to sharp objects that are placed inside the dishwasher, such as knives, forks and glasses (with the risk of wounds). Moreover, if the dishwasher is in operation, the child may also be exposed to high temperatures (with the risk of burns) and/or to chemical detergents (with the risk of poisonings).

[0004] In order to mitigate this problem, dishwashers with a child safety feature have been proposed in the art. Particularly, a standard door latch of the dishwasher may be modified to prevent undesired opening of the door. For example, US-A-2007/0256715 (the entire disclosure of which is herein incorporated by reference) proposes a door lock with a pin or a slide, which can be moved between two positions wherein it inhibits or it does not inhibit, respectively, the movement of a closing member of the door lock.

[0005] However, this requires a complete re-design of the door latch (with a corresponding increase in the cost of the whole dishwasher); moreover, the child safety feature may only by applied to new dishwashers (with the modified door lock).

[0006] Alternatively, a locking device may be added to prevent the door from completely opening. For example, as disclosed in WO-A-2004/005653 (the entire disclosure of which is herein incorporated by reference), a pin is mounted on the door and a closure is mounted on a cabinet of the dishwasher; a spring biases the closure so that, when the door is closed, the pin enters a bolt of the closure. In this way, when the door is opened the pin abuts against a shoulder of the closure thereby limiting its opening. In order to complete the opening of the door, the closure has to be manually slid in opposition to the spring, so as to clear the pin.

[0007] Likewise, in DE-A-102006007328 (the entire disclosure of which is herein incorporated by reference), a plastic safeguard lever is mounted on the cabinet; the safeguard lever is provided with a hook that normally engages an opening on the door, so as to limit its opening. In order to complete the opening of the door, the lever has to be flexed, so as to clear its hook from the opening.

[0008] Moreover, in DE-A-102007029900 (the entire disclosure of which is herein incorporated by reference) a spring hook is provided on the cabinet; when the door is closed, the spring hook engages an opening that is provided on the door for the passage of a standard hinge plate. In this way, the spring hook prevents the opening of the door. The door can be opened by manually flexing the spring hook, so as to disengage it from the opening.

[0009] However, the above-described safety devices are always active to prevent the opening of the door (at least completely). Therefore, this makes the operation of opening the door troublesome, since it requires a coordinate movement to release the standard door latch, and at the same time to unlock the safety device. Moreover, this quite complex operation is always necessary, even when there is no risk at all (for example, when no child is present). In addition, most of the locking devices known in the art are not of general applicability (since they interact with the specific door latch of the dishwasher). Moreover, when the locking device only prevents the complete opening of the door, the risks of injuries are not entirely removed; indeed, even a partial opening of the door may expose the children to some risks (for example, being caused by the discharge of hot steam from the dishwasher).

[0010] In its general terms, a solution according to one or more embodiments of the present invention is based on the idea of providing an independent safety device that may be activated only when it is necessary.

[0011] Particularly, one or more aspects of a solution according to specific embodiments of the invention are set out in the independent claims, with advantageous features of the same solution that are set out in the dependent claims (whose wording is herein incorporated *verbatim* by reference).

[0012] More specifically, an aspect of a solution according to an embodiment of the invention provides a safety device for securing an appliance; the appliance includes a cabinet and a door for closing the cabinet; a latching mechanism is used to maintain the door closed and to allow opening the door. The safety device includes a first locking block, and a first mounting module for mounting the first locking block on the cabinet; the safety device further includes a second locking block, and a second mounting module for mounting the second locking block on the door. The first and second locking blocks are independent of the latching mechanism. In the solution according to an embodiment of the invention, the safety device further includes a command member for selectively switching the safety device between an active condition and an inactive condition; both conditions are stable, so as to be maintained in the absence of external actions. Particularly, in the active condition the first locking block and the second locking block interfere to prevent the opening of the door, whereas in the inactive condition the first locking block and the second locking block do not interfere to allow the opening of the door.

[0013] In an embodiment of the invention, the first locking block includes a hook and a resilient element for biasing the hook, and the second locking block includes a

latch for receiving the hook; in the inactive condition the resilient element disengages the hook from the latch, and in the active condition the command member engages the hook with the latch in opposition to the resilient element.

[0014] In an embodiment of the invention, the second locking block further includes a shoulder for preventing the hook to engage the latch when the safety device is in the active condition with the door being open.

[0015] In an embodiment of the invention, the first locking block includes a support, the first mounting module fastening the support to the cabinet, and the resilient element includes a resilient tab pivoting around the support, the hook projecting from a free end of the resilient tab.

[0016] In an embodiment of the invention, in a rest condition the resilient tab is in proximity to the support; the command member in the active condition flexes the resilient tab away from the support and in the inactive condition allows the resilient tab to return towards the support.

[0017] In an embodiment of the invention, the command member includes a sledge slidable along the support and a lever for driving the sledge from outside the appliance when the door is closed. The resilient tab and/or the sledge include at least one projection projecting towards the sledge and/or the resilient tab, respectively. In the active condition, the sledge is in a corresponding position wherein the at least one projection of the resilient tab and/or the sledge interferes with the sledge and/or the resilient tab, respectively, to flex the resilient tab; in the inactive condition, the sledge is in a corresponding position wherein the at least one projection of the resilient tab and/or the sledge does not interfere with the sledge and/or the resilient tab, respectively, to allow the resilient tab to return towards the support.

[0018] In an embodiment of the invention, in operation a sliding direction of the sledge along the support is transversal to the door; the lever in a position corresponding to the inactive condition projects from the appliance by a first extent, and in a position corresponding to the active condition projects from the appliance by a second extent higher than the first extent.

[0019] In an embodiment of the invention, the command member further includes a snap-fit mechanism for blocking the sledge in the position corresponding to the inactive condition or in the position corresponding to the active condition.

[0020] In an embodiment of the invention, the lever is hinged to the sledge; in operation the lever is adapted to rotate between an operative position wherein the lever projects from the appliance and a hidden position wherein at least a prevalent portion of the lever is hidden in correspondence to the appliance when the door is closed.

[0021] In an embodiment of the invention, the command member includes a further snap-fit mechanism for blocking the lever in the operative position or in the hidden position.

[0022] In an embodiment of the invention, the lever includes a tooth extending transversally to a main plane of the lever, the tooth abutting against the door to remain outside the appliance when the lever is rotated to the hidden position with the door being closed.

[0023] In an embodiment of the invention, the command member further includes an elastic element for biasing the lever towards the operative position.

[0024] A further aspect of a solution according to an embodiment of the invention provides an appliance including a cabinet, a door for closing the cabinet, a latching mechanism for maintaining the door closed and allowing opening the door, and the above-described safety device for securing the appliance.

[0025] In an embodiment of the invention, the appliance is a dishwasher.

[0026] Another aspect of a solution according to an embodiment of the invention provides a corresponding method (with the same advantageous features being recited in the dependent claims for the safety device that apply *mutatis mutandis* to the method). Particularly, there is proposed a method for securing an appliance including a cabinet, a door for closing the cabinet, and a latching mechanism for maintaining the door closed and allowing opening the door. The method includes the steps of mounting a first locking block of a safety device on the cabinet, and mounting a second locking block of the safety device on the door (with the first and second locking blocks that are independent of the latching mechanism). In the solution according to an embodiment of the invention, the method further includes the step of selectively switching the safety device between an active condition and an inactive condition; both conditions are stable, so as to be maintained in the absence of external actions. Particularly, in the active condition the first locking block and the second locking block interfere to prevent the opening of the door, and in the inactive condition the first locking block and the second locking block do not interfere to allow the opening of the door.

[0027] A solution according to one or more embodiments of the invention, as well as further features and the advantages thereof, will be best understood with reference to the following detailed description, given purely by way of a non-restrictive indication, to be read in conjunction with the accompanying drawings (wherein corresponding elements are denoted with equal or similar references and their explanation is not repeated for the sake of brevity). In this respect, it is expressly intended that the figures are not necessary drawn to scale (with some details that may be exaggerated and/or simplified) and that, unless otherwise indicated, they are merely used to conceptually illustrate the structures and procedures described herein. Particularly:

FIG.1 shows a partial view of an exemplary dishwasher to which the solution according to an embodiment of the invention may be applied,

FIG.2 shows an enlarged detail of this dishwasher,
FIG.3A shows a safety device according to an embodiment of the invention in assembled view,
FIG.3B shows the same safety device in exploded view,
FIG.3C shows a detail of this safety device in exploded view,
FIG.4A-FIG.4B and FIG.4C-FIG.4D show the safety device according to an embodiment of the invention in an inactive condition and in an active condition, respectively,
FIG.5A-FIG.5B show a partially cut away top view and a bottom view, respectively, of the dishwasher with a lever of the safety device according to an embodiment of the invention in a hidden position,
FIG.6 shows the safety device according to an embodiment of the invention when its lever is rotated accidentally towards the hidden position, and
FIG.7 shows the safety device according to an embodiment of the invention when it is switched accidentally to the active condition before closing a door of the dishwasher.

[0028] With reference in particular to FIG.1, a partial view of an exemplary dishwasher 100 (to which the solution according to an embodiment of the invention may be applied) is shown. The dishwasher 100 (for example, of the full-integrated type) includes a cabinet 105, which has a housing (not shown in the figure) with a front load opening; the housing of the cabinet 105 is provided with one or more pull-out racks for inserting items to be washed (for example, dishes, cutlery, glasses, pots, pans, and the like). A front door 110 closes the housing of the cabinet 105. The door 110 is hinged at a bottom of the cabinet 105; in this way, the door 110 can be opened (with a drop-down movement) so as to access the housing of the cabinet 105 (to insert the items to be washed and to remove the items being washed). A safety device 115 is added to secure the dishwasher 100; particularly, as described in detail in the following, the safety device 115 is used to prevent any accidental opening of the door 110 (for example, by children).

[0029] An enlarged detail of this dishwasher 100 is shown in FIG.2. As can be seen, the dishwasher 100 is provided with a standard door latch 205, which is used to maintain the door 110 closed. For example, the door latch 205 includes a staple 210 that is fastened to the cabinet 105; particularly, the staple 210 is arranged in a central position under an upper crossbar of the cabinet 105 (around its load opening), so as to project towards the door 110. A matching latch-hole 212 with a resilient catch (not shown in the figure) is provided in an inner face of the door 110. In this way, when the door 110 is closed, the staple 210 snap fits into the latch-hole 212 (being engaged by its resilient catch). The latch-hole 212 is also provided with a sensor, which detects the closure of the door 110 (i.e., the presence of the staple 210); this sensor conditions operation of the dishwasher 100, by enabling it only when the door 110 is closed. The door 110 may be opened by simply pulling it forwards and downwards - for example, by means of a handle (not shown in the figure) that is fastened on an outer face of the door 110; the corresponding force being applied to the door 110 causes the resilient yielding of the catch in the latch-hole 212, thereby clearing the staple 210 that can then be extracted therefrom.

[0030] The safety device 115 is completely independent of the above-described door latch 205. Particularly, the safety device 115 is arranged at the top of the dishwasher, along a longitudinal axis perpendicular to the upper crossbar of the cabinet 105 and to the door 110. More in detail, the safety device 115 includes an inner locking block 215 and an outer locking block 220 (for example, made of plastic material). The inner locking block 215 is mounted in a central position on the upper crossbar of the cabinet 105 (above the staple 210), in a cantilever way so as to project towards the door 110; the outer locking block 220 is instead mounted in a corresponding position on an upper face of the door 110. As described in detail in the following, when the door 110 is closed the locking blocks 215 and 220 interfere (to prevent opening the door 110) if the safety device 115 is in an active condition, whereas they do not interfere (to allow opening the door 110) if the safety device 115 is in an inactive condition.

[0031] The safety device 115 according to an embodiment of the invention is shown in greater detail in FIG. 3A-FIG.3C; particularly, FIG.3A shows the safety device 115 in assembled view, FIG. 3B shows the safety device 115 in exploded view, and FIG.3C shows a particular of the same safety device in exploded view.

[0032] With reference to FIG.3A-FIG.3C together, the inner locking block 215 includes a support 305 that is fastened to the upper crossbar of the cabinet (not shown in the figures). For this purpose, the support 305 has a through threaded hole 310 that crosses it vertically (only visible in FIG.3B and FIG.3C). The threaded hole 310 is aligned with a corresponding through smooth hole of the upper crossbar; a tap screw (not shown in the figures) is inserted from below the upper crossbar into its smooth hole, and it is then screwed into the threaded hole 310 (thereby gripping the support 305 against the upper crossbar). A resilient tab 315 extends outwards from an inner end of the support 305; the resilient tab 315 has an outer free end (facing the door) with a hook 320 projecting downwards. The resilient tab 315 is also provided with two upwards projections 322, which are arranged close to its hook 320 (at the free end of the resilient tab 315).

[0033] The inner locking block 215 further includes a sledge 325, which can slide along the support 305 (i.e., horizontally); for this purpose, the sledge 325 has two side wings (being downturned and then in-turned) at an inner end thereof, each one of them being coupled with a corresponding rail that projects laterally from the support 305. A slotted-hole 330 crosses the sledge 325 in a central position at its inner end; the slotted-hole 330 ex-

tends along the sledge 325, and has two (inner and outer) end portions with a circular section, which are connected by a narrower central portion. Two longitudinal clearings are formed at the sides of the slotted-hole 330 to allow its widening. The slotted-hole 330 receives a cursor 335 matching the end portions of the slotted-hole 330, which cursor 335 projects upwards from the support 305 in a corresponding position at its inner end. The sledge 325 is also provided with two downward projections 337 and two openings 338 for the corresponding (upward) projections 322 of the resilient tab 315 (being each pair of projection 337 and opening 338 aligned along the sledge 325, with the opening 338 in an outer position with respect to the projection 337).

[0034] A lever 340 (ending with a T-shaped handle) is hinged to the sledge 325 at an outer end thereof. For this purpose, the lever 340 has a pin (ending with a rim) that projects downwards in a central position at an inner end thereof; this pin snap fits into a corresponding through-hole crossing the sledge 325 in a central position at its outer end. In this way, the lever 340 can rotate with respect to the sledge 325, around a vertical axis of its pin. However, the lever 340 is also provided with a stop peg 345, which projects downwards in correspondence to an outer edge of the sledge 325. Therefore, the interference of the peg 345 with the outer edge of the sledge 325 at its left (looking at the dishwasher in front of it) prevents any rotation of the lever 340 leftwards. On the contrary, the outer edge of the sledge 325 features a clearing 350 at its right, which extends for about 90° from the longitudinal axis of the safety device 115; the clearing 350 ends with two (outer and lateral) seats receding into the sledge 325 (at the same distance of the peg 345 from the pin of the lever 340), which seats are connected by a slightly larger circular central portion. Normally, the lever 340 extends outwards; in this case, the peg 345 snap fits into the outer seat of the clearing 350, so that the lever 340 is held firmly in this position by the interference of the peg 345 with the central portion of the clearing 350. The handle of the lever 340 is also provided with a tooth 353, which projects downwards from a left end thereof (on the other side of the clearing 350). Moreover, a flexible tongue 355 extends from a left side of the lever 340 (at about the same position of the peg 345 along the lever 340). The flexible tongue 355 is wound around the inner end of the lever 340; the flexible tongue 355 ends with a tooth that snap fits into a corresponding through-hole 360 crossing the sledge 325 on the other side of the lever 340 (i.e., at its right).

[0035] The outer locking block 220 instead includes a plate 365 that is fastened to the upper face of the door (not shown in the figures). For this purpose, the plate 365 has two through smooth holes 370 that cross it vertically at lateral ends thereof. Each smooth hole 370 is aligned with a corresponding through smooth hole of the door and a corresponding blind threaded hole of the door latch; a tap screw (not shown in the figures) is inserted from above the plate 365 into each smooth hole 370 and the corresponding smooth hole of the door, and it is then screwed into the corresponding threaded hole of the door latch (thereby gripping the plate 365 against the door). A recess is formed in the plate 365, in a central position at an outer end thereof (between the smooth holes 370) so as to define a latch 375 for the hook 320. A pocket is instead formed in the plate 365 in a central position at an inner end thereof, so as to define a shoulder 380 (opposite the latch 375) for the hook 320.

[0036] In order to explain operation of the safety device 115, reference is now made to FIG.4A-FIG.4D; particularly, FIG.4A is a top view and FIG.4B is a cross-section view of the safety device 115 in the inactive condition, whereas FIG.4C is a top view and FIG.4D is a cross-section view of the safety device 115 in the active condition.

[0037] Starting from FIG.4A and FIG.4B (together), in the inactive condition of the safety device 115 (with the lever 340 in an operative position extending outwards) the lever 340 is retracted in the cabinet 105. At the same time, the cursor 335 of the support 305 snap fits in the outer end portion of the slotted-hole 330 of the sledge 325; therefore, the sledge 325 is held firmly in this position by the interference of the cursor 335 with the (narrower) central portion of the slotted-hole 330. In this way, the handle of the lever 340 slightly projects from the door 110 (when it is closed by means of the door latch 205, with the staple 210 engaged in the latch-hole 212).

[0038] As can be seen in FIG.4B, in the inactive condition the (upward) projections 322 of the resilient tab 315 and the (downward) projections 337 of the sledge 325 are staggered (with the projections 322 that are received in the openings 338 of the sledge 325), so that they do not interfere. Therefore, the resilient tab 315 remains in a rest position in proximity to the support 305, with the hook 320 that is raised. In this condition, the hook 320 is disengaged from the latch 375 of the plate 365. As a result, the door 110 can be opened as usual by pulling it forwards and downwards (so as to clear the staple 210 from the latch-hole 212).

[0039] With reference now to FIG.4C and FIG.4D (together), the safety device 115 is switched to the active condition by pulling the lever 340, so as to extract it from the cabinet 105. The corresponding force that is exerted on the lever 340 allows the cursor 335 to leave the outer end portion of the slotted-hole 330 and to pass through its central portion (thanks to its widening into the corresponding clearings), until the cursor 335 reaches the inner end portion of the slotted-hole 330. As above, the cursor 335 snap fits into the inner end portion of the slotted-hole 330, so that the sledge 325 is held firmly in this position by the interference of the cursor 335 with the (narrower) central portion of the slotted-hole 330. In this way, the handle of the lever 340 projects to a grater extent from the door 110 (when it is closed).

[0040] As can be seen in FIG.4D, the projections 337 now interfere with the projections 322 (as soon as lead-in faces of the projections 337 reach corresponding lead-

in faces of the projections 322). Therefore, the resilient tab 315 flexes downwards, so as to lower the hook 320. In this condition, the hook 320 engages the latch 375. As a result, the door 110 cannot be opened, since the hook 320 holds the plate 365 (and then the door 110 integral therewith).

[0041] *Vice-versa,* the safety device 115 is returned to the inactive condition by pushing the lever 340, so as to retract it into the cabinet 105 (with the corresponding force that allows the cursor 335 to leave the inner end portion and to pass through the central portion of the slotted-hole 330, until it snap fits into the outer end portion thereof). In this way, the projections 337 clear the projections 322 (as they move inwards). Therefore, the resilient tab 315 returns to its rest position (in proximity to the support 305), so as to raise the hook 320 as shown in FIG.4B.

[0042] In general, the solution according to an embodiment of the invention allows securing the dishwasher, so as to prevent any accidental opening of the door that may pose risks of injuries (for example, for children).

[0043] This result is achieved in a very simple way, since the proposed safety device is completely independent of the standard door latch of the dishwasher. Therefore, no re-design of this door latch is required (with a corresponding saving in the cost of the whole dishwasher); moreover, the safety device is of general applicability, since it can be added to whatever dishwasher (irrespectively of its door latch), with minor - or even no - modifications to other parts thereof (such as its door and/or upper crossbar).

[0044] Moreover, the safety device may be switched between the active condition and the inactive condition at will (and then it remains steadily in the selected condition without the need of any external action). In this way, it is possible to use the safety device only when it is necessary (for example, in presence of children); otherwise, the safety device does not interfere with the standard operation of the dishwasher.

[0045] The specific embodiment of the safety device described above offers further advantages. Particularly, the proposed structure (with the hook on the cabinet and the latch on the door, which hook is arranged on the resilient tab that is flexed by acting on the sledge) allows achieving the desired result with a structure that is simple, inexpensive, and easy to use.

[0046] Moreover, the operation of the safety device is very practical (since it only requires extracting or retracting its lever), but at the same time child-proof (since the above-described snap-fitting mechanism for blocking the sledge requires a relatively high force to switch the safety device between the active condition and the inactive condition).

[0047] The choice of having the lever extracted when the safety device is in the active condition and the lever retracted when the safety device is in the inactive condition further increases its reliability. Indeed, in this case the operation required to switch the safety device from the active condition to the inactive condition (i.e., pushing the lever) is more complex with respect to the one required to switch the safety device from the inactive condition to the active condition (i.e., pulling the lever), which instead might be performed even accidentally - for example, when the lever remains entangled in something; therefore, it is possible to avoid (or at least strongly reduce) the risk that a child could perform this operation (and then opening the door of the dishwasher).

[0048] Moving to FIG.5A-FIG-5B, the safety device 115 according to an embodiment of the invention with its lever 340 in a hidden position is shown in a partially cut away top view and a bottom view, respectively.

[0049] Starting from FIG.5A, when the door 110 is open and the lever 340 is retracted in the dishwasher 100 (in the position corresponding to the inactive condition of the safety device 115), the lever 340 may be rotated with respect to the sledge 325 (horizontally) rightwards by about 90°. For this purpose, it is necessary to exert a corresponding force, which allows the peg 345 to leave the outer seat of the clearing 350 and to pass through its central portion (thanks to the elastic yield of the peg 345), until the peg 345 reaches the lateral seat of the clearing 350 and snaps fits into it. As above, the lever 340 is held firmly in this position by the interference of the peg 345 with the central portion of the clearing 350. Therefore, when the door 110 is closed, the lever 340 is now completely contained within the door 100 (i.e., it does not project outside it any longer). In this way, the safety device 115 is hidden under a top covering of the dishwasher 100 (not shown in the figure) or in correspondence thereto (for example, under a top covering of a kitchen, not shown in the figure). In any case, the safety device 115 may be readily restored by simply opening the door 110, and then rotating the lever 340 leftwards (with the corresponding force that allows the peg 345 to leave the lateral seat and to pass through the central portion of the clearing 350, until it snap fits into the outer seat thereof). In this way, the lever 340 returns to the operative position extending outwards (not shown in the figure).

[0050] This allows making the safety device 115 substantially invisible when it is not necessary (for example, because no child is present). The same feature is also advantageous before the dishwasher 100 is installed; indeed, by bringing the lever 340 to the hidden position, it is possible to avoid the need of any specific packaging to protect the safety device 115 (for example, in factories, warehouses, and transport means).

[0051] Moving to FIG.5B, when the lever 340 is brought to the hidden position with the door 110 that is already closed, the tooth 353 abuts against the door 110. Therefore, the lever 340 cannot be hidden completely inside the dishwasher 100, since its tooth 353 always remains outside the door 110.

[0052] This feature is particularly advantageous when the lever 340 is brought accidentally to the hidden position with the door 110 closed and the safety device 115 in the active condition. In this case, if the lever 340 was

completely hidden the dishwasher 100 would be blocked. Indeed, it is not possible to open the door 110; at the same time, it would be very difficult (if not impossible) to reach the lever 340 (for returning it to the operative position and then switching the safety device 115 to the inactive condition). Instead, in the above-described embodiment of the invention the tooth 353 outside the door 100 may be grasped (for example, with a finger) for pulling the lever 340 outwards the dishwasher 100, and then returning it to the operative position.

[0053] Considering now FIG.6, there is shown the safety device 115 according to an embodiment of the invention when its lever 340 is rotated accidentally towards the hidden position. Normally, when the lever 340 is in the operative position (extending outwards), the flexible tongue 355 is maintained loose. Instead, as soon as the lever 340 rotates towards the hidden position (i.e., rightwards), the flexible tongue 355 bends; this generates an elastic force, which biases the lever 340 towards the operative position. Therefore, should a force be applied to the lever 340 (for example, because it is hit with something), with an intensity enough to cause the lever 340 to leave the operative position and to rotate towards the hidden position, the flexible tongue 355 automatically returns the lever 340 to the operative position.

[0054] This ensures that the lever 340 is maintained correctly in its operative position; at the same time, it reduces the possibility of accidentally bringing the lever 340 to the hidden position when the door 110 is closed and the safety device 115 is in the active condition. Nevertheless, this does not prevent the lever 340 to be brought to the hidden position when it is necessary (with the safety device 115 in the inactive condition). Indeed, as soon as the lever 340 reaches the hidden position, the peg 345 is received into the lateral seat of the clearing 350, so that its interference with the central portion of the clearing 350 prevents the return of the lever 340 towards the operative position (unless an external force is applied to cause the peg 345 to leave the lateral seat of the clearing 350).

[0055] At the end, FIG.7 shows the safety device 115 according to an embodiment of the invention when it is switched accidentally to the active condition before closing the door of the dishwasher (not shown in the figure). In this case, the hook 320 of the resilient tab 315 is lowered (by the sledge 325 that is extracted from the dishwasher); therefore, when the door is moved towards the cabinet the hook 320 abuts against the shoulder 380 of the plate 365, thereby preventing its closure.

[0056] This avoids any risk of blocking the dishwasher, by accidentally closing the door with the safety device 115 in the active condition and the lever in the hidden position (with the same difficulties pointed out above).

[0057] Naturally, in order to satisfy local and specific requirements, a person skilled in the art may apply to the solution described above many logical and/or physical modifications and alterations. More specifically, although this solution has been described with a certain degree of particularity with reference to one or more embodiments thereof, it should be understood that various omissions, substitutions and changes in the form and details as well as other embodiments are possible. Particularly, different embodiments of the invention may even be practiced without the specific details (such as the numerical examples) set forth in the preceding description to provide a more thorough understanding thereof; conversely, well-known features may have been omitted or simplified in order not to obscure the description with unnecessary particulars. Moreover, it is expressly intended that specific elements and/or method steps described in connection with any embodiment of the disclosed solution may be incorporated in any other embodiment as a matter of general design choice.

[0058] Particularly, similar considerations apply if the safety device has a different structure or includes equivalent components (either separate to each other or combined together, in whole or in part); moreover, the safety device may have different operative characteristics. For example, the components of the safety device made be made of any other material (for example, of tin), they may be mounted on the cabinet and the door in a different way (for example, with a press-fit mechanism), and the like. Of course, the use of the safety device is not limited to the presence of children, but it may be useful in any other situation wherein it is necessary to ensure that the door cannot open (for example, because of an overpressure of its internal steam).

[0059] In any case, it should be noted that the above-described safety device lends itself to be put on the market even as a stand-alone product, in order to be added to standard washing machines.

[0060] Moreover, the possibility of inverting the position of the two locking blocks (i.e., with the sledge and the lever mounted on the door and the latch mounted on the cabinet) is not excluded.

[0061] The hook and the latch may be replaced with equivalent components; alternatively, the hook may be normally biased to engage the latch, with the hook that is disengaged from the latch in opposition to its biasing.

[0062] Other techniques are feasible to prevent the hook to engage the latch when the safety device is in the active condition with the door being open (for example, by simply exploiting a vertical inner wall of the plate); in any case, this feature is not strictly necessary and it may be omitted in specific implementations (for example, when the lever cannot rotate around the sledge).

[0063] Moreover, it is possible to replace the resilient tab carrying the hook with any other elastic element adapted to bias the hook correctly (for example, a distinct spring acting on a rocking beam, a push button, and the like).

[0064] Nothing prevents having the hook lowered in the inactive condition and raised in the active condition of the safety device (for cooperating with a latch arranged above it).

[0065] The sledge and the resilient tab may have any

number of cooperating projections (down to a single one). Moreover, it is possible to have the projections only on one between the sledge and the resilient tab; likewise, openings for the downward projections of the sledge may be formed in the resilient tab (in addition or in alternative to the openings in the sledge for the upwards projections of the resilient tab), or *vice-versa* these openings may be omitted at all. More generally, the sledge may interfere with any other element to lower and raise the hook (for example, by pushing down a button carrying the hook at its lower end, which button is normally biased upwards).

[0066] The possibility of moving the sledge along another direction (for example, laterally) is not excluded. In any case, the operation of the safety device may also be inverted (with the safety device in the active condition when the lever is retracted and in the inactive condition when the lever is extracted).

[0067] Nothing prevents providing other mechanisms (even not of the snap-fitting type) for blocking the sledge when the lever is extracted or retracted (for example, based on a flexible catch). In any case, the safety device may lack any mechanism for blocking the sledge (for example, when the sledge fits on the support with strong interference, so that its sliding requires the application of a remarkable force).

[0068] Similar considerations apply if the lever is brought from the operative position to the hidden position by rotating it leftwards. In any case, in a basic implementation, it is possible to have the lever integral with the sledge (so that it cannot be hidden inside the dishwasher).

[0069] Likewise, the lever may be blocked in the operative position or in the hidden position with any other mechanism, even not of the snap-fit type (although this feature is not strictly necessary).

[0070] The tooth of the lever (or any other equivalent element, even extending on the same plane thereof) may be configured to remain always outside the dishwasher (for example, by having it projecting upwards so as to abut against the cabinet of the dishwasher); in this case, of course, the lever would never be completely hidden inside the dishwasher. *Vice-versa,* it is possible to omit this feature so as to allow always hiding the lever completely inside the dishwasher.

[0071] The flexible tongue for biasing the lever towards its operative position may be replaced by any other elastic element - for example, a leaf spring. However, this feature is merely optional (with the lever that may also be allowed to rotate both leftwards and rightwards from the operative position when it is missing).

[0072] Similar considerations apply if the dishwasher has a different structure or includes equivalent components (either separate to each other or combined together, in whole or in part). For example, the dishwasher may be of the built-under type, of the free-standing-built-under type, or of the free-standing type; moreover, the door may open in another way (such as laterally), its standard door latch may be based on any other mechanism (for example, with an opening lever), and the like.

[0073] Although in the preceding description reference has been made to a dishwasher, this is not to be interpreted in a limitative manner; indeed, the same safety device may also be used in a different appliance (for example, a oven, a fridge, a washing machines, a tumble dryer, and the like).

[0074] The above-described safety device may be mounted and/or operated with an equivalent method (by using similar steps, removing some steps being non-essential, or adding further optional steps - even in a different order).

Claims

1. A safety device (115) for securing an appliance (100) including a cabinet (105), a door (110) for closing the cabinet, a latching mechanism (215) for maintaining the door closed and allowing opening the door, wherein the safety device includes:

   a first locking block (215), a first mounting module (310) for mounting the first locking block on the cabinet, a second locking block (220), and a second mounting module (370) for mounting the second locking block on the door, the first and second locking blocks being independent of the latching mechanism,

   characterized in that

   the safety device further includes a command member (325,340) for selectively switching the safety device between an active condition and an inactive condition being both stable to be maintained in the absence of external actions, in the active condition the first locking block and the second locking block interfering to prevent the opening of the door, and in the inactive condition the first locking block and the second locking block not interfering to allow the opening of the door.

2. The safety device (115) according to claim 1, wherein the first locking block (215) includes a hook (320) and a resilient element (315) for biasing the hook, and wherein the second locking block (220) includes a latch (375) for receiving the hook, in the inactive condition the resilient element disengaging the hook from the latch, and in the active condition the command member (325,340) engaging the hook with the latch in opposition to the resilient element.

3. The safety device (115) according to claim 2, wherein the second locking block (220) further includes a shoulder (380) for preventing the hook (320) to engage the latch (375) when the safety device is in the active condition with the door (110) being open.

4. The safety device (115) according to claim 2 or 3, wherein the first locking block (215) includes a support (305), the first mounting module (310) fastening the support to the cabinet (105), and wherein the resilient element includes a resilient tab (315) pivoting around the support, the hook (320) projecting from a free end of the resilient tab.

5. The safety device (115) according to claim 4, wherein in a rest condition the resilient tab (315) is in proximity to the support (305), the command member (325,340) in the active condition flexing the resilient tab away from the support and in the inactive condition allowing the resilient tab to return towards the support.

6. The safety device (115) according to claim 5, wherein the command member (325,340) includes a sledge (325) slidable along the support (305) and a lever (340) for driving the sledge from outside the appliance (100) when the door (110) is closed, and wherein the resilient tab (315) and/or the sledge include at least one projection (322;337) projecting towards the sledge and/or the resilient tab, respectively, in the active condition the sledge being in a corresponding position wherein the at least one projection of the resilient tab and/or the sledge interferes with the sledge and/or the resilient tab, respectively, to flex the resilient tab, and in the inactive condition the sledge being in a corresponding position wherein the at least one projection of the resilient tab and/or the sledge does not interfere with the sledge and/or the resilient tab, respectively, to allow the resilient tab to return towards the support.

7. The safety device (115) according to claim 6, wherein in operation a sliding direction of the sledge (325) along the support (305) is transversal to the door (110), the lever (340) in a position corresponding to the inactive condition projecting from the appliance (100) by a first extent and in a position corresponding to the active condition projecting from the appliance by a second extent higher than the first extent.

8. The safety device (115) according to claim 6 or 7, wherein the command member (325,340) further includes a snap-fit mechanism (330,335) for blocking the sledge (325) in the position corresponding to the inactive condition or in the position corresponding to the active condition.

9. The safety device (115) according to any claim from 6 to 8, wherein the lever (340) is hinged to the sledge (325), in operation the lever being adapted to rotate between an operative position wherein the lever projects from the appliance (100) and a hidden position wherein at least a prevalent portion of the lever is hidden in correspondence to the appliance when the door (110) is closed.

10. The safety device (115) according to claim 9, wherein the command member (325,340) includes a further snap-fit mechanism (345,350) for blocking the lever (340) in the operative position or in the hidden position.

11. The safety device (115) according to claim 9 or 10, wherein the lever (340) includes a tooth (353) extending transversally to a main plane of the lever, the tooth abutting against the door (110) to remain outside the appliance (100) when the lever is rotated to the hidden position with the door being closed.

12. The safety device (115) according to any claim from 9 to 11, wherein the command member (325,340) further includes an elastic element (355) for biasing the lever (340) towards the operative position.

13. An appliance (100)- including a cabinet (105), a door (110) for closing the cabinet, a latching mechanism (215) for maintaining the door closed and allowing opening the door, and the safety device (115) according to any claim from 1 to 12 for securing the appliance.

14. The appliance (100) according to claim 13, wherein the appliance is a dishwasher.

15. A method for securing an appliance (100) including a cabinet (105), a door (110) for closing the cabinet, and a latching mechanism (215) for maintaining the door closed and allowing opening the door, wherein the method includes the steps of:

mounting a first locking block (215) of a safety device (115) on the cabinet, and
mounting a second locking block (220) of the safety device on the door, the first and second locking blocks being independent of the latching mechanism
characterized by
selectively switching the safety device between an active condition and an inactive condition being both stable to be maintained in the absence of external actions, in the active condition the first locking block and the second locking block interfering to prevent the opening of the door, and in the inactive condition the first locking block and the second locking block not interfering to allow the opening of the door.

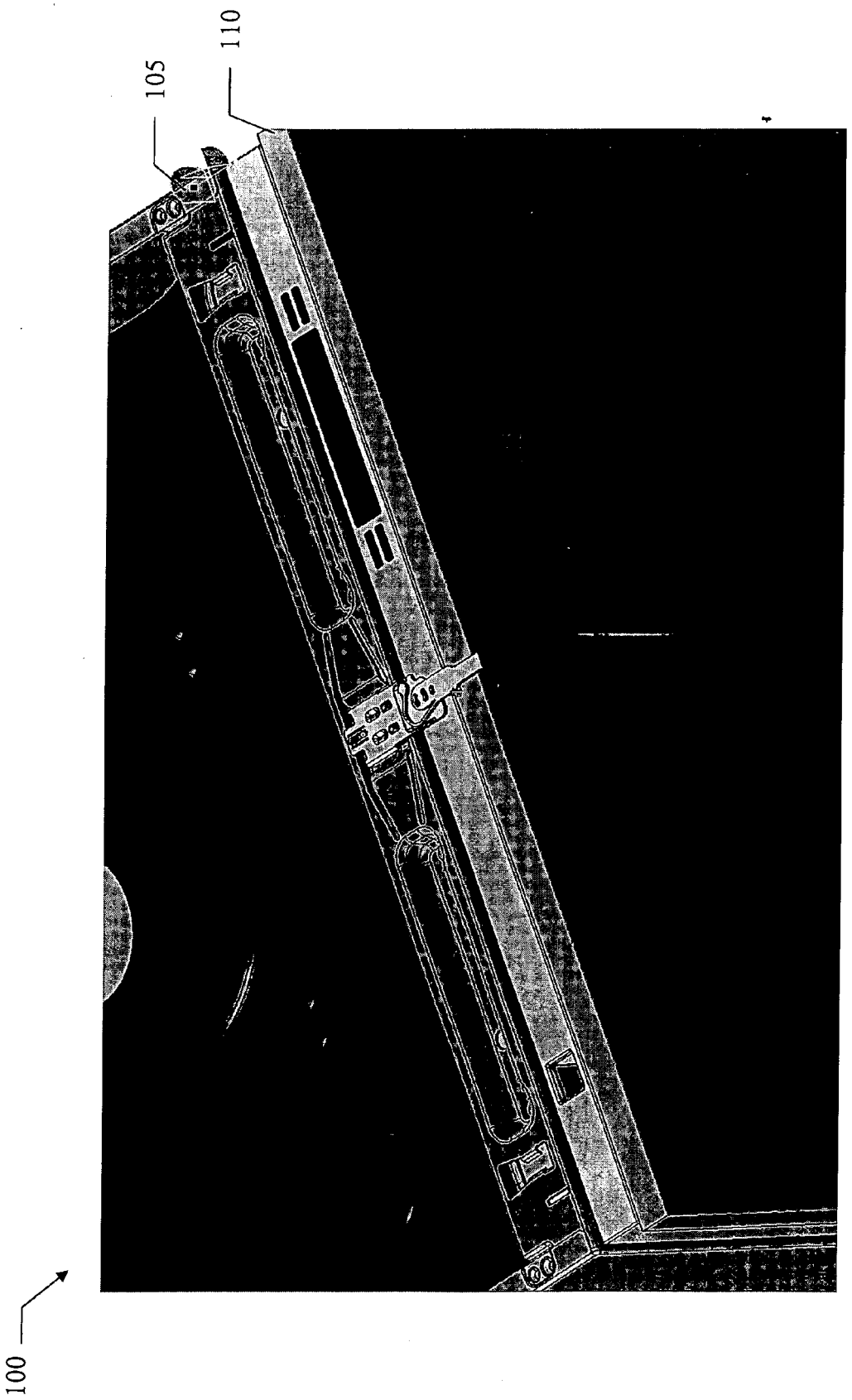

FIG.1

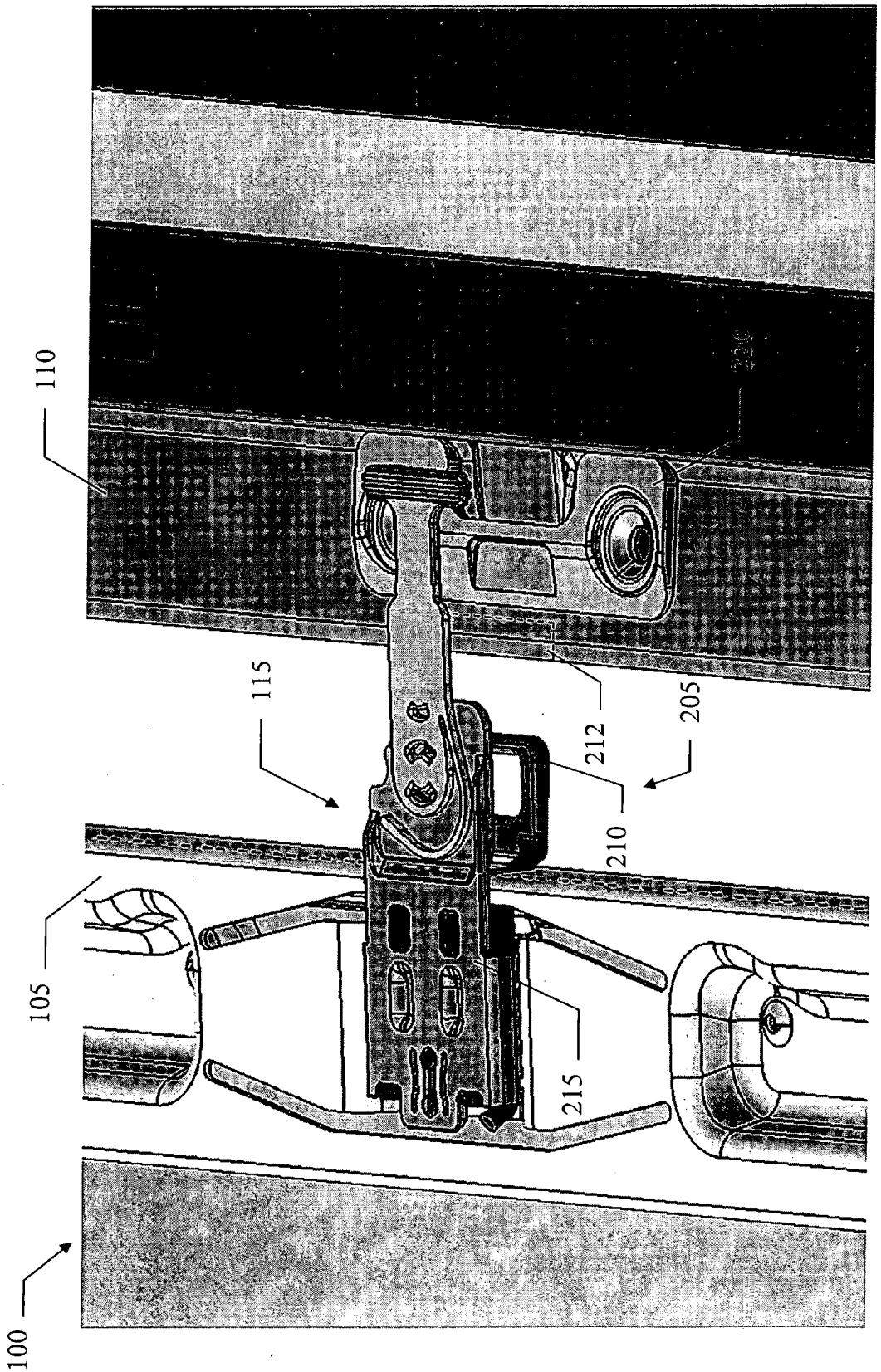

FIG.2

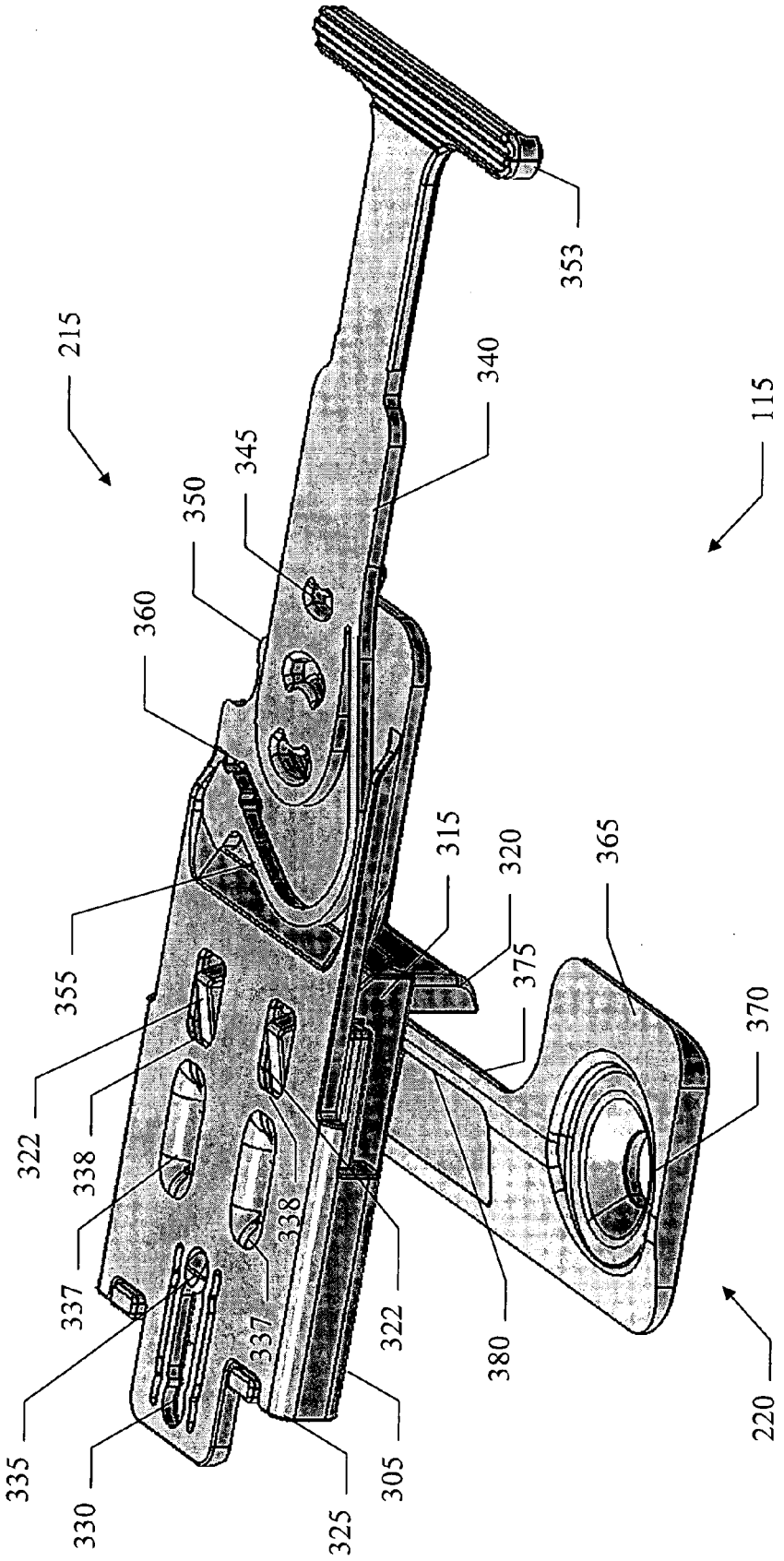
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FIG.3A

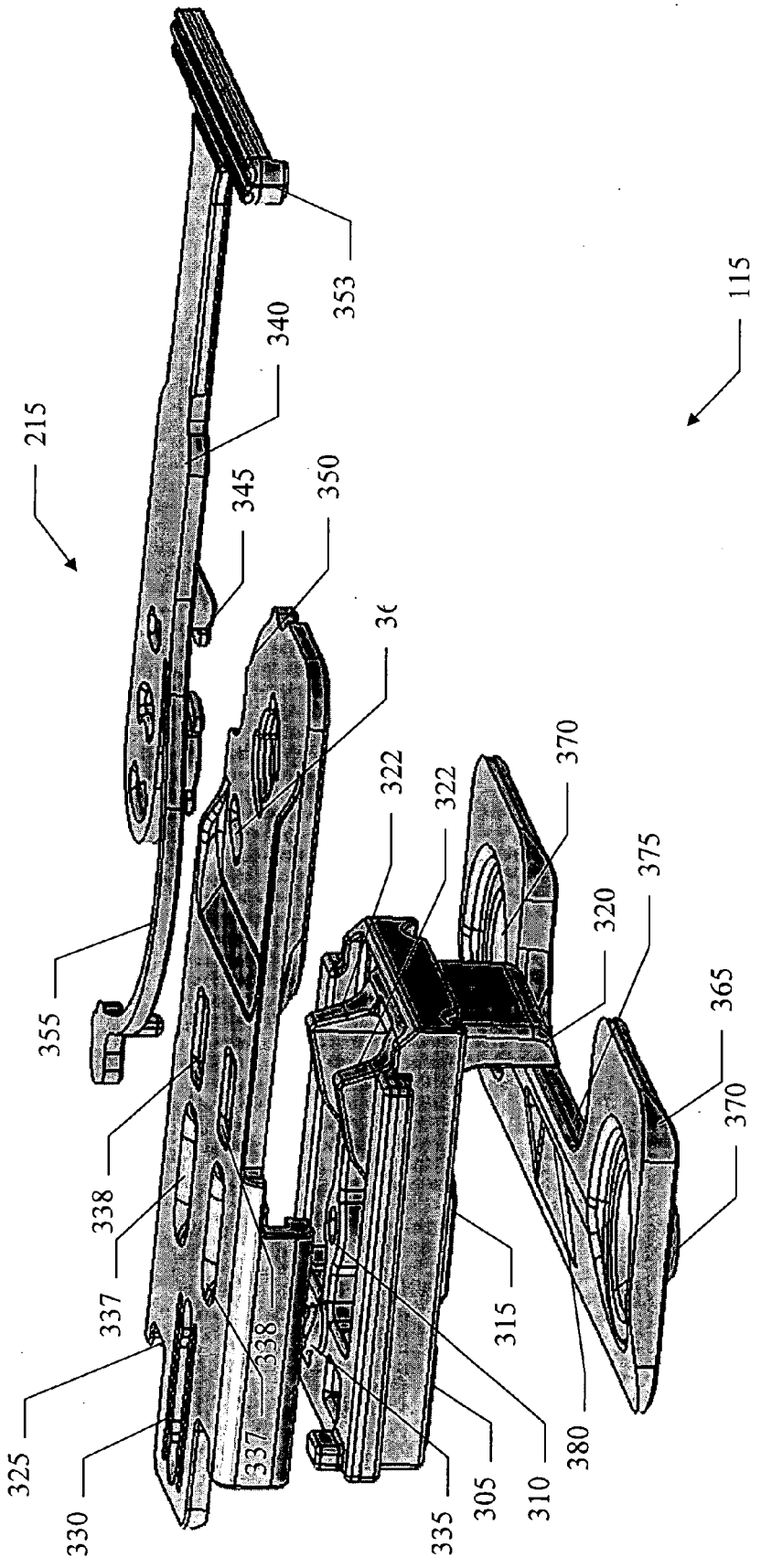
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FIG.3B

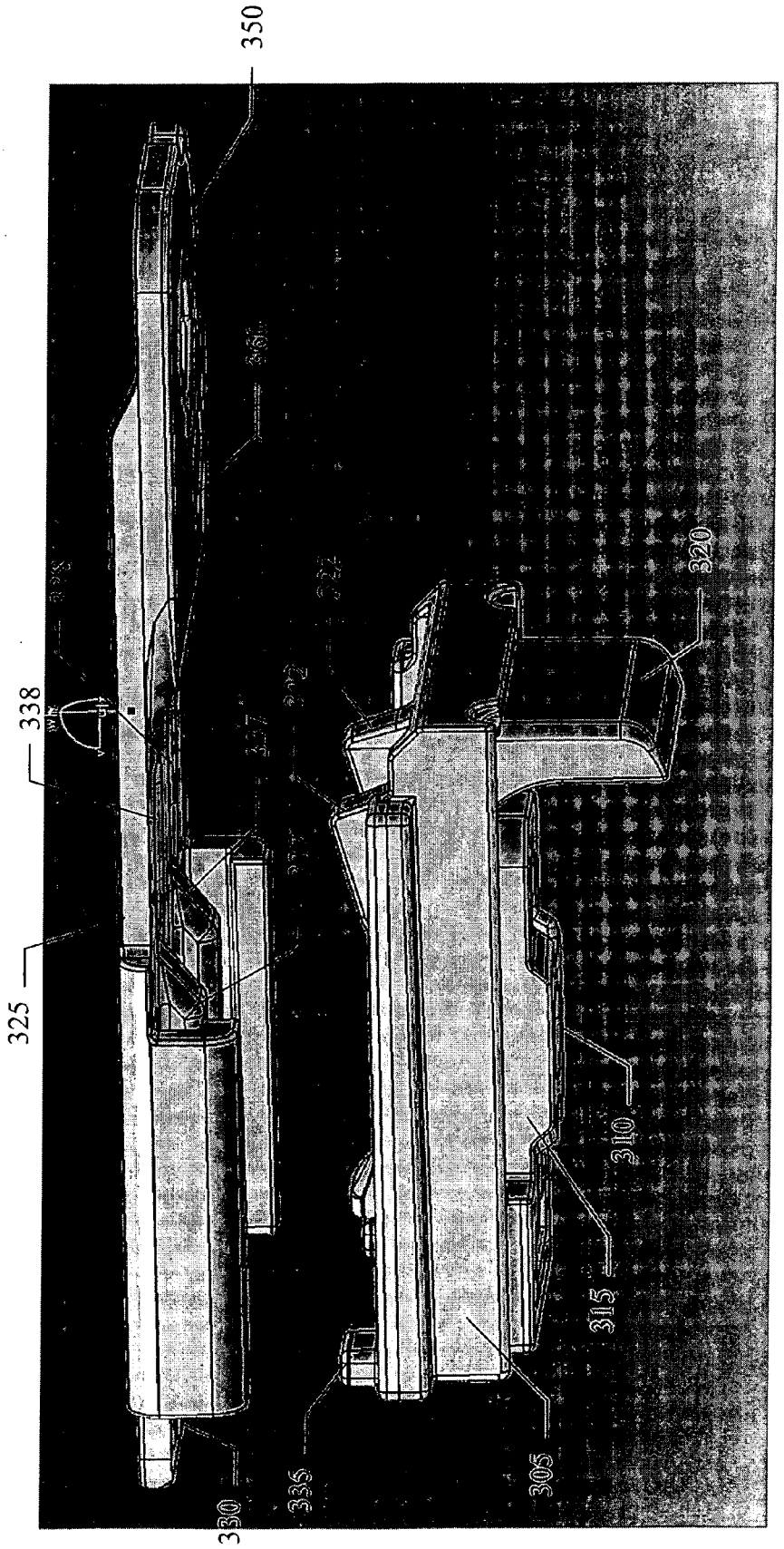

FIG.3C

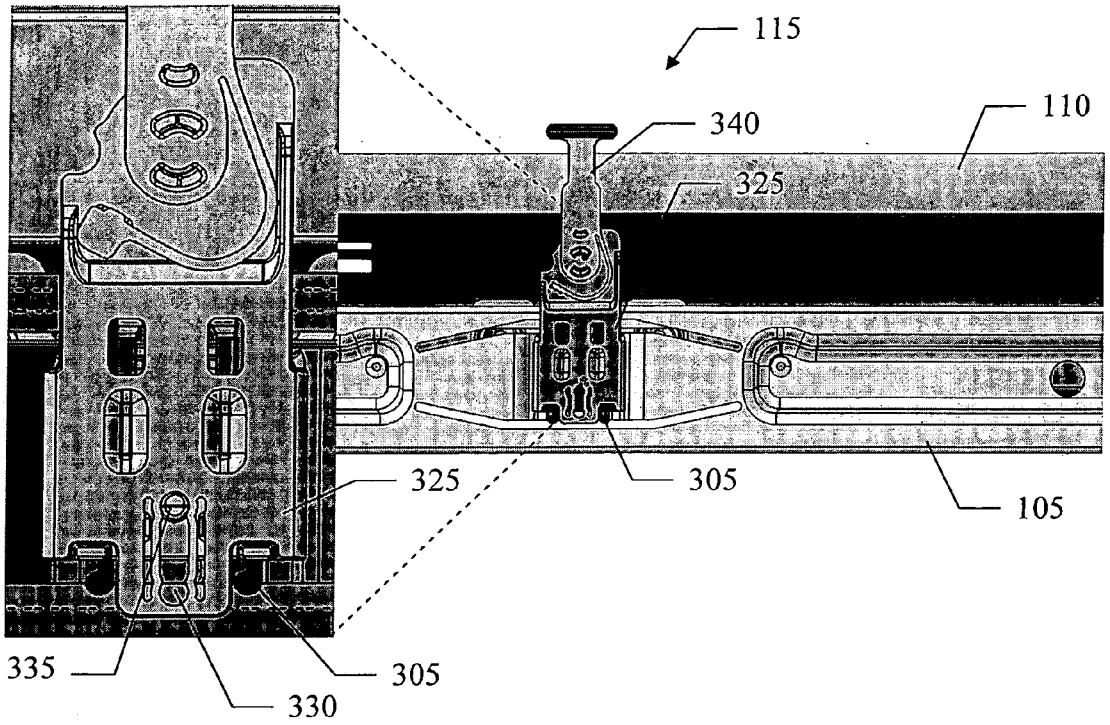
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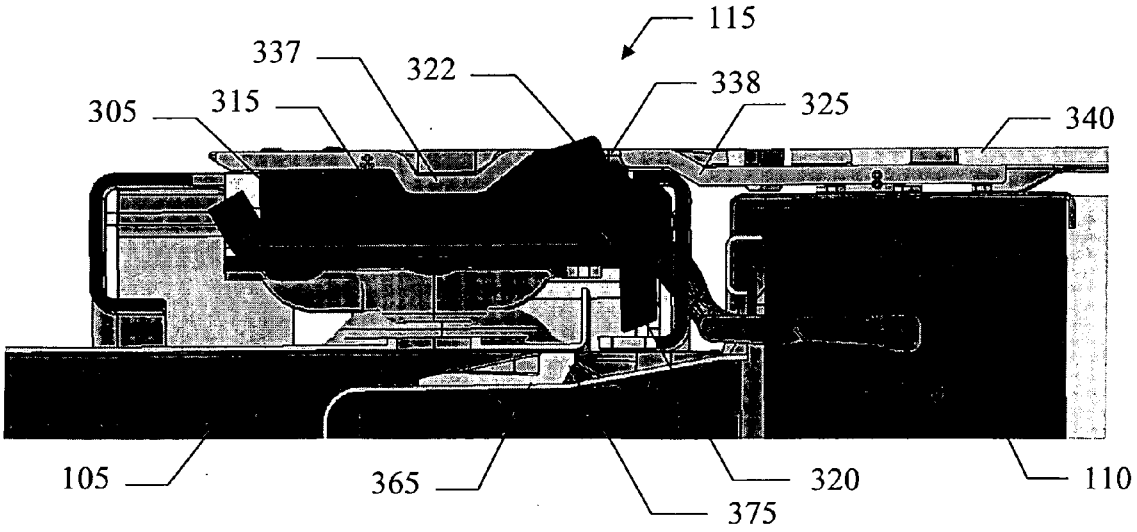
FIG.4A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365
375
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FIG.4B

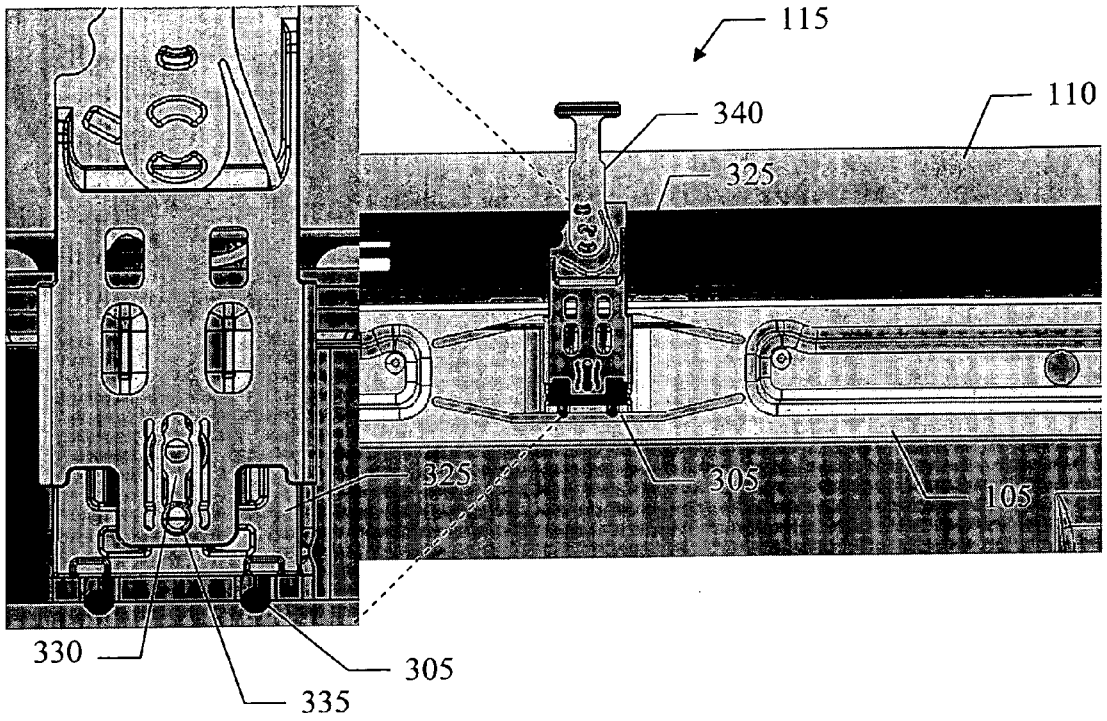
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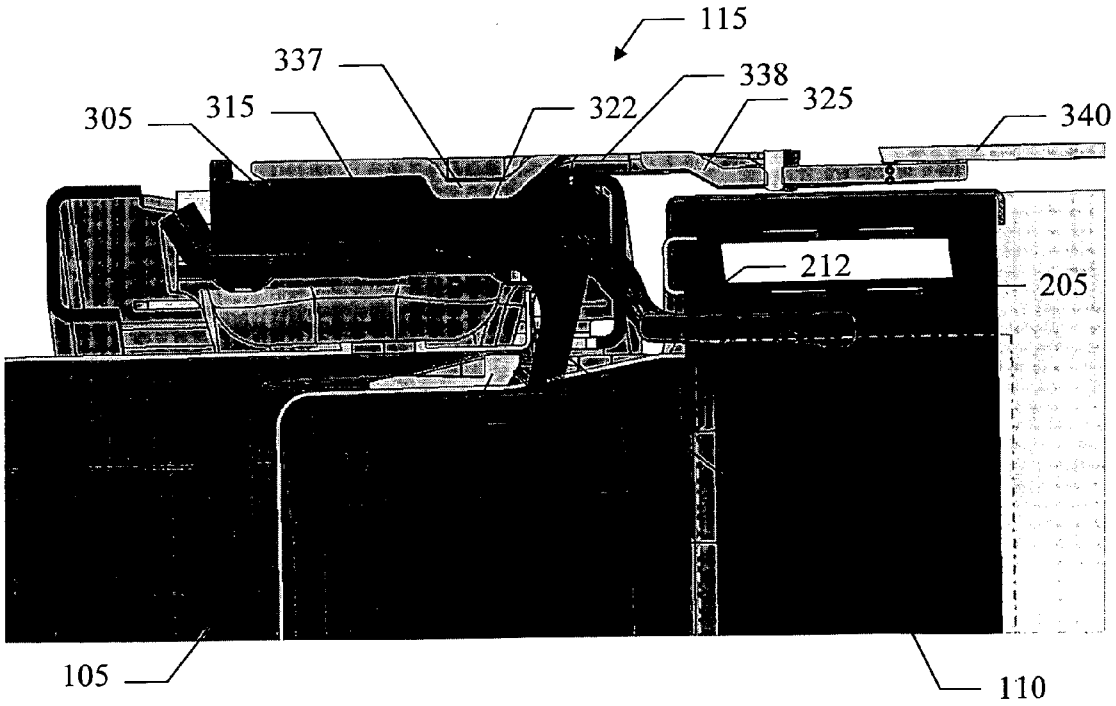
FIG.4C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110

FIG.4D

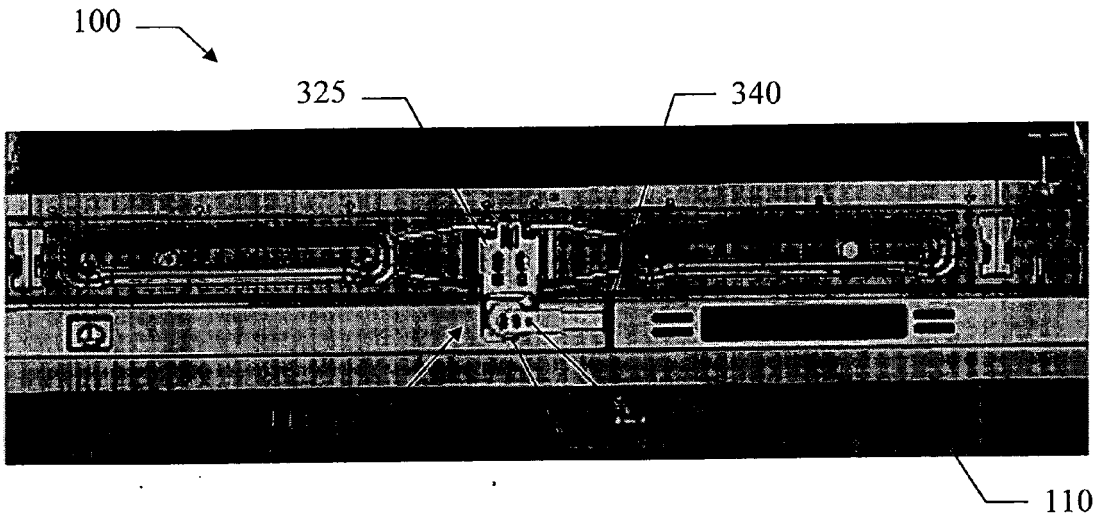

FIG.5A

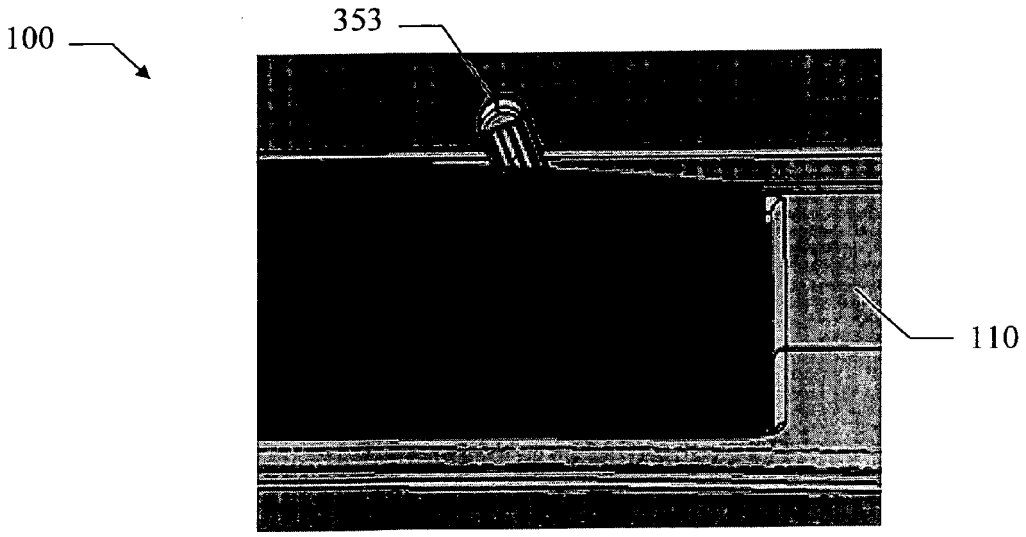

FIG.5B

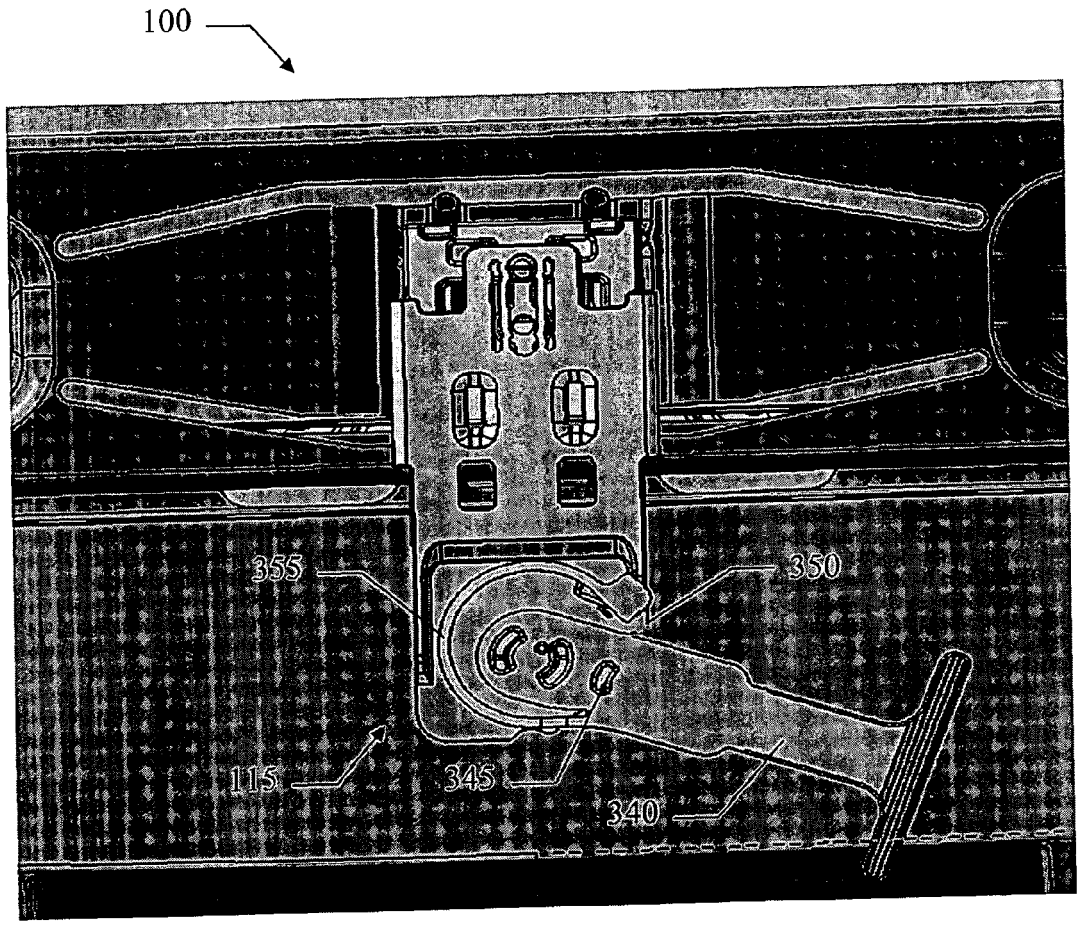

FIG.6

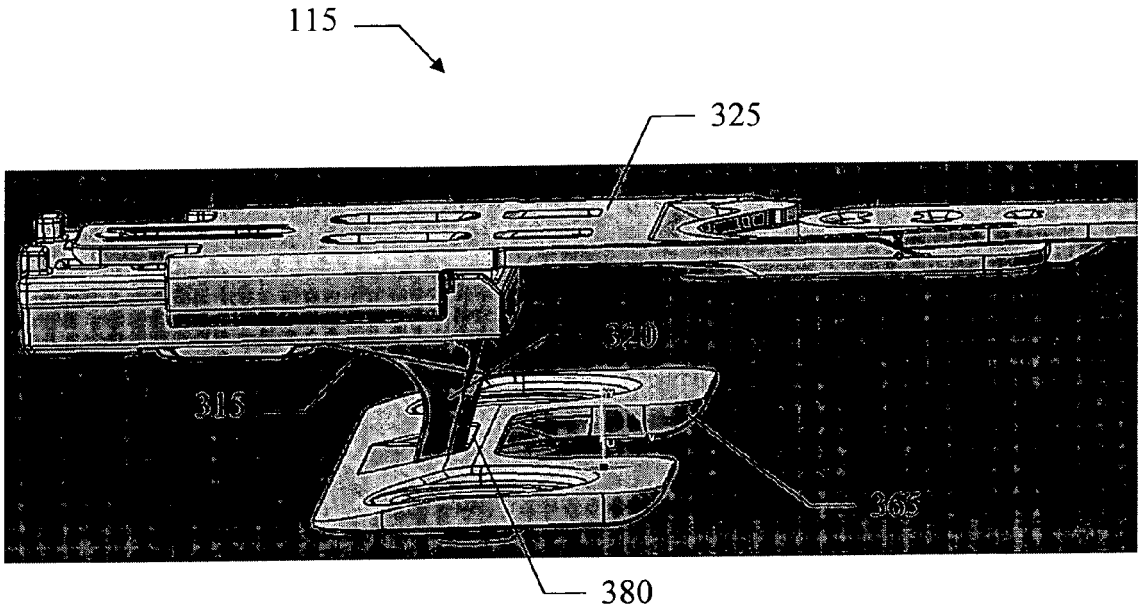

FIG.7

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EUROPEAN SEARCH REPORT

Application Number
EP 10 00 3649

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 10 2007 029903 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 2 January 2009 (2009-01-02) * page 4, paragraph 31 - page 5, paragraph 38; figures 1-3 *	1-15	INV. E05B65/00 A47L15/42
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	22 June 2010	Friedrich, Albert

CATEGORY OF CITED DOCUMENTS

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