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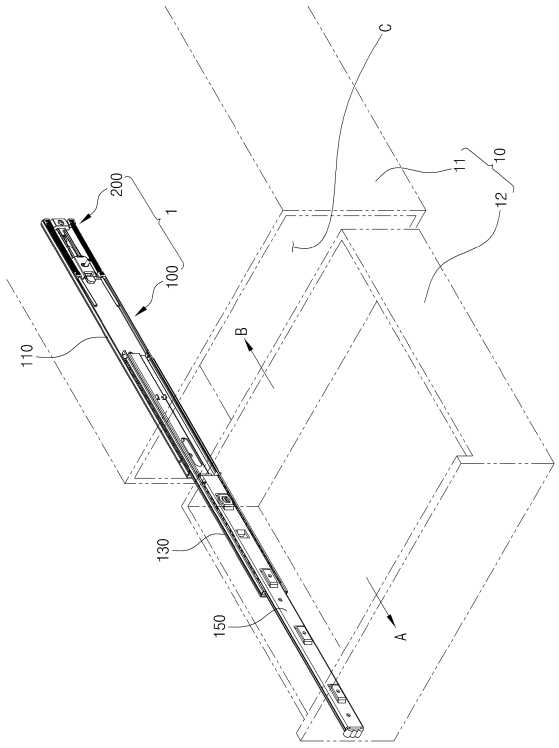
(54) DRAWER SLIDING DEVICE

(57) Disclosed herein is a drawer sliding device. The drawer sliding device is configured such that when a drawer is pulled out, an intermediate rail and an inner rail are moved together. Therefore, the load support capacity of a drawer slide can be enhanced and the drawer can be smoothly pulled out. The drawer sliding device may be designed such that the intermediate rail can be extended to a position above an operating rail. In this case, the range of the operation of the automatic closing means can be increased without a reduction in the structural strength of the rail. Furthermore, in the present invention, the drawer slide is provided with the automatic closing means. Therefore, when the drawer is retracted to a predetermined range or more, the drawer can be automatically retracted to a completely closed position, and the drawer in the closed state can be prevented from being undesirably opened.

[Fig. 1]



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Description

Technical Field

[0001] The present invention relates, in general, to drawer sliding devices and, more particularly, to a drawer sliding device that guides pulling-out and retraction of a drawer and is configured such that the drawer is automatically retracted when the drawer is within a predetermined range.

Background Art

[0002] Generally, drawers are used in a variety of storage means such as furniture, refrigerators, warmer cabinets, cooking devices, electronic products, etc. having storage spaces therein.

[0003] Different kinds of objects can be stored in such drawers. In some cases, it is required to store objects such as medicine or food, which must be stored under constant temperature conditions because they are sensitive to temperature change. In some other cases, for example, in cooling devices, heat exchange between a storage space and the outside must be prevented.

[0004] Therefore, after a user pulls such objects out of a drawer or puts objects into the drawer and retracts the drawer to close it, there is a need for preventing the drawer from being undesirably opened by various reasons such as small inclination or wobbling, a small shock transmitted from the outside, etc. In an effort to meet such necessity, the applicant of the present invention has proposed an automatic closing device for drawer slides in Korean Patent Registration No. 1150479.

[0005] Drawer slides typically have two or three rails. Recently, the use of drawer slides having three rails has increased to improve a range within which a drawer can be extended out from a storage body.

[0006] Here, the three rails provided in the drawer slide generally include an outer rail, an intermediate rail and an inner rail that are successively arranged parallel to each other and slidably coupled to each other. The three rails are configured such that the width and cross-sectional area thereof are reduced from the outer rail to the inner rail. Thus, the structural strength is generally reduced from the outer rail to the inner rail.

[0007] If a heavy object is received in the drawer, which is guided by the drawer slide when the drawer is pulled out or retracted, or the drawer itself is heavy, comparatively large force is applied to the slide. Particularly, a load may be focused upon the inner rail when the inner rail slides relative to the intermediate rail and thus protrudes from the intermediate rail during a process of pulling out the drawer. As mentioned above, since the structural strength of the inner rail is lower than that of the intermediate rail or the outer rail, the drawer slide may twist or the drawer may excessively droop when the load is focused upon the inner rail, whereby noise may be generated or the drawer may not be reliably pulled-out or retracted.

Disclosure

Technical Problem

[0008] Accordingly, the present invention has been made keeping in mind the above problems occurring in the prior art, and an object of the present invention is to provide a drawer sliding device configured such that the load support capacity thereof when a drawer is pulled out can be enhanced, whereby the drawer can be reliably pulled out, and noise can be prevented.

[0009] Another object of the present invention is to provide a drawer sliding device that can increase a range, within which the drawer can be automatically closed, without a reduction in strength.

[0010] A further object of the present invention is to provide a drawer sliding device configured such that when the drawer that has been opened is retracted to a predetermined degree, the drawer can be automatically moved to a completely closed position, thus preventing the drawer in the closed state from being undesirably opened by trivial reasons such as a small shock or wobbling.

Technical Solution

[0011] In order to accomplish the above objects, the present invention provides a drawer sliding device for guiding a drawer such that the drawer is pulled out from or retracted into a storage space formed in a storage body, the drawer sliding device including: an outer rail fastened at a first surface thereof to either the storage body or the drawer; an intermediate rail coupled to the outer rail so as to be slidable in a direction parallel to a longitudinal direction of the outer rail; an inner rail coupled to the intermediate rail so as to be slidable in a direction parallel to a longitudinal direction of the intermediate rail, the inner rail being fastened to the other one of the storage body and the drawer; and an automatic closing means coupled to the outer rail. The automatic closing means includes: a closing means body coupled to a first end of a second surface of the outer rail; an operating rail protruding from the closing means body towards a second end of the outer rail, the operating rail having a linear portion oriented parallel to a direction in which the drawer is pulled out, and a curved portion bent from an end of the linear portion in a direction different from the linear portion; a slider coupled to the operating rail so as to be slidable in a longitudinal direction of the operating rail; an operating pin configured such that a first end thereof is disposed in the guide depression and a second end thereof passes through the slider and protrudes from the slider; and an elastic body fastened at a first end thereof to the closing means body and fastened at a second end thereof to the slider, the elastic body elastically supporting the slider towards the closing means body.

While the drawer is pulled out, the slider makes contact with the intermediate rail and moves along with the inner rail and the intermediate rail until the first end of the operating pin reaches the curved portion via the linear portion.

[0012] Furthermore, a push rod may protrude from the slider so that when the drawer is pulled out. The push rod may come into contact with the intermediate rail and push the intermediate rail.

[0013] A slot may be formed in an end of the intermediate rail that faces the closing means body. The slot may receive the operating rail therein when the drawer is in a retracted state. A portion of the end of the intermediate rail other than the slot may be brought into contact with and be pushed by the slider when the drawer is pulled out.

[0014] A height to which the operating rail protrudes from the second surface of the outer rail may be less than a distance between the second surface of the outer rail and the intermediate rail. When the drawer is in a retracted state, a portion of the operating rail that faces the second end of the outer rail may be disposed between the outer rail and the intermediate rail. An end of the intermediate rail that faces the closing means body may be brought into contact with and be pushed by the slider when the drawer is pulled out.

[0015] In addition, an insert hole may be formed in a portion of the outer rail at which the operating rail is disposed. The insert hole may have a shape corresponding to the operating rail, and the operating rail may be disposed in the insert hole.

[0016] Furthermore, a shock absorber may be provided at a position at which the slider and the intermediate rail make contact with each other. The shock absorber may comprise a shock absorption member made of elastic material and coupled to the slider or the intermediate rail, or a shock absorption protrusion protruding from the slider.

Advantageous Effects

[0017] A drawer sliding device according to an embodiment of the present invention is configured such that when a drawer is pulled out, an intermediate rail and an inner rail are moved together. Therefore, the load support capacity of a drawer slide can be enhanced and the drawer can be reliably and smoothly pulled out. A drawer drooping problem or noise can also be prevented when the drawer is pulled out.

[0018] Furthermore, according to another embodiment of the present invention, the drawer sliding device may be designed such that the length of the intermediate rail can be extended to reach a position above an operating rail by reducing the thickness of the operating rail of an automatic closing means. In this case, the range of the operation of the automatic closing means can be increased or reduced without a reduction in the structural strength of the rail.

[0019] In the drawer sliding device according to the present invention, the drawer slide is provided with the automatic closing means. Therefore, when the drawer is retracted to a predetermined range or more, the drawer can be automatically retracted to a completely closed position. Moreover, the drawer in the closed state can be prevented from being undesirably opened.

Description of Drawings

[0020]

Fig. 1 is a perspective view illustrating the installation of a drawer sliding device, according to a first embodiment of the present invention;

Fig. 2 is an exploded perspective view of a drawer slide of the drawer sliding device of Fig. 1;

Figs. 3 and 4 are perspective views showing an automatic closing means of the drawer sliding device of Fig. 1;

Figs. 5 through 7 are views illustrating the operation of the drawer sliding device of Fig. 1;

Fig. 8 is a sectional view of portion E of Fig. 6;

Figs. 9 through 11 are views illustrating the operation of a drawer sliding device, according to a second embodiment of the present invention;

Fig. 12 is a perspective view illustrating an automatic closing means of a drawer sliding device, according to a third embodiment of the present invention;

Figs. 13 through 15 are views illustrating the operation of the drawer sliding device according to the third embodiment of the present invention.

Best Mode

[0021] The present invention will now be described in detail based on aspects (or embodiments). The present invention may, however, be embodied in many different forms and should not be construed as being limited to only the embodiments set forth herein, but should be construed as covering modifications, equivalents or alternatives falling within ideas and technical scope of the present invention. In the following description of the invention, if the related known functions or specific instructions on configuring the gist of the present invention unnecessarily obscure the gist of the invention, the detailed description thereof will be omitted.

[0022] Reference now should be made to the drawings, in which the same reference numerals are used throughout the different drawings to designate the same or similar components. Some explanations will be omitted or condensed if deemed redundant.

[0023] Hereinafter, embodiments of the present invention will be described in detail with reference to the attached drawings.

[0024] Fig. 1 is a perspective view illustrating the installation of a drawer sliding device, according to a first embodiment of the present invention.

[0025] Referring to Fig. 1, a drawer sliding device 1 according to the first embodiment of the present invention is installed in a storage means 10. The drawer sliding device 1 includes a drawer slide 100 and an automatic closing means 200.

[0026] The storage means 10 refers to furniture, a refrigerator, a warmer cabinet, a cooking device, an electronic product, etc. The storage means 10 includes a storage body 11 defining a storage space C therein, and a drawer 12 installed in the storage space C so as to be slidable out of the storage space C or retractable thereinto. Here, a direction in which the drawer 12 moves to an open position to allow a user to put an object into the drawer 12 or remove an object therefrom is designated as an extension direction A. A direction in which the drawer 12 moves into the storage space C to a closed position is designated as a retraction direction B.

[0027] The drawer slide 100 includes an outer rail 110, an intermediate rail 130 and an inner rail 150.

[0028] A first surface of the outer rail 110 is fastened to an inner surface of the storage body 11, that is, an inner wall surface in the storage space C. The outer rail 110 is oriented such that the longitudinal direction thereof is parallel to the extension direction A and the retraction direction B of the drawer 12.

[0029] The intermediate rail 130 is slidably coupled to a second surface of the outer rail 110. The intermediate rail 130 is oriented such that the longitudinal direction thereof is parallel to the longitudinal direction of the outer rail 110.

[0030] In the same manner, the inner rail 150 is slidably coupled to the intermediate rail 130 and is oriented such that the longitudinal thereof is parallel to the longitudinal direction of the intermediate rail 130. As shown in the drawings, the inner rail 150 is fastened to a corresponding surface of the drawer 12 that faces the inner surface of the storage body 11.

[0031] The automatic closing means 200 is coupled to the second surface of a retraction-direction-side end of the outer rail 110. The automatic closing means 200 will be explained herein below in more detail with reference to Figs. 3 and 4.

[0032] The drawer sliding device 1 functions to guide the drawer 12 so that the drawer 12 can smoothly extended from the storage body 11 or retracted thereinto. The drawer sliding device 1 is configured such that when the drawer 12 that has been in the open state is retracted into the storage body 11 to a predetermined range or more, the drawer 12 can be automatically moved in the retraction direction B and closed.

[0033] For reference, the drawer sliding device 1 may be configured such that, as shown in the drawings, the outer rail 110 is fastened to the storage body 11 and the inner rail 150 is fastened to the drawer 12. Alternatively, the drawer sliding device 1 may be configured such that, although it is not shown in the drawings, the outer rail 110 is fastened to the drawer 12 and the inner rail 150 is fastened to the storage body 11.

[0034] If the outer rail 110 is fastened to the drawer 12 and the inner rail 150 is fastened to the storage body 11, the automatic closing means 200 is coupled to the second surface of an extension-direction-side end of the outer rail 110, on the contrary to the structure shown in the drawings, to make the drawer 12 that has been opened be automatically closed when the drawer 12 is retracted to a predetermined range or more.

[0035] The extension direction A and the retraction direction B defined above are provided merely to clarify the criteria for defining the orientation needed in describing the structure and operation of the embodiments introduced in this specification. Therefore, use of these words is limited to the embodiments of this specification, and it should not be understood that these words are used to indicate the absolute directions.

[0036] As needed, the number of drawer sliding devices 1 may be changed; for example, at least one sliding device 1 may be provided on each of opposite sides of the drawer 12 or, alternatively, a plurality of sliding devices 1 may be provided on one side of the drawer 12. Arrangement of drawer sliding devices 1 can also be changed in a variety of ways. Although a plurality of drawer sliding devices 1 are provided, the structure of each drawer sliding device 1 is the same; therefore, the description of the single drawer sliding device 1 substitutes for explanation of the other drawer sliding devices not shown in the drawings.

[0037] Bearings for reliable sliding movement are interposed between the outer rail 110 and the intermediate rail 130 and between the intermediate rail 130 and the inner rail 150. This will be explained in detail with reference to Fig. 2.

[0038] Fig. 2 is an exploded perspective view of the drawer slide shown in Fig. 1.

[0039] Referring to Fig. 2, the drawer slide 100 further includes a first bearing 120 and a second bearing 140.

[0040] The outer rail 110 includes an outer rail body 111.

[0041] Bent in the same direction, two flanges 112 are respectively provided on opposite edges of the outer rail body 111 with respect to a longitudinal axis of the outer rail body 111. A raceway 113 is formed on each flange 112 along the longitudinal direction of the flange 112. The raceway 113 can have various shapes to receive portions of balls 129, which will be described later herein. In this embodiment, the raceway 113 is configured in a form having a groove formed in the longitudinal direction of the flange 112.

[0042] The outer rail body 111 has: a stopper 115 limiting a movement range of a retainer 121, which will be described in detail later herein; coupling holes 116 for

use in fastening the automatic closing means (200 of Fig. 1) to the outer rail body 111; and a coupling hole 118 for use in fastening the outer rail body 111 to the storage body 11 or the drawer 12.

[0043] The first bearing 120 includes a retainer 121 and balls 129.

[0044] Bent in the same direction, two flanges 122 are respectively provided on opposite edges of the retainer 121 with respect to a longitudinal axis of the retainer 121. Arranged in the longitudinal direction of the flange 122, a plurality of ball insert holes 123 are formed in the flange 122. The balls 129 are disposed in the respective ball insert holes 123.

[0045] The first bearing 120 is seated in the outer rail body 111. Portions of the balls 129 are received in the corresponding raceways 113.

[0046] The intermediate rail 130 includes an intermediate rail body 131.

[0047] Bent in the same direction, two flanges 132 are respectively provided on opposite edges of the intermediate rail body 131 with respect to a longitudinal axis of the intermediate rail body 131. An inner raceway 133 and an outer raceway 134 are respectively formed on inner and outer surfaces of each flange 132.

[0048] The outer raceway 134 protrudes from the outer surface of the flange 132 towards the inside of the intermediate rail body 131, that is, towards an imaginary center line drawn on the intermediate portion of the intermediate rail body 131 in the longitudinal direction of the intermediate rail body 131.

[0049] Portions of the balls 129 of the first bearing 120 are received in each outer raceway 134. Therefore, when the intermediate rail body 131 is seated in the outer rail body 111, the retainer 121 is disposed in a form in which it is interposed between the intermediate rail body 131 and the outer rail body 111. The balls 129 are received both in the raceways 113 of the outer rail body 111 and in the outer raceways 134 of the intermediate rail body 131 and are brought into rolling contact with the raceways 113 and the outer raceways 134 so that the outer rail body 111 and the intermediate rail body 131 can smoothly slide relative to each other.

[0050] The inner raceways 133 are configured to protrude in opposite directions to the outer raceways 134. Balls 149 of the second bearing 140, which will be explained later herein, are received in the inner raceways 133.

[0051] A stopper 135 is provided in the intermediate rail body 131 so that a movement range of the inner rail body 151 is limited by the stopper 135. Preferably, the stopper 135 is provided on an extension-direction-side end of the intermediate rail body 131.

[0052] The second bearing 140 includes a retainer 141 and the balls 149.

[0053] Bent in the same direction, two flanges 142 are respectively provided on opposite edges of the retainer 141 with respect to a longitudinal axis of the retainer 141. Arranged in the longitudinal direction of the flange 142, a plurality of ball insert holes 143 are formed in the flange 142. The balls 149 are disposed in the respective ball insert holes 143.

[0054] The second bearing 140 is seated in the intermediate rail body 131, and portions of the balls 149 are received in the inner raceway 133.

[0055] The inner rail 150 includes the inner rail body 151 and a shock absorption means 159.

[0056] Bent in the same direction, two flanges 152 are respectively provided on opposite edges of the inner rail body 151 with respect to a longitudinal axis of the inner rail body 151. A raceway 153 is formed on each flange 152 along the longitudinal direction of the flange 152. The raceway 153 has an appropriate shape to receive portions of the balls 149.

[0057] When the inner rail body 151 is seated in the intermediate rail body 131, the retainer 141 is disposed in a form in which it is interposed between the intermediate rail body 131 and the inner rail body 151. The balls 149 are received between the inner raceways 133 and the raceways 153 of the inner rail body 151 and are brought into rolling contact with the inner raceways 133 and the raceways 153 so that the intermediate rail body 131 and the inner rail body 151 can smoothly slide relative to each other.

[0058] A stopper 156 is provided in the inner rail body 151. The stopper 156 comes into contact with the stopper 135 and limits a range within which the inner rail body 151 can slide relative to the intermediate rail body 131 in the retraction direction B. Preferably, the stopper 156 is provided on an extension-direction-side end of the inner rail body 151.

[0059] The shock absorption means 159 is provided to reduce shock and noise generated when the stopper 135 of the inner rail body 151 comes into contact with the stopper 135 of the intermediate rail body 131. Preferably, the shock absorption means 159 is made of elastic material. As shown in the drawings, the shock absorption means 159 may be coupled to the stopper 156 or, alternatively, it may be coupled to the stopper 135.

[0060] The inner rail body 151 has a stopper 155 limiting a movement range of the retainer 141, and a coupling part 157 and a coupling hole 158 by which the inner rail body 151 is fastened to the storage body 11 or the drawer 12.

[0061] The outer rail body 111 and the intermediate rail body 131 are coupled so as to be slidable relative to each other, and the intermediate rail body 131 and the inner rail body 151 are also coupled so as to be slidable relative to each other. Such sliding movement can be smoothly and reliably embodied by the first bearing 120 and the second bearing 140.

[0062] For reference, when the intermediate rail body 131 slides relative to the outer rail body 111 in the extension direction A, the balls 129 rotate between the raceway 113 and the outer raceway 134, and the retainer 121 also moves in the direction in which the intermediate rail body 131.

[0063] During this process, when the intermediate rail body 131 reaches a limit of the movement range within which it can move relative to the outer rail body 111, a stopper-contact part 125 formed on the retainer 121 comes into contact with the stopper 115. Then, the retainer 121 can no longer move; therefore, the intermediate rail body 131 no longer moves relative to the outer rail body 111 in the extension direction A.

[0064] In the same manner, when the stopper 135 of the intermediate rail body 131 comes into contact with a stopper-contact part 146 formed on an extension-direction-side end of the retainer 141 or the stopper 155 of the inner rail body 151 comes into contact with a stopper-contact part 145 formed on a retraction-direction-side end of the retainer 141, the inner rail body 151 no longer moves relative to the intermediate rail body 131 in the extension direction A.

[0065] Meanwhile, an actuating block 160 is provided at a predetermined position on a retraction-direction-side end of the inner rail body 151. The actuating block 160 is disposed on a surface of the inner rail body 151 that faces the intermediate rail body 131.

[0066] The actuating block 160 includes an actuating block body 161. A coupling slot 162 and a guide surface 163 are formed on the actuating block 160. The actuating block 160 will be explained in more detail later herein.

[0067] Figs. 3 and 4 illustrate the automatic closing means of the drawer slide shown in Fig. 1. The automatic closing means will be described with reference to Figs. 3 and 4.

[0068] Referring to Figs. 3 and 4, the automatic closing means 200 includes a closing means body 210, an operating rail 211, a slider 230, an operating pin 250 and elastic bodies 270.

[0069] As described with reference to Fig. 1, the closing means body 210 is coupled to the second surface of the outer rail (110 of Fig. 1) that is opposite to the surface of the outer rail 110 that is coupled to the storage body (11 of Fig. 1). The closing means body 210 is disposed on the retraction-direction-side end of the outer rail 110. As shown in the drawings, the operating rail 211 and the elastic-body supports 215 are provided on the closing means body 210.

[0070] The operating rail 211 protrudes from the closing means body 210 towards the other end of the outer rail 110, that is, in the extension direction A. A guide depression 212 is formed in the operating rail 211. The guide depression 212 includes a linear portion 212a and a curved portion 212b.

[0071] Extending parallel to the extension direction A or the retraction direction B, a slot is formed in the linear portion 212a. The curved portion 212b extends from an end of the linear portion 212a that corresponds to the extension-direction-side end of the outer rail 110. The curved portion 212b is curved in a direction different from the direction parallel to the linear portion 212a. Preferably, the direction in which the curved portion 212b extends is approximately perpendicular to the direction parallel to the linear portion 212a.

[0072] The coupling hole 216 formed in the closing means body 210 and the coupling hole 217 formed in the end of the operating rail 211 are used to fasten the closing means body 210 to the outer rail 110. The coupling holes 216 and 217 are formed at positions corresponding to the coupling holes (116 of Fig. 1) formed in the outer rail 110.

[0073] The slider 230 is coupled to the operating rail 211 so as to be slidable in the longitudinal direction of the operating rail 211. The slider 230 has a pin hole 231, push rods 233, elastic-body supports 235 and a shock absorber 219.

[0074] The pin hole 231 has a slot shape extending a predetermined length in a direction corresponding to the orientation of the curved portion 212b. The elastic-body supports 325 are provided on opposite sides of the slider 230. As shown in the drawings, the push rods 233 protrude from the elastic-body supports 325 in the extension direction A, that is, in the direction parallel to the direction in which the operating rail 211 protrudes from the closing means body 210. For reference, the push rods 233 may protrude from another portion of the slider 230 rather than the elastic-body supports 325, although this is not shown in the drawings.

[0075] The shock absorber 219 is provided to reduce shock generated when the end of the operating rail 211 collides with the intermediate rail (130 of Fig. 1). As shown in the drawings, the shock absorber 219 may be provided on the end of the operating rail 211. Alternatively, the shock absorber 219 may be provided on ends of the push rods 233 although this is not shown in the drawings.

[0076] For reference, as shown in the drawings, the shock absorber 219 may be integrally formed with the slider 230 in a form protruding from the slider 230. Alternatively, although it is not shown in the drawings, the shock absorber 219 may be configured in such a way that a shock absorption member made of elastic material is coupled to the slider 230. As a further alterative, although it is not shown in the drawings, the shock absorption member may be coupled to a portion of the intermediate rail (130 of Fig. 1) that comes into contact with the slider 230.

[0077] The operating pin 250 is configured such that a first end thereof is inserted into the guide depression 212 and a second end thereof passes through the pin hole 231 of the slider 230. For reference, the structure and operational principle of the operating pin 250 are explained in detail in Korean Patent Unexamined Publication No. 10-2008-0089126 filed by the applicant of the present invention.

[0078] A first end of each elastic body 270 is fastened to the corresponding elastic-body support 215 provided on the closing means body 210. A second end of the elastic body 270 is fastened to the corresponding elastic-body support 235 provided on the slider 230. Each elastic body 270 is a tension spring, which is elastically biased

in a contraction direction when it is extended. The elastic bodies 270 elastically support the slider 230 in the retraction direction B. In other words, the elastic bodies 270 elastically support the slider 230 with respect to the closing means body 210 such that the distance between the slider 230 and the closing means body 210 is minimized.

[0079] Figs. 5 through 7 are views illustrating the operation of the drawer sliding device according to the first embodiment of the present invention. For reference, in Figs. 5 through 7, a portion of the drawer sliding device (1 of Fig. 1) of the first embodiment to which the automatic closing means (200 of Fig. 1) is coupled is simplified. The first bearing (120 of Fig. 2) and the second bearing (140 of Fig. 2) are partially illustrated only in Fig. 6 and are omitted in the other drawings. Although the operating block body 161 is disposed at a position at which it is covered with the inner rail body 151, it is shown by a solid line for the sake of explanation.

[0080] Fig. 5 illustrates a portion of the drawer sliding device (1 of Fig. 1) when the drawer (12 of Fig. 1) is moved to the end in the retraction direction B and thus is in a closed state.

[0081] When the drawer 12 is in the closed state, the intermediate rail body 131 and the inner rail body 151 are located at positions as adjacent to the closing means body 210 as possible within the range in which they can move in the retraction direction B. In other words, the retraction-direction-side end of the intermediate rail body 131 is located at a position at which it makes contact with the extension-direction-side ends of the push rods 233. The inner rail body 151 is located such that the second end of the operating pin 250 is disposed in the coupling slot 162 of the operating block body 161. The second end of the operating pin 250 refers to the portion of the operating pin 250 that protrudes outwards through the pin hole 231 of the slider 230 as described above.

[0082] At this time, the first end of the operating pin 250 is disposed in the linear portion 212a, whereby the operating pin 250 is prevented from moving in the longitudinal direction of the pin hole 231. Therefore, while the second end of the operating pin 250 is disposed in the coupling slot 162, the operating pin 250 is prevented from being separated from the operating block body 161 because the second end of the operating pin 250 is coupled to the coupling slot 162.

[0083] In this state, when a user moves the drawer 12 in the extension direction A to open the drawer 12, the inner rail body 151 coupled to the drawer 12 is moved in the extension direction A. Then, because the operating pin 250 is coupled to the coupling slot 162, the slider 230 is also moved in the extension direction A as the inner rail body 151 to which the operating block body 161 is coupled is moved.

[0084] The elastic bodies 270 that are fastened at the opposite ends thereof to the closing means body 210 and the slider 230 is therefore extended while the slider 230 is elastically biased towards the closing means body 210. That is, if the force by which the inner rail body 151 is moved in the extension direction A is removed, the inner rail body 151 can return to the state of Fig. 5.

[0085] Meanwhile, as the slider 230 moves in the extension direction A, the intermediate rail body 131 is pushed by the push rods 233 and moved along with the inner rail body 151 in the extension direction A.

[0086] Fig. 6 illustrates the decoupling of the inner rail body 151 from the slider 230 during the process of moving the drawer (12 of Fig. 1) in the extension direction A.

[0087] Fig. 6 also illustrates the operation pin 250 decoupled from the coupling slot 162.

[0088] As mentioned above, when the slider 230 reaches the curved portion 212b while the drawer 12 moves in the extension direction A, the first end of the operating pin 250 that has been guided by the linear portion 212a and moved along the linear portion 212a enters the curved portion 212b. The second end of the operating pin 250 moves to the end of the curved portion 212b along the edge of the coupling slot 162 formed in the operating block body 161. Thereby, the second end of the operating pin 250 is removed from the coupling slot 162.

[0089] When the second end of the operating pin 250 is removed from the coupling slot 162, the inner rail body 151 is separated from the slider 230; therefore, the force applied to the inner rail body 151 while pulling out the drawer 12 is not transmitted to the slider 230.

[0090] Just until the operating pin 250 is removed from the coupling slot 162, the slider 230 moves along with the inner rail body 151 in the extension direction A; therefore, the intermediate rail body 131 pushed by the push rods 233 also moves along with the inner rail body 151 in the extension direction A.

[0091] Here, the slider 230 enters a state in which the first end of the operating pin 250 is coupled to the end of the curved portion 212b. The slider 230 maintains contact with the extension-direction-side end of the operating rail 211 until the first end of the operating pin 250 is returned to the linear portion 212a by force applied to the second end of the operating pin 250 towards the junction between the linear portion 212a and the curved portion 212b.

[0092] Fig. 7 illustrates the inner rail body 151 and the intermediate rail body 131 further moved together in the extension direction A.

[0093] As described above, when the inner rail body 151 moves in the extension direction A from the position at which the drawer 12 is closed, the inner rail body 151, the slider 230 and the intermediate rail body 131 are moved together in the extension direction A.

[0094] When the slider 230 reaches the limit of the range within which it can move, that is, the first end of the operating pin 250 enters the curved portion 212b, the slider 230 stops. When the slider stops, the intermediate rail body 131 is separated from the push rods 233 and thus is no longer pushed by the push rods 233.

[0095] After the intermediate rail body 131 begins to move along with the inner rail body 151, although the intermediate rail body 131 is not pushed by the push rods

233, the intermediate rail body 131 can move in the direction in which it has moved along with the inner rail body 151, that is, in the extension direction A.

[0096] The reason for this is because of the inertia applied to the intermediate rail body 131 and a difference in the magnitude of the friction coefficient among the inner rail body 151, the intermediate rail body 131 and the outer rail body 111. This will be explained in detail with reference to Fig. 8.

[0097] Fig. 8 is a sectional view of portion E of Fig. 6.

[0098] Referring to Fig. 8, the balls (129 of Fig. 2) of the first bearing (120 of Fig. 2) are interposed between the flange 112 of the outer rail body 111 and the flange 132 of the intermediate rail body 131. The balls (149 of Fig. 2) of the second bearing (140 of Fig. 2) are interposed between the flange 132 of the intermediate rail body 131 and the flange 152 of the inner rail body 151.

[0099] The balls 129 of the first bearing (120 of Fig. 2) are disposed in the respective ball insert holes 123 formed in the flange 122 of the retainer (121 of Fig. 2). The balls 149 of the second bearing (140 of Fig. 2) are disposed in the respective ball insert holes 149 formed in the flange 142 of the retainer (141 of Fig. 2).

[0100] The inner diameter of each of the ball insert holes 123 and 143 is generally greater than the outer diameter of the corresponding ball 129, 149; however, a portion of each ball 129, 149 comes into contact with a portion of the inner surface of the corresponding ball insert hole 123, 143 because the outer rail body 111, the intermediate rail body 131, and the inner rail body 151 drawer slide relative to each other during the pulling-out or retraction process of the drawer 12.

[0101] As described above with reference to Figs. 5 through 7, when the drawer (12 of Fig. 1) begins to move in the extension direction A from the closed state, the inner rail body 151 fastened to the drawer 12, the slider 230 coupled to the inner rail body 151 by the operating pin 250 and the intermediate rail body 131 pushed by the push rods 233 protruding from the slider 230 begin to move together.

[0102] Reference character Vi in the drawing denotes a speed of movement of the inner rail body 151, and reference character Vm denotes a speed of movement of the intermediate rail body 131. Vi and Vm have the same magnitude because the inner rail body 151 and the intermediate rail body 131 integrally move together.

[0103] Here, not only the weight of the drawer 12 but also the weight of objects received in the drawer 12 are applied to the inner rail body 151 fastened to the drawer 12. The sum of weights is transmitted to the intermediate rail body 131 via the balls 149.

[0104] Therefore, just after the intermediate rail body 131 begins to move along with the inner rail body 151, inertial force derived from the movement is applied to the intermediate rail body 131 and the inner rail body 151. The intermediate rail body 131 and the inner rail body 151 can maintain the integrated movement until external force is applied to the intermediate rail body 131 and the inner rail body 151 in the counter direction to the direction in which they are moving.

[0105] Furthermore, the balls 149 interposed between the flange 132 of the intermediate rail body 131 and the flange 152 of the inner rail body 151 do not rotate because there is no relative movement between the inner rail body 151 and the intermediate rail body 131. Therefore, static friction force is applied to the surfaces of the balls 149 that do not move; however, kinetic friction force is applied to the surfaces of the balls 129 that are rotating.

[0106] It is known that the coefficient of kinetic friction is always less than the coefficient of static friction. Thus, the coefficient of static friction of the static friction force applied to the balls 149 of the second bearing 140 is greater than the coefficient of kinetic friction of the kinetic friction force applied to the balls 129 of the first bearing 120. Thanks to such a difference in coefficient of friction, the intermediate rail body 131 that is moved along the inner rail body 151 by the push rods 233 can still move along with the inner rail body 151 even after the intermediate rail body 131 is separated from the push rods 233.

[0107] As described above, during the process of pulling out the drawer 12 to open it, the intermediate rail body 131 is pushed by the push rods 233 and thus moved along with the inner rail body 151. Even after the slider 230 reaches the limit of the movement range, that is, even when the intermediate rail body 131 is no longer pushed by the push rods 233, the intermediate rail body 131 can be still moved along with the inner rail body 151 by the inertial force and the difference in coefficient of friction.

[0108] The intermediate rail body 131 is moved along with the inner rail body 151 until the intermediate rail body 131 reaches the critical point of the range within which it can move relative to the outer rail body 111. After that, the intermediate rail body 131 stops, and the inner rail body 151 slides relative to the intermediate rail body 131.

[0109] As such, in the drawer sliding device 1 according to the first embodiment of the present invention, the inner rail body 151 and the intermediate rail body 131 are moved together in the extension direction A when the drawer 12 that has been in the closed state is pulled out. This movement is continuous within the range in which the intermediate rail body 131 can move in the extension direction A.

[0110] Therefore, the drawer sliding device 1 according to the first embodiment of the present invention has the following advantages by virtue of the configuration in which the intermediate rail (130 of Fig. 1) and the inner rail (150 of Fig. 1) are moved together when the drawer 12 is pulled out. The load support capacity of the drawer slide (100 of fig. 1) can be enhanced and the drawer 12 can be smoothly and reliably moved and pulled out. Additionally, during the process of pulling out the drawer 12, the drawer slide 100 can be prevented from excessively drooping, and noise can be prevented. These advantages are can be obtained because the drawer sliding device 1 according to the first embodiment of the present

invention is configured such that the operation of the intermediate rail 130 is controlled by the automatic closing means 200, unlike the intermediate rail (not shown) of the typical triple drawer slide (not shown) that is completely passively operated.

[0111] Figs. 9 through 11 are views illustrating the operation of a drawer sliding device, according to a second embodiment of the present invention.

[0112] Fig. 9 is a view showing conditions of the drawer sliding device according to the second embodiment when the drawer is in a closed state.

[0113] Referring to Fig. 9, a slot 139 is formed in an end of an intermediate rail body 131 that is adjacent to the closing means body 210, in other words, corresponds to the retraction direction B. The slot 139 has an appropriate size to receive the operating rail 211 when the drawer 12 is in the closed state, that is, when the intermediate rail body 131 is moved in the retraction direction B to the maximum within the range in which the intermediate rail body 131 can move.

[0114] A portion of the retraction-directional end of the intermediate rail body 131 other than the slot 139 comes into contact with the slider 230.

[0115] Fig. 10 illustrates the decoupling of the inner rail body 151 from the slider 230 during the process of moving the drawer (12 of Fig. 1) in the extension direction A.

[0116] Fig. 10 also illustrates the operation pin 250 that is being removed from the coupling slot 162. The process of decoupling the operating pin 250 from the coupling slot 162 is the same as that described above with reference to Fig. 6; therefore, further description will be omitted.

[0117] However, in the drawer sliding device according to the second embodiment of the present invention, the portion of the retraction-directional end of the intermediate rail body 131 other than the slot 139 is brought into contact with the slider 230 and is pushed by the slider 230 in the extension direction A until the operating pin 250 is removed from the coupling slot 162.

[0118] Thereby, the intermediate rail body 131 is moved along with the inner rail body 151 in the extension direction A.

[0119] Fig. 11 illustrates the inner rail body 151 and the intermediate rail body 131 of the drawer sliding device according to the second embodiment that have further moved together in the extension direction A.

[0120] By virtue of the inertial force and the difference in coefficient of friction that have been described with reference to Fig. 8, the intermediate rail body 131 can be moved along with the inner rail body 151 in the extension direction A even when the portion of the retraction-directional end of the intermediate rail body 131 other than the slot 139 is separated from the slider 230 and is no longer pushed by the slider 230 in the extension direction A.

[0121] The drawer sliding device according to the second embodiment of the present invention having the above-mentioned construction has not only the effects of the drawer sliding device (1 of Fig. 1) according to the first embodiment that have been described with reference to Fig. 8 but also the following effects. As shown in Fig. 9, because the slot 139 has a length D1 corresponding to the length of the operating rail 211, the operating rail 211 can be manufactured such that the length thereof can be changed as needed. Thereby, the range of the operation of the automatic closing means can be adjusted. In other words, in the second embodiment, the range in which the drawer 12 can be automatically closed when it is moved in the retraction direction B can be increased or reduced as needed.

[0122] Furthermore, in the drawer sliding device according to the second embodiment of the present invention, the length of the intermediate rail body 131 is increased by D1. Thus, the length of a portion of the outer rail body 111 that supports the load transmitted from the drawer 12 to the intermediate rail body 131 through the inner rail body 151 is also increased. The structural strength of the drawer sliding device according to the second embodiment is therefore increased.

[0123] Fig. 12 is a perspective view illustrating an automatic closing means of a drawer sliding device, according to a third embodiment of the present invention. Figs. 13 through 15 are views illustrating the operation of the drawer sliding device according to the third embodiment of the present invention.

[0124] Referring to Fig. 12, in the automatic closing means of the drawer sliding device according to the third embodiment, the thickness t of an operating rail 211a differs from that of the automatic closing means (200 of Fig. 3) described with reference to Figs. 3 and 4. A fastening depression 218 is formed unlike the automatic closing means (200 of Fig. 3). A shock absorber 234 in lieu of the push rods (233 of Fig. 3) is provided. The general structure of the automatic closing means according to the third embodiment other than the above-mentioned construction is the same as that of the automatic closing means (200 of Fig. 3); therefore, further explanation will be omitted.

[0125] Referring to Figs. 12 and 13, the thickness t of the operating rail 211a provided in the automatic closing means of the drawer sliding device according to the third embodiment of the present invention, that is, the height to which the operating rail 211a protrudes from the second surface of the outer rail body 111 that faces the intermediate rail body 113, is less than a distance between the second surface of the outer rail body 111 and the intermediate rail body 113 although this is not shown in detail in the drawings.

[0126] Therefore, when the drawer (12 of Fig. 1) is in the closed state and the intermediate rail body 131 is moved to the maximum in the retraction direction B, an extension-direction-side portion of the operating rail 211a is covered with a retraction-direction-side portion of the intermediate rail body 131, as shown in Fig. 13. That is, when the drawer 12 is retracted and closed, the extension-direction-side portion of the operating rail 211a is

located between the outer rail body 111 and the intermediate rail body 131.

[0127] Given this, the thickness t of the operating rail 211a is preferably minimized within a range in which the guide depression 212 can have a sufficient depth to reliably guide the first end of the operating pin 250.

[0128] For reference, if an insert hole (not shown) having a shape corresponding to the operating rail 211a is formed in a portion of the outer rail body 111 in which the operating rail 211a is disposed, the operating rail 211a is inserted into the insert hole, and the thickness t of the operating rail 211a can be ensured by the thickness of the outer rail body 111. In other words, if the outer rail body 111 is configured such that the operating rail 211a can be inserted into the insert hole (not shown), the thickness t of the operating rail 211a can be increased by the depth of the insert hole without increasing the height to which the operating rail 211a protrudes from the surface of the outer rail body 111 that faces the intermediate rail body 113. In this way, the guide depression 212 of the operating rail 211a can be configured to have a sufficient depth.

[0129] Furthermore, when the operating rail 211a is configured such that it can be inserted into the insert hole (not shown), the space required for installation of the automatic closing means of the drawer sliding device according to the third embodiment can be minimized.

[0130] To minimize the thickness t of the operating rail 211a, the fastening depression 218 may be formed in the end of the operating rail 211a in lieu of the coupling hole (216 of Fig. 3) that has been described with reference to Fig. 3. A fastening piece (not shown) provided by cutting and bending a portion of the outer rail body 111 is inserted into the fastening depression 218 so that the end of the operating rail 211a is fastened to the outer rail body 111.

[0131] As such, by virtue of the reduced thickness t of the operating rail 211a, the intermediate rail body 131 can be configured to make contact with the slider 230 without forming the slot (139 of Fig. 9) in the intermediate rail body 131 or providing the push rods (233 of Fig. 3) on the slider 230.

[0132] A shock absorber 234 is provided at a position at which the slider 230 makes contact with the intermediate rail body 131. The shock absorber 234 functions to reduce shock or noise generated by collision between the slider 230 and the intermediate rail body 131. As shown in the drawings, the shock absorber 234 may comprise a shock absorption protrusion protruding from the slider 230. Alternatively, although it is not shown in the drawings, the shock absorber 234 may be configured in such a way that a shock absorption member made of elastic material is coupled to the intermediate rail body 131.

[0133] Fig. 14 shows the operating pin 250 decoupled from the coupling slot 162. The process of decoupling the operating pin 250 is the same as that described above with reference to Fig. 6; therefore, further description will be omitted.

[0134] In the drawer sliding device according to the third embodiment of the present invention, until the operating pin 250 is decoupled from the coupling slot 162, the retraction-direction-side end of the intermediate rail body 131 makes contact with the slider 230; therefore, the intermediate rail body 131 is pushed in the extension direction A by the slider 230 and thus moved along with the inner rail body 151 in the extension direction A.

[0135] Fig. 15 illustrates the inner rail body 151 and the intermediate rail body 131 of the drawer sliding device of the third embodiment that are further moved together in the extension direction A.

[0136] By virtue of the inertial force and the difference in coefficient of friction that have been described with reference to Fig. 8, the intermediate rail body 131 can be moved along with the inner rail body 151 in the extension direction A even when the intermediate rail body 131 is separated from the slider 230 and is no longer pushed in the extension direction A by the slider 230.

[0137] Compared to the drawer sliding device according to the second embodiment described above, the drawer sliding device according to the third embodiment of the present invention having the above-mentioned construction is advantageous in that the range of the operation of the automatic closing means can be increased without a reduction in the structural strength of the intermediate rail body 131. In other words, the intermediate rail body 131 of the drawer sliding device according to the third embodiment of the present invention has no slot (139 of Fig. 9), thus preventing the strength of the intermediate rail body 131 from reducing.

[0138] Furthermore, as shown in Fig. 13, the drawer sliding device according to the third embodiment of the present invention is configured such that the length of the intermediate rail body 131 does not influence the length D2 of the operating rail 211a at all. Therefore, the drawer sliding device may be manufactured such that the length of the operating rail 211a can be changed to adjust the range of the operation of the automatic closing means as needed. That is, the range in which the drawer 12 can be automatically closed when it is moved in the retraction direction B can be increased or reduced as needed.

[0139] Meanwhile, the structure and operation method for guiding, using the guide depression (212 of Fig. 3 or 12), the operating pin (250 of Fig. 3 or 12) of the automatic closing means (refer to Fig. 3 or 12) provided in the above-mentioned embodiments of the present invention can be changed in a variety of ways. For instance, the structure and operation method of the operating pin 250 may be changed into those introduced in Korean Patent Registration No. 1056922, 1114477 or 1129569, filed by the applicant of the present invention.

[0140] Although the preferred embodiments of the drawer sliding device according to the present invention have been disclosed for illustrative purposes, the spirit of the invention is not limited to the embodiments. Those

skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims. Such modifications, additions and substitutions must be regarded as falling within the scope of the present invention.

Claims

1. A drawer sliding device for guiding a drawer such that the drawer is pulled out from or retracted into a storage space formed in a storage body, the drawer sliding device comprising:

   an outer rail fastened at a first surface thereof to either the storage body or the drawer;
   an intermediate rail coupled to the outer rail so as to be slidable in a direction parallel to a longitudinal direction of the outer rail;
   an inner rail coupled to the intermediate rail so as to be slidable in a direction parallel to a longitudinal direction of the intermediate rail, the inner rail being fastened to the other one of the storage body and the drawer; and
   an automatic closing means coupled to the outer rail, the automatic closing means comprising:

      a closing means body coupled to a first end of a second surface of the outer rail;
      an operating rail protruding from the closing means body towards a second end of the outer rail, the operating rail having a linear portion oriented parallel to a direction in which the drawer is pulled out, and a curved portion bent from an end of the linear portion in a direction different from the linear portion;
      a slider coupled to the operating rail so as to be slidable in a longitudinal direction of the operating rail;
      an operating pin configured such that a first end thereof is disposed in the guide depression and a second end thereof passes through the slider and protrudes from the slider; and
      an elastic body fastened at a first end thereof to the closing means body and fastened at a second end thereof to the slider, the elastic body elastically supporting the slider towards the closing means body,

   wherein while the drawer is pulled out, the slider makes contact with the intermediate rail and moves along with the inner rail and the intermediate rail until the first end of the operating pin reaches the curved portion via the linear portion.

2. The drawer sliding device of claim 1, wherein a push rod protrudes from the slider so that when the drawer is pulled out, the push rod comes into contact with the intermediate rail and pushes the intermediate rail.

3. The drawer sliding device of claim 1, wherein a slot is formed in an end of the intermediate rail that faces the closing means body, the slot receiving the operating rail therein when the drawer is in a retracted state,
   wherein a portion of the end of the intermediate rail other than the slot is brought into contact with and is pushed by the slider when the drawer is pulled out.

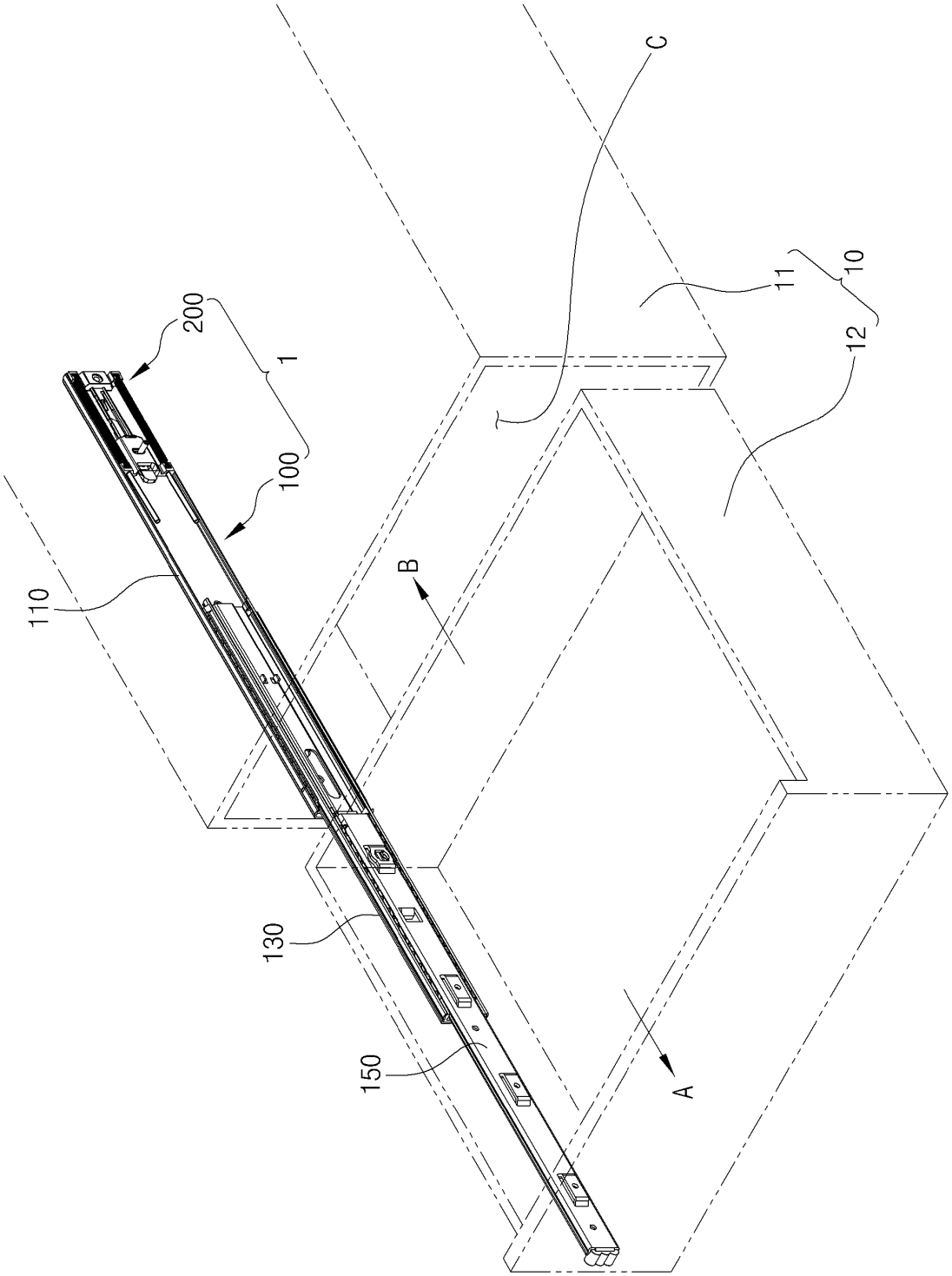
4. The drawer sliding device of claim 1, wherein a height to which the operating rail protrudes from the second surface of the outer rail is less than a distance between the second surface of the outer rail and the intermediate rail,
   wherein when the drawer is in a retracted state, a portion of the operating rail that faces the second end of the outer rail is disposed between the outer rail and the intermediate rail, and
   an end of the intermediate rail that faces the closing means body is brought into contact with and is pushed by the slider when the drawer is pulled out.

5. The drawer sliding device of claim 1 or 4, wherein an insert hole is formed in a portion of the outer rail at which the operating rail is disposed, the insert hole having a shape corresponding to the operating rail, and
   the operating rail is disposed in the insert hole.

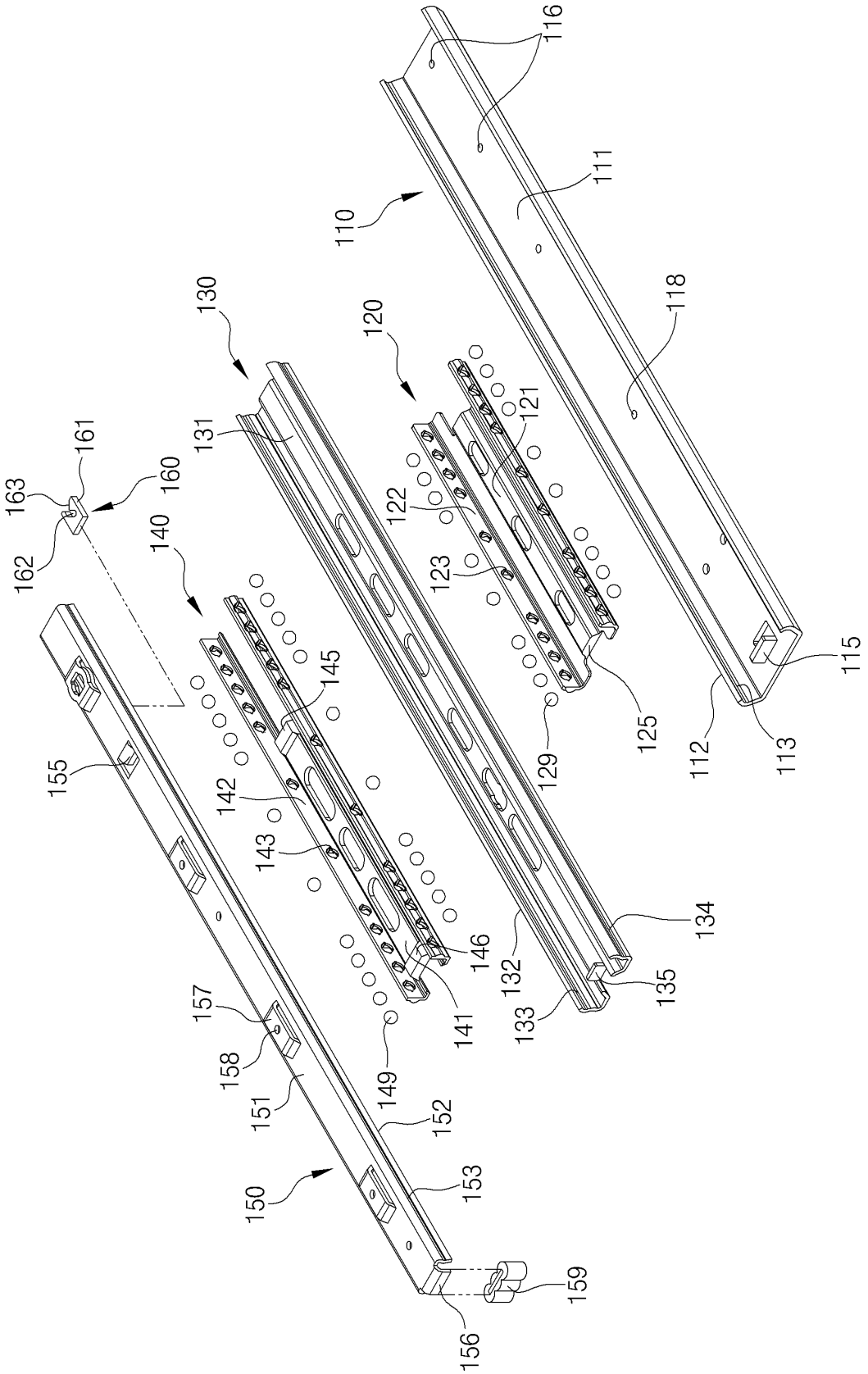
6. The drawer sliding device of any one of claims 2, 3 and 4, wherein a shock absorber is provided at a position at which the slider and the intermediate rail make contact with each other.

7. The drawer sliding device of claim 6, wherein the shock absorber comprises a shock absorption member made of elastic material, the shock absorption member being coupled to the slider or the intermediate rail, or a shock absorption protrusion protruding from the slider.

[Fig. 1]



[Fig. 2]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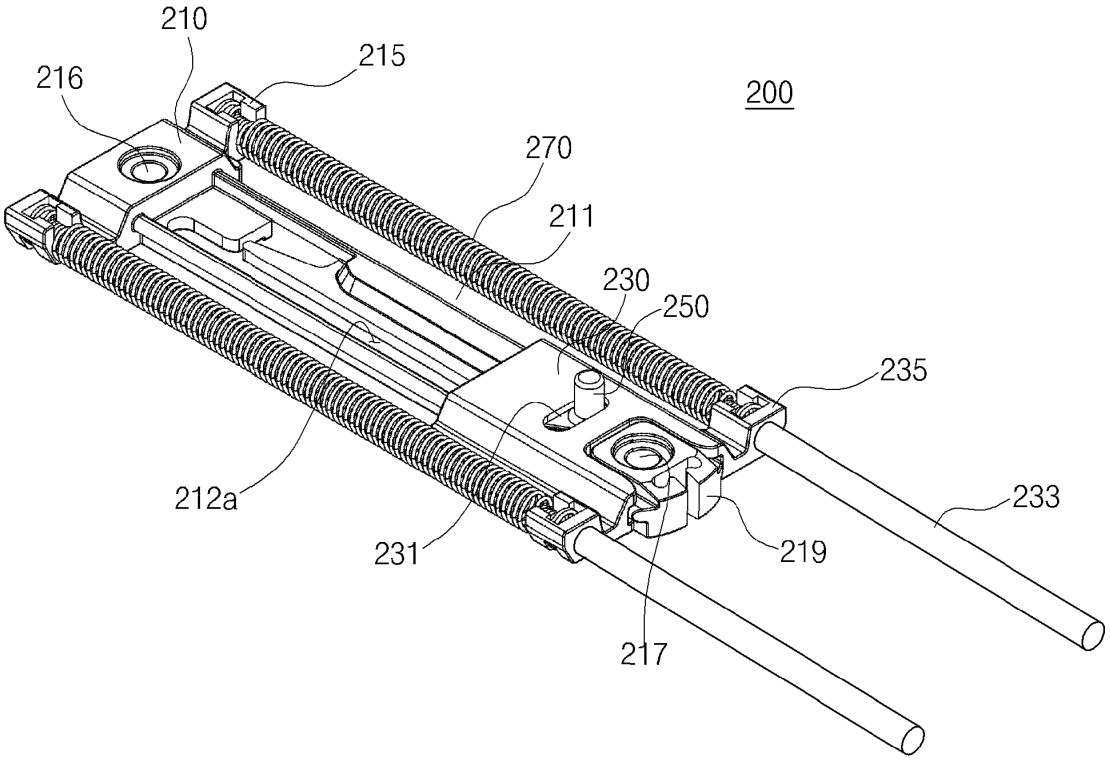
[Fig. 3]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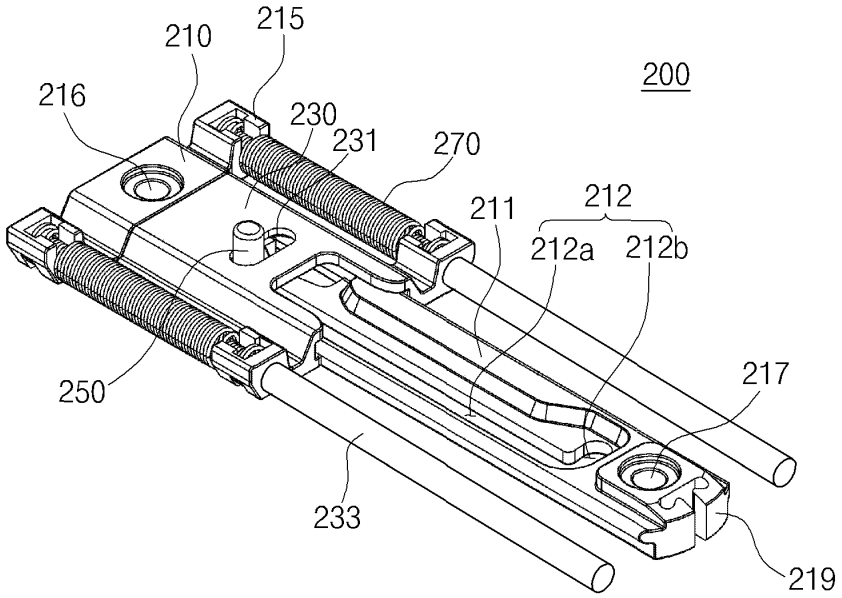
[Fig. 4]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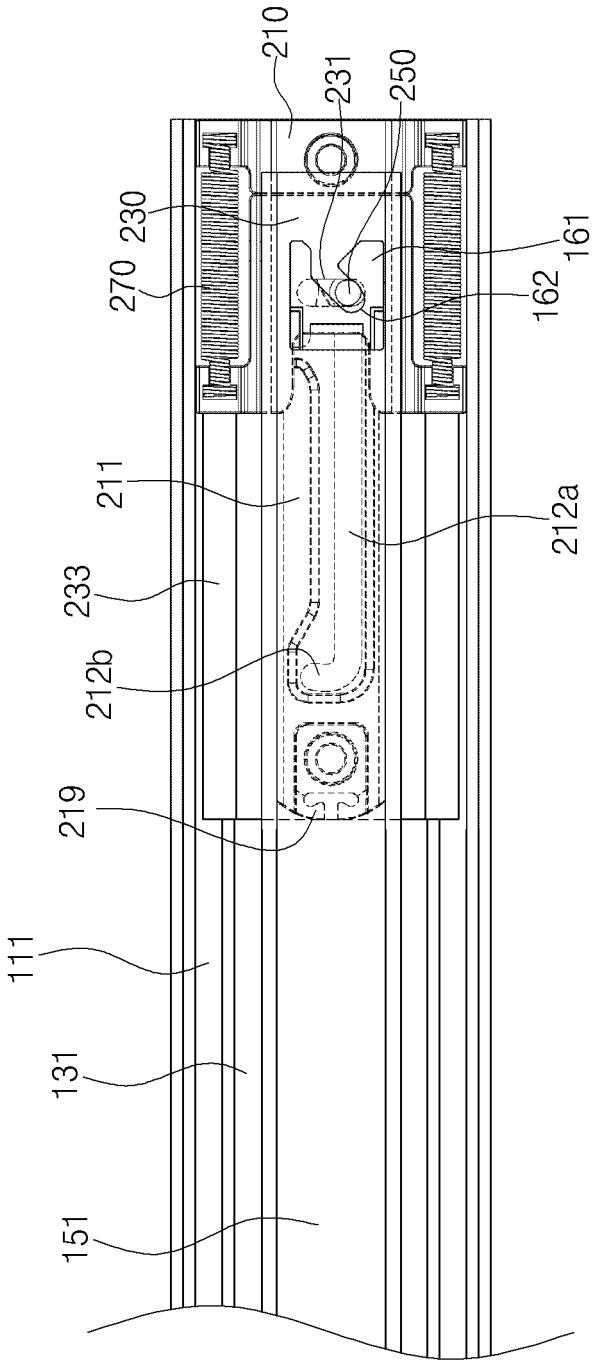
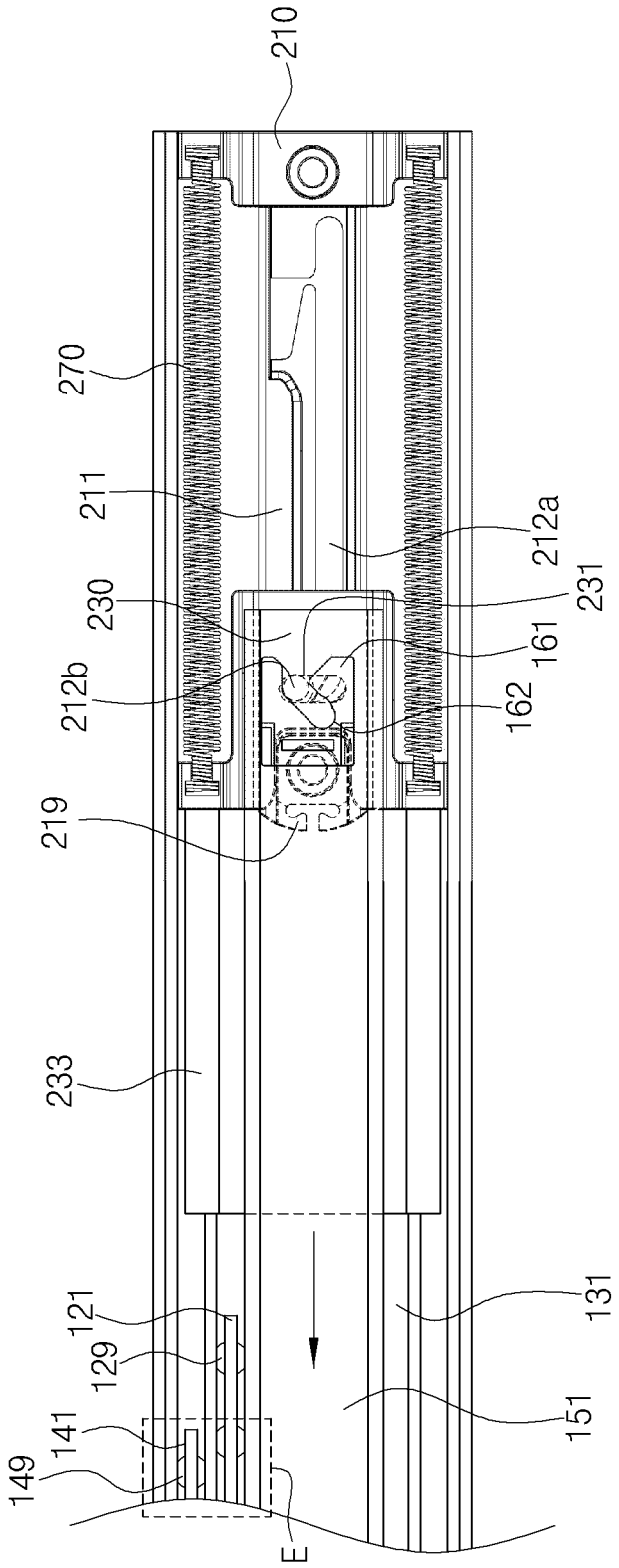
[Fig. 5]



[Fig. 6]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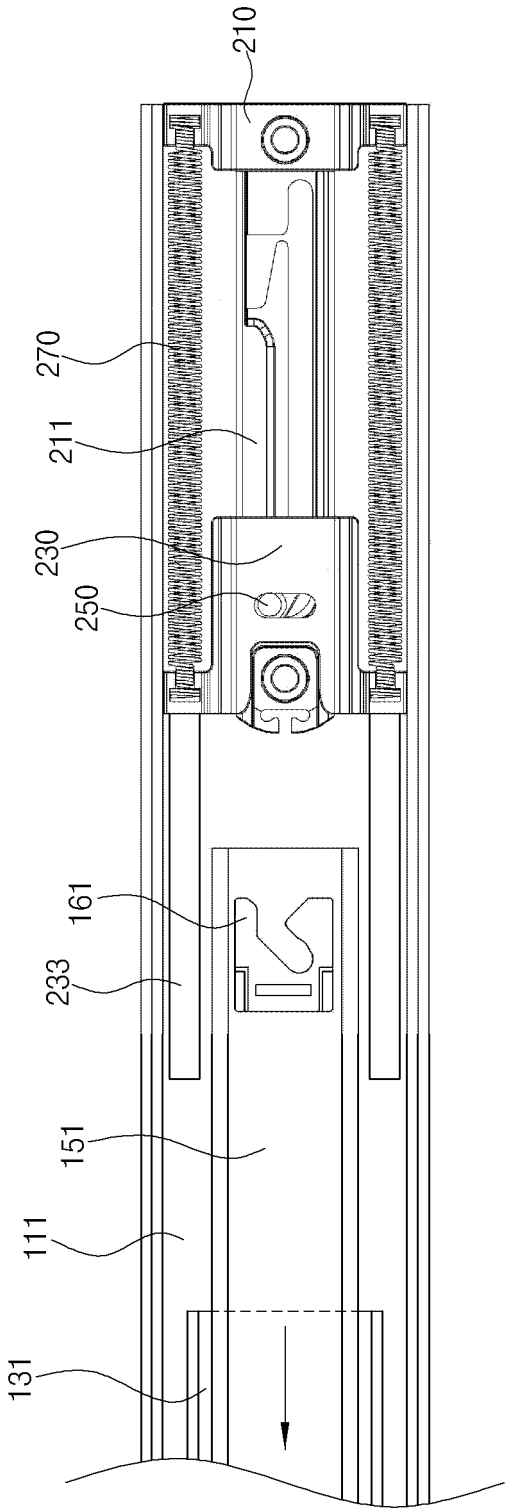
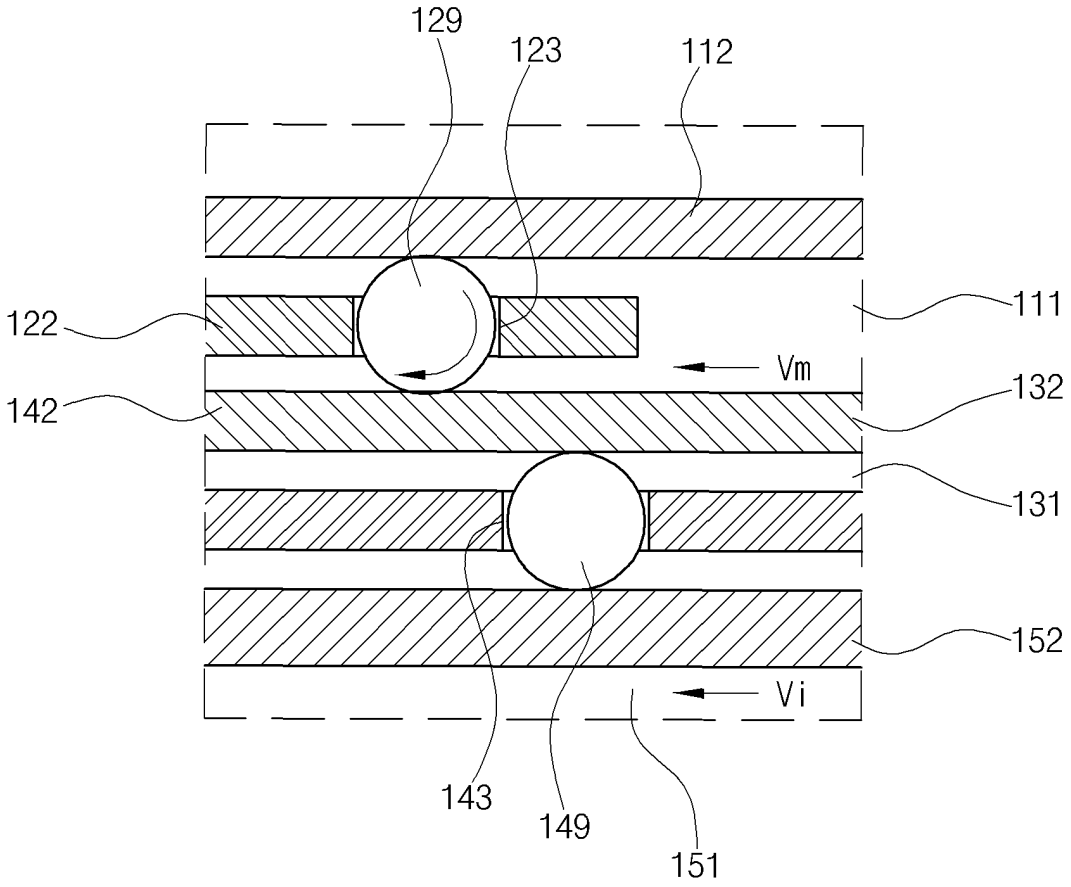
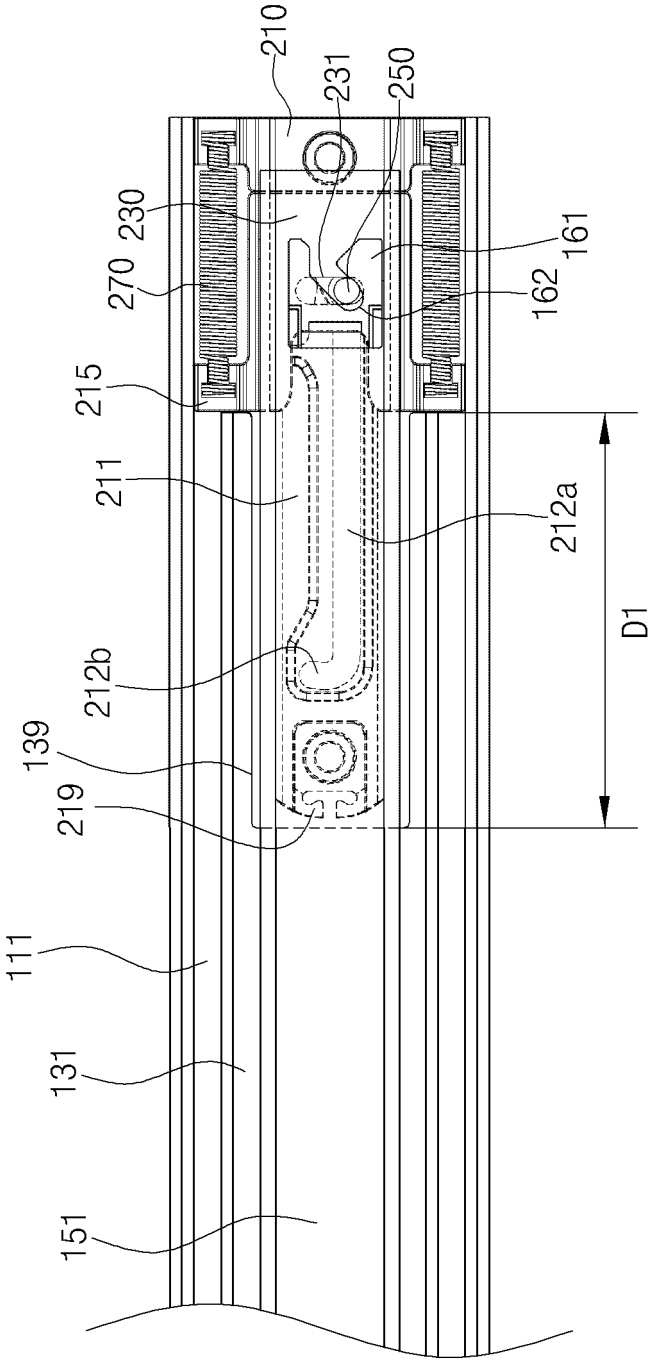
[Fig. 7]



[Fig. 8]



[Fig. 9]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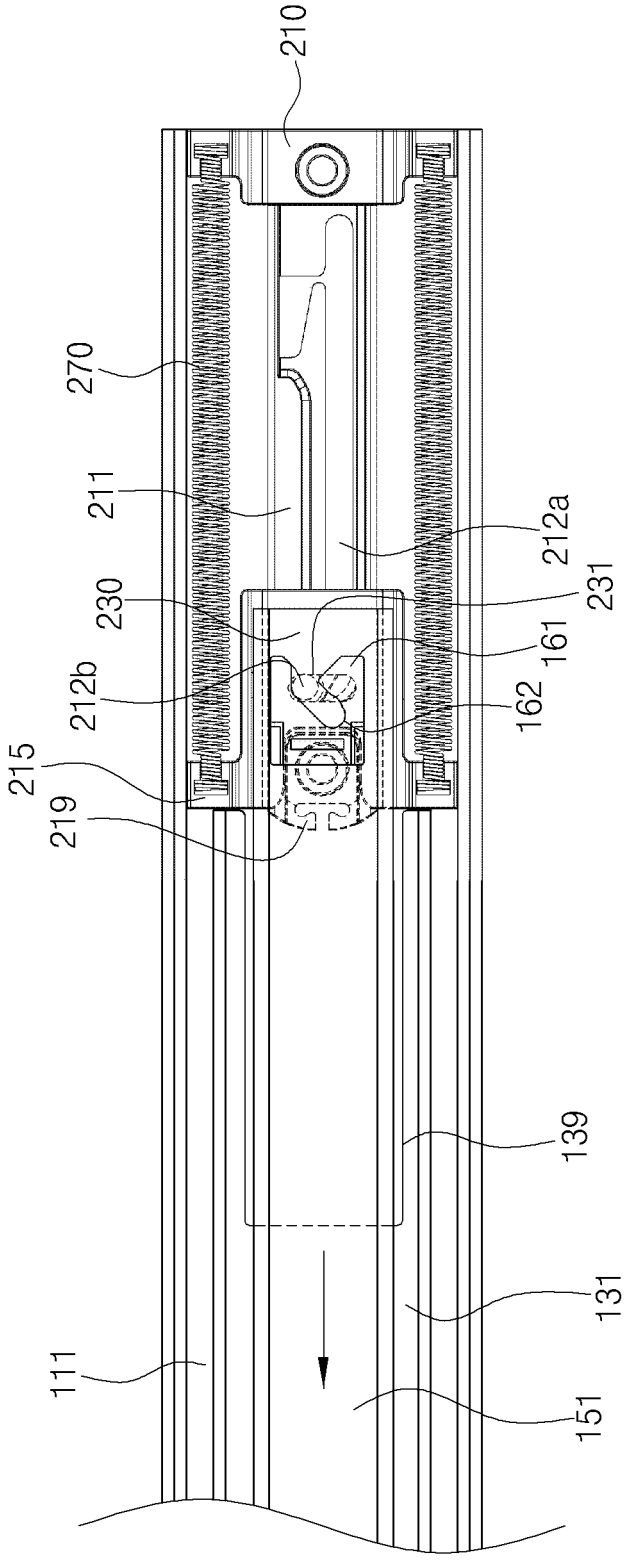
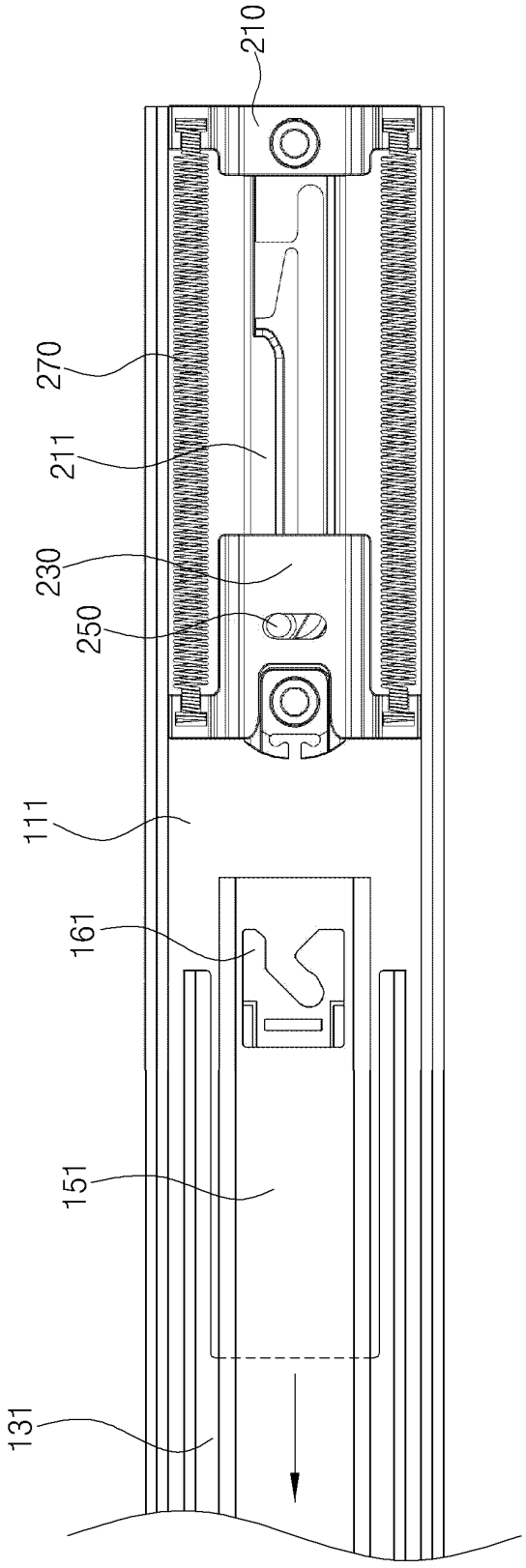
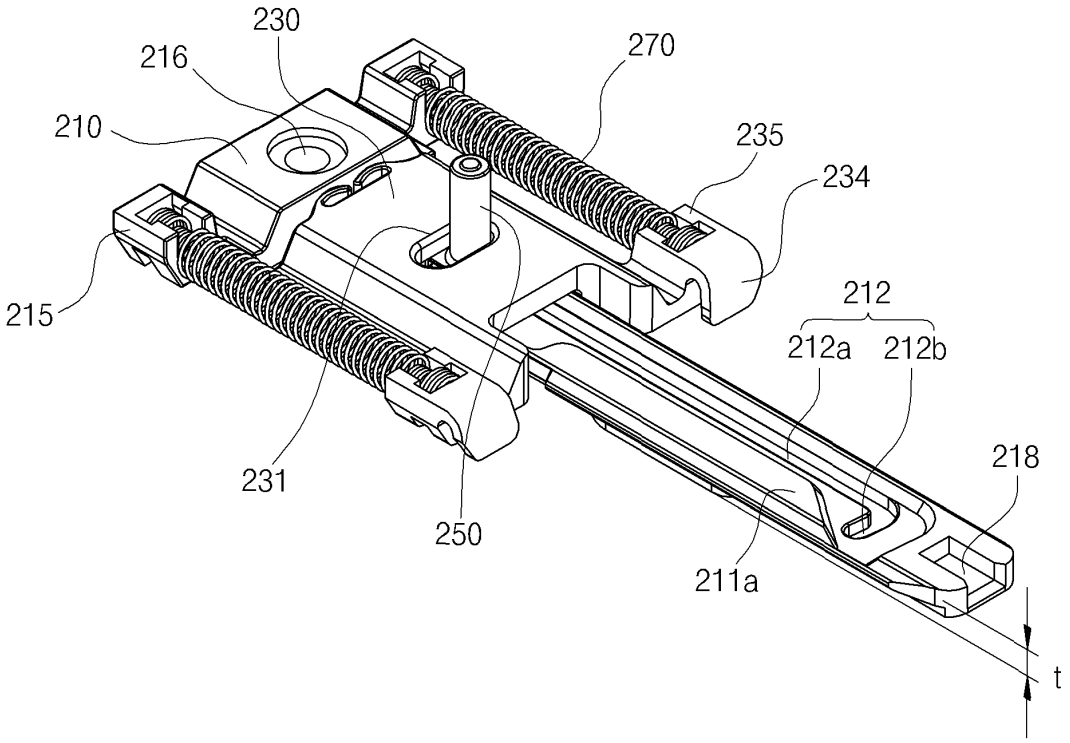
[Fig. 10]



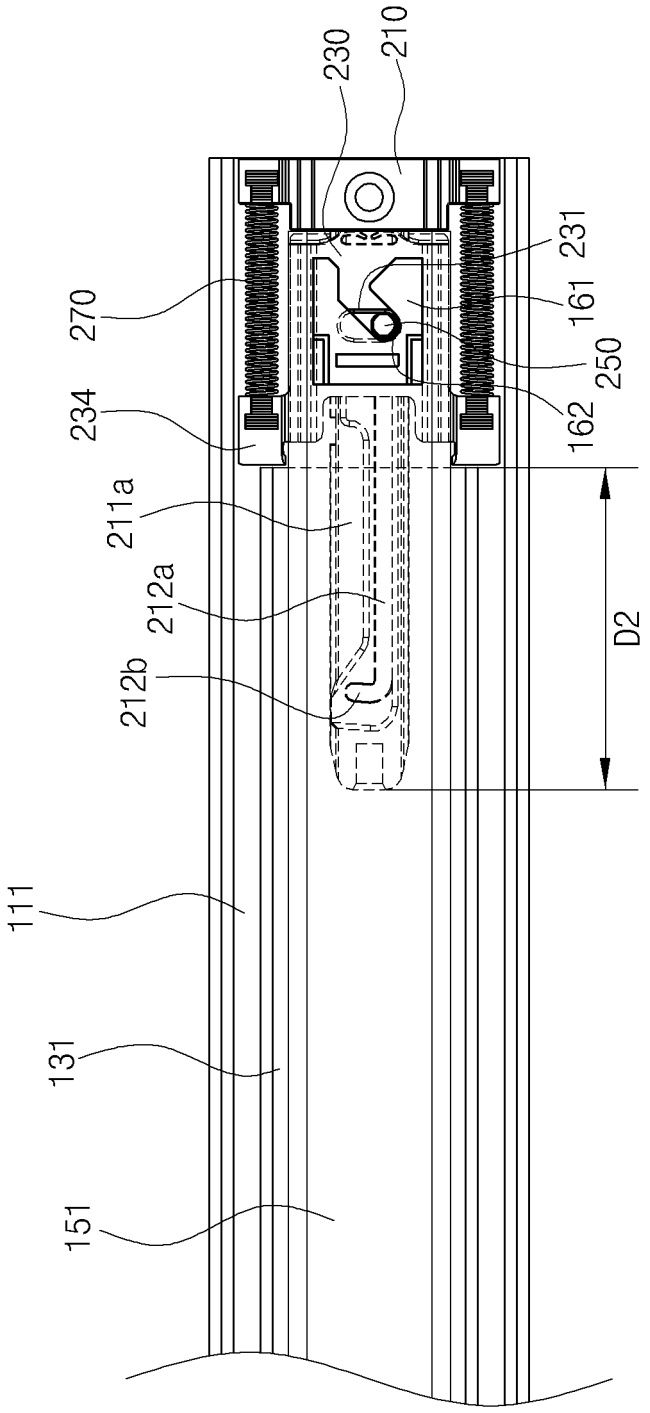
[Fig. 11]



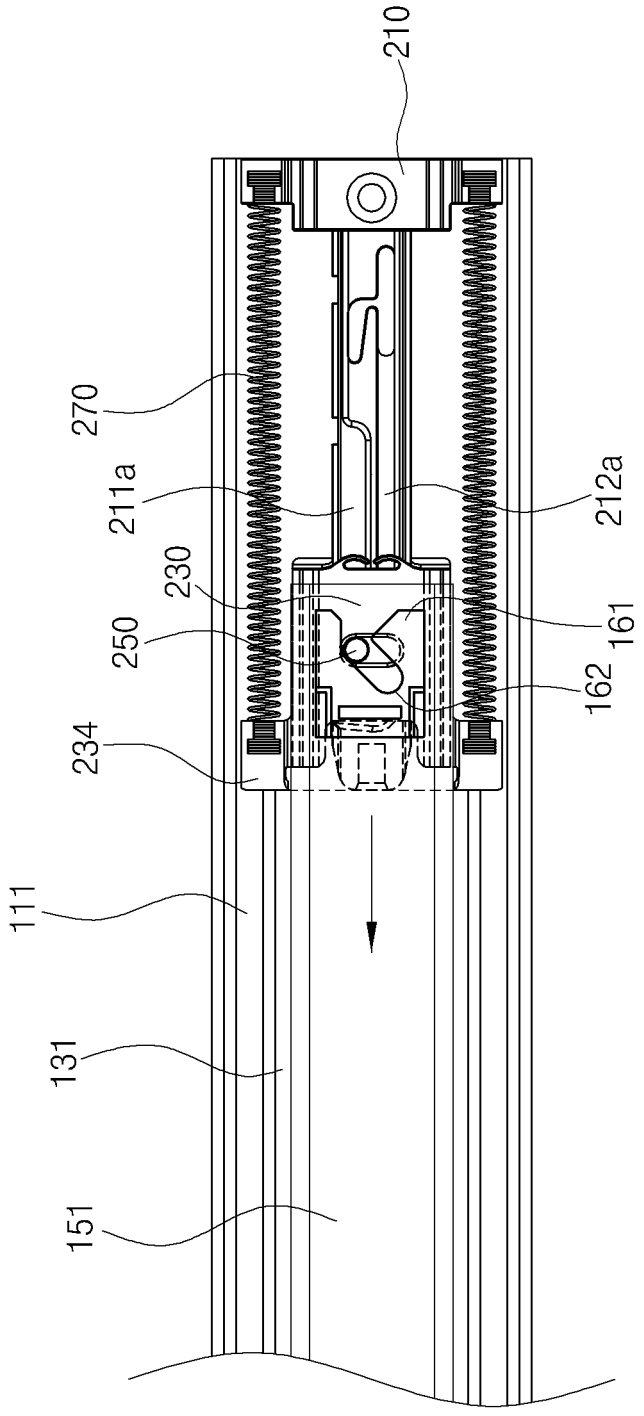
[Fig. 12]



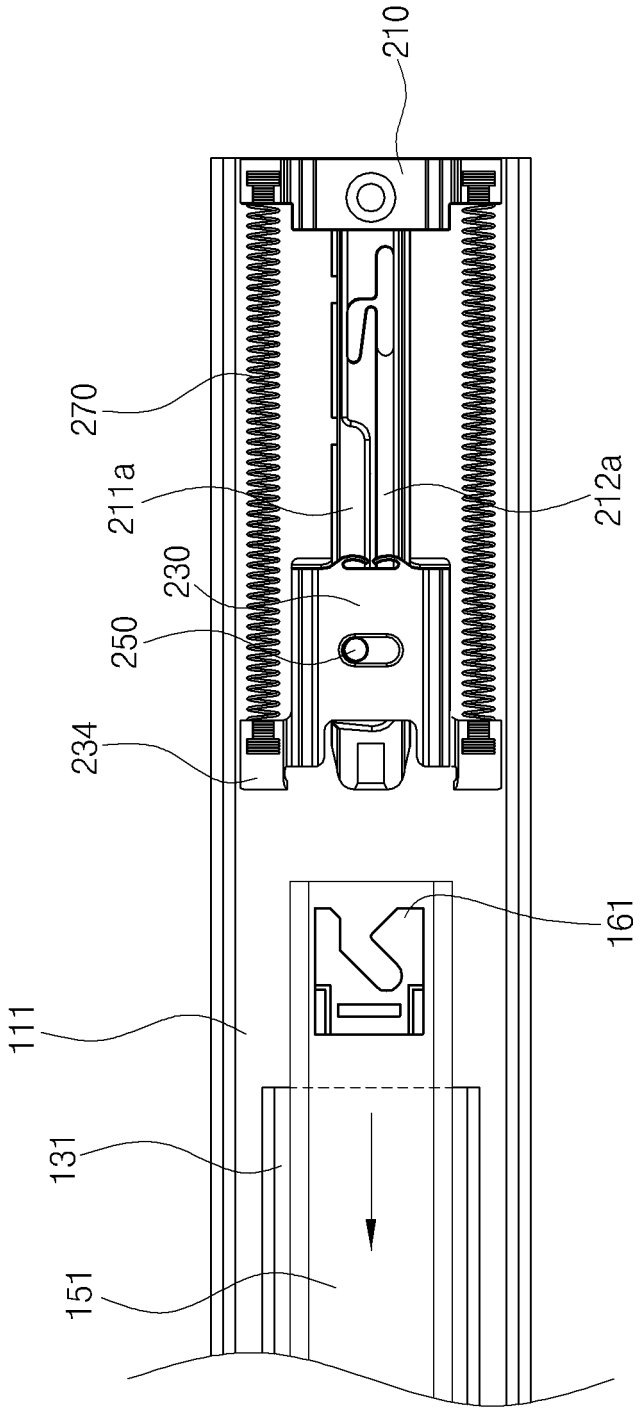
[Fig. 13]



[Fig. 14]



[Fig. 15]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2013/003098

A. CLASSIFICATION OF SUBJECT MATTER

A47B 88/08(2006.01)i, A47B 88/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47B 88/08; A47B 88/12; A47B 88/00; A47B 88/04; A47B 88/16; A47B 88/14

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Utility models and applications for Utility models: IPC as above
Japanese Utility models and applications for Utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & Keywords: drawer, slide device, outer rail, middle rail, inner rail, auto closing means, operating rail, slider, operating pin, elastic body

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-2007-0031608 A (PARK, Yoon Sig) 20 March 2007 See page 2, line 38 - page 3, line 35 and figures 1-9.	1,3-5
Y		2,6-7
Y	US 2008-0136300 A1 (WANG, Chun-Ping) 12 June 2008 See paragraphs [0027], [0030] and figures 4, 7.	2
Y	US 2009-0021129 A1 (HU, Thomas Sheng-Shyong et al.) 22 January 2009 See paragraph [0094] and figures 15-16.	6-7
A	KR 10-2008-0089126 A (PARK, Yoon Sig) 06 October 2008 See paragraphs [0044]-[0050] and figures 9-12.	1-7
A	KR 10-2010-0087773 A (ULIKE CORPORATION) 05 August 2010 See paragraphs [0028]-[0029] and figures 6-7c.	1-7

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 JULY 2013 (16.07.2013)	**18 JULY 2013 (18.07.2013)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 189 Seonsa-ro, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2013/003098

Patent document cited in search report	Publication date	Patent family member	Publication date
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