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(54) **IMPROVED LABORSAVING APPARATUS AND FURNITURE HAVING SAME**

(57) A labor-saving device includes a base (1), a connecting element (2) hinged to the base (1), a moving element (3) movably connected to connecting element (2), a fixed mechanism (4) rotatably connected to the moving element (3), a damping mechanism (5) connected to connecting element (2), and a buffer mechanism (10) installed to the base (1). The damping mechanism (5) is operated on the fixed mechanism (4) by the connecting element (2) and the moving element (3), and the buffer mechanism (10) is operated on the moving element (3) by the connecting element (2). The buffer mechanism (10) includes a buffer seat (101) installed at the base (1), a buffering part (102) installed at the buffer seat (101), and a buffer adjusting member (103) for adjusting the buffer force of the buffering part (102), and the buffering part (102) abuts the connecting element (2).

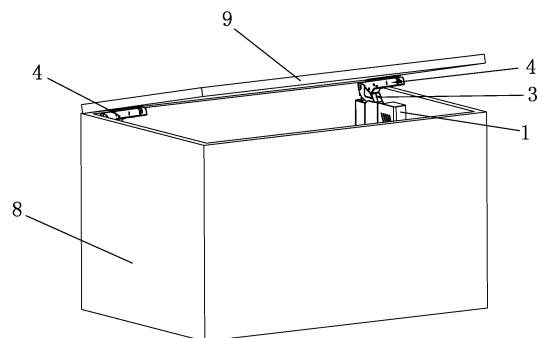


FIG.1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to the field of household products, and more particularly to an improved labor-saving device and furniture with the labor-saving device.

BACKGROUND OF THE INVENTION

[0002] Furniture such as box, cabinet, and table is a necessary household item for every family. At present, a conventional door panel supporting device of the box, cabinet, and table has the following drawbacks: 1. The door panel has a low damping/buffering performance, so that the door panel produces a loud noise while opening or closing the panel and such loud noise is a nuisance. 2. Opening and closing the door panel is laborious, and thus making the use of furniture user-unfriendly and inconvenient.

[0003] In view of the aforementioned drawbacks of the prior art, the inventor of the present invention based on years of experience to conduct extensive research and experiment, and finally provided a feasible solution to overcome the drawbacks of the prior art.

SUMMARY OF THE INVENTION

[0004] Therefore, it is a primary objective of the present invention to provide a labor-saving device and furniture with the labor-saving device, whose operation is quick, easy and convenient to reduce the labor intensity of users, and a fixed mechanism can be opened or closed easily with respect to a base to achieve the labor saving effect, and the fixed mechanism can be opened or closed stably with respect to the base to reduce noises. Obviously, the application of the present invention can make our daily life more convenient.

[0005] To achieve the aforementioned and other objectives, the present invention provides a labor-saving device, comprising: a base; a connecting element, hinged to the base; a moving element movably coupled to the connecting element; a fixed mechanism rotatably coupled to the moving element, a damping mechanism coupled to the connecting element, and a buffer mechanism installed at the base, and the damping mechanism being acted on the fixed mechanism by the connecting element and the moving element, and the buffer mechanism being acted on the moving element by the connecting element, and the buffer mechanism comprising a buffer seat installed at the base, a buffering part installed at the buffer seat, and a buffer adjusting member for adjusting the buffer force of the buffering part, and the buffering part abutting the connecting element.

[0006] Further, the fixed mechanism comprises a housing rotatably coupled to the moving element, a fastener installed to the housing, and an opening/closing

assembly for limiting the fastener at the housing. The housing has a plug-in shaft, and the fastener has a plug-in slot formed at an end of the fastener for receiving the plug-in shaft.

[0007] Further, the opening/closing assembly comprises an opening/closing element rotatably coupled to the housing and an opening/closing torque spring installed between the opening/closing element and the housing, and an end of the opening/closing torque spring abuts the opening/closing element, and the other end of the opening/closing torque spring abuts the housing. The opening/closing element includes a rotating portion rotatably coupled to the housing, a fastening portion coupled to the rotating portion and a pressing portion bent and extended from the fastening portion, and a fastening slot formed at the other end of the fastener for accommodating the fastening portion.

[0008] Further, the buffering part is a buffer spring, and the buffer adjusting member comprises a screw installed at the buffer seat and a force tuning member coupled to the screw by a thread, and the buffer spring is sheathed on the outer side of the screw and has an end abutting the force tuning member and the other end abutting the connecting element.

[0009] Further, the housing includes a protecting element rotatably coupled thereto for protecting the fastener, and the protecting element includes a rotating member rotatably coupled to the housing for driving the protective torsion spring to restore its original position, and a limiter rotatably coupled to the housing, and the rotating member has an end for fastening the housing and the other end for abutting the limiter.

[0010] Further, the moving element comprises a moving arm hinged with the housing and the connecting element, a pushing part installed at the moving arm, and a buffer for buffering the pushing part, and the pushing part has an end hinged with the housing and the other end hinged with the connecting element, and the buffer is installed at the moving arm.

[0011] Further, the connecting element comprises a first connecting part, a second connecting part, a third connecting part and a fourth connecting part, and the first connecting part has an end hinged with the base, the middle hinged with the middle of the moving arm, and the other end hinged with the other end of the pushing part, and the second connecting part has an end hinged with the base and the other end hinged with an end of the moving arm away from the housing, and the third connecting part has an end hinged with the second connecting part and the other end hinged with an end of the fourth connecting part, and the other end of the fourth connecting part is hinged with the base, and an end of the damping mechanism is coupled to the fourth connecting part, and an end of the second connecting part proximate to the third connecting part abuts an end of the buffering part which is away from the buffer seat.

[0012] Further, the damping mechanism comprises a first holder coupled to the fourth connecting part, a sec-

ond holder installed at the base, and a spring installed between the first holder and the second holder, and the spring has an end abutting the first holder and the other end abutting the second holder.

[0013] Further, the fourth connecting part comprises an adjusting assembly installed thereto for adjusting the damping mechanism, and the adjusting assembly comprises an adjusting seat installed to the fourth connecting part, a thread adjusting shaft installed to the adjusting seat, and a thread adjusting member coupled to the thread adjusting shaft, and the thread adjusting member being coupled to the first holder.

[0014] The present invention further provides furniture with a labor-saving device, and the furniture comprises the labor-saving device and further comprises a box and a cover for opening or closing the box, and the base is installed to the box, and the cover is coupled to the fixed mechanism.

[0015] The present invention has the following advantages and effects:

The cover can be opened manually to drive the fixed mechanism to move upward, so that the fixed mechanism can be opened with respect to the base to drive the moving element to move, and the moving element drives the connecting element to rotate, and the connecting element compresses the damping mechanism, and the damping mechanism buffers the connecting element. Now, the buffering part of the buffer mechanism is stretched to abut the connecting element, and the buffer mechanism provides an upward moving force to the moving element from the connecting element to facilitate opening the cover, so as to achieve the labor saving effect. When the fixed mechanism is opened to a specific angle, the fixed mechanism is released manually and reset to abut the connecting element, and the connecting element pushes the moving element to drive the fixed mechanism to be opened automatically, slowly and accordingly to a predetermined open angle. Similarly, when the fixed mechanism is closed with respect to the base, the connecting element compresses the buffering part of the buffer mechanism, and the buffering part buffers the connecting element, and the buffer mechanism provides a downward moving force to the moving element from the connecting element to provide the buffering force, so as to achieve the buffering effect for the opening and closing of the cover. When the fixed mechanism is closed to a specific angle with respect to the base, the damping mechanism is compressed, and the fixed mechanism is released and closed automatically, slowly and accordingly under the effect of the damping mechanism. With the effect of the buffer mechanism and damping mechanism, the opening or closing of the fixed mechanism with respect to the base produces little or no noise and the opening or closing of the cover is labor saving. In addition, the buffer force of the buffering part can be adjusted by the buffer adjusting member according to actual requirements to improve the practicality of the present invention. The labor-saving device and furniture with the

labor-saving device have the features of simple structure, compact and reasonable design, easy, quick and convenient operation and reduce the labor intensity of users, and the fixed mechanism can be opened or closed easily with respect to a base to achieve the labor saving effect, and the fixed mechanism can be opened or closed stably with respect to the base to reduce noises. Obviously, the application of the present invention can make our daily life more convenient. The invention is applicable for furniture such as cabinet, table and box.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

FIG. 1 is a perspective view of a piece of furniture with a labor-saving device in accordance with the present invention;

FIG. 2 is a perspective view of a labor-saving device of the present invention;

FIG. 3 is another perspective view of a labor-saving device of the present invention;

FIG. 4 is a perspective view of a labor-saving device concealed behind a base in accordance with the present invention;

FIG. 5 is a perspective view of a fixed mechanism of the present invention;

FIG. 6 is an exploded view of a fixed mechanism of the present invention; and

FIG. 7 is a perspective view of a housing of the present invention.

Brief Description of Numerals in the Figures

[0017] 1: Base; 2: Connecting element; 21: First connecting part; 22: Second connecting part; 23: Third connecting part; 24: Fourth connecting part; 3: Moving element; 31: Moving arm; 32: Pushing part; 33: Buffer; 4: Fixed mechanism; 41: Housing; 411: plug-in shaft; 412: Operating portion; 413: snap shaft; 42: Fastener; 421: plug-in slot; 422, fastening slot; 43: opening/closing assembly; 431: Opening/closing element; 4311: Rotating portion; 4312: fastening portion; 4313: Pressing portion; 432: Opening/closing torque spring; 5: Damping mechanism; 51: First holder; 52: second holder; 53: Spring; 6: Protecting element; 61: rotating member; 611: snap slot; 62: protective torsion spring; 63: limiter; 7: Adjusting assembly; 71: Adjusting seat; 72: Thread adjusting shaft; 73: Thread adjusting member; 8: box; 9: cover; 10: Buffer mechanism; 101: Buffer seat; 102: Buffering part; 103: Buffer adjusting member; 1031: Screw; 1032: Force tuning member.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0018] The technical contents of the present invention will become apparent with the detailed description of pre-

ferred embodiments accompanied with the illustration of related drawings as follows. It is intended that the embodiments and figures disclosed herein are to be considered illustrative rather than restrictive.

[0019] With reference to FIGS. 1 to 7 for a labor-saving device of the present invention, the labor-saving device comprises a base 1; a connecting element 2, hinged to the base 1; a moving element 3 movably coupled to the connecting element 2; a fixed mechanism 4 rotatably coupled to the moving element 3, a damping mechanism 5 coupled to the connecting element 2, and a buffer mechanism 10 installed at the base 1, wherein the damping mechanism 5 is acted on the fixed mechanism 4 by the connecting element 2 and the moving element 3, and the buffer mechanism 10 is acted on the moving element 3 by the connecting element 2, and the buffer mechanism 10 comprises a buffer seat 101 installed at the base 1, a buffering part 102 installed at the buffer seat 101, and a buffer adjusting member 103 for adjusting the buffer force of the buffering part 102, and the buffering part 102 abuts the connecting element 2. Specifically, the buffer mechanism 10 and the damping mechanism 5 are disposed on both sides of the moving element 3 respectively.

[0020] In a practical application, the cover 9 is opened manually, and the cover 9 drives the fixed mechanism 4 to move upward, so that the fixed mechanism 4 can be opened with respect to the base 1, and the fixed mechanism 4 drives the moving element 3 to move, and the moving element 3 drives the connecting element 2 to rotate, and the connecting element 2 compresses the damping mechanism 5, and the damping mechanism 5 buffers the connecting element 2. Now, the buffering part 102 of the buffer mechanism 10 is stretched to abut the connecting element 2, and the buffer mechanism 10 provides an upward moving force to the moving element 3 from the connecting element 2 to facilitate opening the cover 9, so as to achieve the labor saving effect. When the fixed mechanism 4 is opened to a specific angle, the fixed mechanism 4 is released manually, and the damping mechanism 5 is reset to abut the connecting element 2, and the connecting element 2 pushes the moving element 3, and the moving element 3 drives the fixed mechanism 4 to be opened automatically, slowly and accordingly to a predetermined open angle. Similarly, when the fixed mechanism 4 is closed with respect to the base 1, the connecting element 2 compresses the buffering part 102 of the buffer mechanism 10, and the buffering part 102 buffers the connecting element 2, and the buffer mechanism 10 moves the moving element 3 downward to provide a buffering force through the connecting element 2, so as to achieve the buffering effect of opening and closing the cover 9. When the fixed mechanism 4 is closed to a specific angle with respect to the base 1, the damping mechanism 5 is compressed, and the fixed mechanism 4 is released manually, and the fixed mechanism 4 together with the cover 9 are closed automatically, slowly and accordingly under the effect of the damping mechanism 5. With the effect of the buffer mechanism

10 and damping mechanism 5, the opening or closing of the fixed mechanism 4 with respect to the base 1 produces little or no noise, and the opening or closing of the cover 9 is labor saving. In addition, the buffer force of the buffering part 102 can be adjusted by the buffer adjusting member 103 according to actual requirements to improve the practicality of the present invention;

[0021] The labor-saving device and furniture with the labor-saving device have the features of simple structure, compact and reasonable design, easy, quick and convenient operation and reduce the labor intensity of users, and the fixed mechanism 4 can be opened or closed easily with respect to a base 1 to achieve the labor saving effect, and the fixed mechanism 4 can be opened or closed stably with respect to the base 1 to reduce noises. Obviously, the application of the present invention can make our daily life more convenient. The invention is applicable for furniture such as cabinet, table and box.

[0022] In this exemplary embodiment, the fixed mechanism 4 comprises a housing 41 rotatably coupled to the moving element 3, a fastener 42 installed to the housing 41, and an opening/closing assembly 43 for limiting the fastener 42 in the housing 41, and the fastener 42 is provided for connecting the cover 9 externally; and the housing 41 and fastener 42 may be detachably coupled. During assembling, the opening/closing assembly 43 limits the fastener 42 in the housing 41 to facilitate assembling the fastener 42 and the housing 41. During disassembling, the opening/closing assembly 43 is pressed to release the fastener 42, so that the fastener 42 is loosened from the housing 41, and the fastener 42 can be removed from the housing 41. Therefore, the fastener 42 and housing 41 can be assembled or disassembled conveniently to improve the efficiency of the assembling and disassembling process and makes the application convenient to our daily life. The housing 41 has a plug-in shaft 411, and the fastener 42 has a plug-in slot 421 formed at an end of the fastener 42 for accommodating the plug-in shaft 411. When the fastener 42 and the housing 41 are assembled, the plug-in shaft 411 is accommodated in the plug-in slot 421, so that the fastener 42 and the housing 41 can be latched or coupled easily. Obviously, such arrangement has the features of simple structure and ingenious design and facilitates the assembling and disassembling of the fastener 42 and the housing 41 to improve the efficiency of assembling and disassembling the fastener 42 and the housing 41 as well as the stability of assembling the fastener 42 and the housing 41.

[0023] In this exemplary embodiment, the opening/closing assembly 43 comprises an opening/closing assembly 431 rotatably coupled to the housing 41 and an opening/closing torque spring 432 installed between the opening/closing assembly 431 and the housing 41, and the opening/closing torque spring 432 has an end abutting the opening/closing assembly 431 and the other end abutting the housing 41. Specifically, the plug-in shaft 411 is rotatably received in the plug-in slot 421, and

the opening/closing assembly 431 comprises a rotating portion 4311 rotatably coupled to the housing 41, a fastening portion 4312 coupled to the rotating portion 4311, and a pressing portion 4313 bent and extended from the fastening portion 4312, and the fastener 42 has a fastening slot 422 formed at the other end of the fastener 42 for accommodating the fastening portion 4312. In a preferred embodiment, the housing 41 has an operating portion 412 disposed thereon and apart from the pressing portion 4313, and the opening/closing torque spring 432 has an end abutting the pressing portion 4313 and the other end abutting the operating portion 412.

[0024] When the fastener 42 is removed, the pressing portion 4313 of the opening/closing assembly 431 is pressed, so that the rotating portion 4311 is rotated with respect to the housing 41, and the rotating portion 4311 drives the fastening portion 4312 to rotate, and the pressing portion 4313 and operating portion 412 compress the opening/closing torque spring 432, so that the fastening portion 4312 is separated from or connected to the fastening slot 422 of the fastener 42. When the pressing force of the pressing portion 4313 is released, the opening/closing torque spring 432 drives the opening/closing assembly 431 to restore its original position, so as to achieve the effect of opening or closing the fastener 42 and the housing 41. The opening/closing assembly 43 has the features of simple structure, sensitive response, stable opening and closing, and quick and convenient operation to facilitate assembling and disassembling the fastener 42 and the housing 41. Wherein, the pressing portion 4313 and the operating portion 412 provide a convenient operation to users and improve the comfortability of the users' operation.

[0025] In this exemplary embodiment, the buffering part 102 is a buffer spring, and the buffer adjusting member 103 comprises a screw 1031 installed at the buffer seat 101 and a force tuning member 1032 coupled to the screw 1031 by a thread, and the buffer spring is sheathed on the outer side of the screw 1031, and the buffer spring has an end abutting the force tuning member and the other end abutting the connecting element. When the buffer force of the buffering part 102 is adjusted, the force tuning member 1032 is rotated, so that the force tuning member 1032 can be moved up and down along the screw 1031 to abut against the buffer spring. Since the buffer spring is compressed in different levels and the resilience of the buffer spring varies, therefore the buffer force of the buffer spring can be changed.

[0026] In this exemplary embodiment, the rotation of the housing 41 is helpful to protect the fastener 42 by the protecting element 6, and the protecting element 6 comprises a rotating member 61 rotatably coupled to the housing 41, a protective torsion spring 62 for driving the rotating member 61 to restore its original position, and a limiter 63 rotatably coupled to the housing 41, wherein the rotating member 61 has an end engaged with the housing 41 and the other end abutting the limiter 63, and the limiter 63 is provided for abutting the fastener 42 to

prevent the plug-in shaft 411 from falling out from the plug-in slot 421. Specifically, the middle of the rotating member 61 is rotatably coupled to the housing 41, and the protective torsion spring 62 is pivotally coupled to the housing 41 through a pivot, and the protective torsion spring 62 has an end abutting the housing 41 and the other end abutting the rotating member 61, and the housing 41 has a snap shaft 413 engaged with the rotating member 61, and the rotating member 61 has a snap slot 611 for accommodating the snap shaft 413.

[0027] When the fastener 42 is installed to the housing 41, the fastener 42 abuts the limiter 63, so that the limiter 63 is rotated downwardly, and the limiter 63 abuts the rotating member 61, and the rotating member 61 is rotated, and the rotating member 61 and housing 41 compress the protective torsion spring 62, and the snap slot 611 of the rotating member 61 is separated from the snap shaft 413. When the fastener 42 is installed into its position, the fastener 42 abuts the limiter 63, and the free end of the limiter 63 abuts the rotating member 61, and the limiter 63 positions the rotating member 61 and fastener 42. When the fastener 42 has not been installed to the housing 41, the protective torsion spring 62 drives the rotating member 61 to rotate with respect to the housing 41, and an end of the rotating member 61 is engaged with the snap shaft 413, so that the snap shaft 413 is received in the snap slot 611, and the other end of the rotating member 61 abuts the limiter 63, so that the limiter 63 is rotated upward, and the rotating member 61 and the limiter 63 give the effect of a "safety buckle". When the fastener 42 is not installed into its position, the opening/closing assembly 43 cannot fix the fastener 42 and the housing 41 to prevent damaging the fixed mechanism 4, extending the service life of the fixed mechanism 4, or improving the safety of the fixed mechanism 4.

[0028] In this exemplary embodiment, the moving element 3 comprises a moving arm 31 hinged with the housing 41 and the connecting element 2, a pushing part 32 movably installed into the moving arm 31, and a buffer 33 for buffering the pushing part 32, and the pushing part 32 has an end hinged with the housing 41 and the other end hinged with the connecting element 2, and the buffer 33 is installed at the moving arm 31. Specifically, the connecting element 2 comprises a first connecting part 21, a second connecting part 22, a third connecting part 23 and a fourth connecting part 24, wherein the first connecting part 21 has an end hinged with the base 1, the middle hinged with the middle of the moving arm 31, and the other end hinged with the other end of the pushing part 32, and the second connecting part 22 has an end hinged with the base 1 and the other end hinged with an end of the moving arm 3 which is away from the housing 41, and the third connecting part 23 has an end hinged with an end of the second connecting part 22 and the other end hinged with an end of the fourth connecting part 24, and the other end of fourth connecting part 24 is hinged with the base 1, and an end of the damping mechanism 5 is coupled to the fourth connecting part 24,

and an end of the second connecting part 22 proximate to the third connecting part 23 abuts an end of the buffering part 102 which is away from the buffer seat 101.

[0029] When the fixed mechanism 4 is driven manually to be closed with respect to the base 1, the fixed mechanism 4 drives the moving arm 31 and the pushing part 32 to move downward, and an end of the pushing part 32 proximate to the first connecting part 21 abuts the buffer 33, and the buffer 33 provides a buffering effect to the pushing part 32, so that the pushing part 32 can be moved stably, and the moving arm 31 drives an end of the second connecting part 22 to rotate downward, and the other end of the second connecting part 22 compresses the buffering part 102 to provide a buffering effect to the second connecting part 22, wherein the buffer force of the buffering part 102 is acted onto the fixed mechanism 4 and the cover 9 through the second connecting part 22 and the moving arm 31, so that the fixed mechanism 4 can be moved stably and reliably to reduce the noise produced when the cover 9 is closed. When the fixed mechanism 4 is driven manually to be opened with respect to the base 1, the fixed mechanism 4 drives the moving arm 31 and the pushing part 32 to move upward, and the pushing part 32 is separated from the buffer 33, and the fourth connecting part 24 compresses the damping mechanism 5. When the fixed mechanism 4 is opened to a specific angle, the damping mechanism 5 restores its original position and abuts the fourth connecting part 24, and the moving arm 31 drives an end of the second connecting part 22 to rotate upward, so that the buffering part 102 is stretched to abut the other end of the second connecting part 22, and the resilience of the buffering part 102 is acted onto the fixed mechanism 4 and the cover 9 through the second connecting part 22 and the moving arm 31 to open the fixed mechanism 4 automatically, slowly and accordingly, so as to achieve the labor saving effect. Wherein, the first connecting part 21, the second connecting part 22, the third connecting part 23 and the fourth connecting part 24 come with a compact structure to reduce the volume of the labor-saving device and facilitate the fixed mechanism 4, the moving arm 31 and the pushing part 32 to be stretched and moved, so as to facilitate the buffer 33 to buffer the pushing part 32, while facilitating the buffer mechanism 10 and the damping mechanism 5 to buffer the connecting element 2 and storing energy to further achieve the labor saving effect.

[0030] In this exemplary embodiment, the damping mechanism 5 comprises a first holder 51 coupled to fourth connecting part 24, a second holder 52 installed at the base 1, and a spring 53 installed between the first holder 51 and the second holder 52, and the first holder 51 is slidably coupled to the second holder 52, and the spring 53 has an end abutting the first holder 51 and the other end abutting the second holder 52. The damping mechanism 5 has the features of simple structure, sensitive response, and stable and reliable operation to facilitate the damping mechanism 5 to compress or abut against the connecting element 2.

[0031] In this exemplary embodiment, the fourth connecting part 24 may add an adjusting assembly 7 for adjusting the damping mechanism 5 according to the actual required tightness of the damping mechanism 5 to provide different supporting or buffering forces, wherein the adjusting assembly 7 comprises an adjusting seat 71 installed at the fourth connecting part 24, a thread adjusting shaft 72 installed at the adjusting seat 71, and a thread adjusting member 73 coupled to the thread adjusting shaft 72 by a thread, and the thread adjusting member 73 is rotatably coupled to the first holder 51. The adjusting assembly 7 has the features of simple structure and convenient operation to facilitate adjusting the tightness of the damping mechanism 5.

[0032] In this exemplary embodiment, the labor-saving device may be applied in different types of furniture such as table, box, and door.

[0033] This embodiment further provides furniture with a labor-saving device, and the furniture comprises the labor-saving device and further comprises a box 8 and a cover 9 for opening or closing the box 8, wherein the base 1 is installed at the box 8, and the cover 9 is coupled to the fixed mechanism 4. Specifically, the cover 9 is coupled to the fastener 42. The furniture with the labor-saving device has the same technical characteristics and effects of the aforementioned labor-saving device, and thus will not be repeated. The technical characteristics of this embodiment may be combined freely according to actual needs.

[0034] While the present invention has been described by means of specific embodiments, numerous modifications and variations could be made thereto by those skilled in the art without departing from the scope and spirit of the present invention set forth in the claims.

Claims

1. A labor-saving device, comprising: a base (1); a connecting element (2), hinged to the base (1); a moving element (3) movably coupled to the connecting element (2); a fixed mechanism (4) rotatably coupled to the moving element (3), a damping mechanism (5) coupled to the connecting element (2), and a buffer mechanism (10) installed at the base (1), and the damping mechanism (5) being acted on the fixed mechanism (4) by the connecting element (2) and the moving element (3), and the buffer mechanism (10) being acted on the moving element (3) by the connecting element (2), and the buffer mechanism (10) comprising a buffer seat (101) installed at the base (1), a buffering part (102) installed at the buffer seat (101), and a buffer adjusting member (103) for adjusting the buffer force of the buffering part (102), and the buffering part (102) abutting the connecting element (2).
2. The labor-saving device of claim 1, wherein the fixed

- mechanism (4) comprises a housing (41) rotatably coupled to the moving element (3), a fastener (42) installed to the housing (41), and an opening/closing assembly (43) for limiting the fastener (42) at the housing (41); the housing (41) has a plug-in shaft (411), and the fastener (42) has a plug-in slot (421) formed at an end of the fastener (42) for accommodating the plug-in shaft (411).
3. The labor-saving device of claim 2, wherein the opening/closing assembly (43) comprises an opening/closing element (431) rotatably coupled to the housing (41) and an opening/closing torque spring (432) installed between the opening/closing element (431) and the housing (41), and an end of the opening/closing torque spring (432) abuts the opening/closing element (431), and the other end of the opening/closing torque spring (432) abuts the housing (41); the opening/closing element (431) includes a rotating portion (4311) rotatably coupled to the housing (41), a fastening portion (4312) coupled to the rotating portion (4311) and a pressing portion (4313) bent and extended from the fastening portion (4312), and a fastening slot (422) formed at the other end of the fastener (42) for accommodating the fastening portion (4312).
 4. The labor-saving device of claim 1, wherein the buffering part (102) is a buffer spring (53), and the buffer adjusting member (103) comprises a screw (1031) installed at the buffer seat (101) and a force tuning member (1032) coupled to the screw (1031) by a thread, and the buffer spring (53) is sheathed on the outer side of the screw (1031) and has an end abutting the force tuning member (1032) and the other end abutting the connecting element (2).
 5. The labor-saving device of claim 2, wherein the housing (41) includes a protecting element (6) rotatably coupled thereto for protecting the fastener (42), and the protecting element (6) includes a rotating member (61) rotatably coupled to the housing (41) for driving the protective torsion spring (62) to restore its original position and a limiter (63) rotatably coupled to the housing (41), and the rotating member (61) has an end for fastening the housing (41) and the other end for abutting the limiter (63).
 6. The labor-saving device of claim 2, wherein the moving element (3) comprises a moving arm (31) hinged with the housing (41) and the connecting element (2), a pushing part (32) installed at the moving arm (31), and a buffer (33) for buffering the pushing part (32), and the pushing part (32) has an end hinged with the housing (41) and the other end hinged with the connecting element (2), and the buffer (33) is installed at the moving arm (31).
 7. The labor-saving device of claim 6, wherein the connecting element (2) comprises a first connecting part (21), a second connecting part (22), a third connecting part (23) and a fourth connecting part (24), and the first connecting part (21) has an end hinged with the base (1), the middle hinged with the middle of the moving arm (31), and the other end hinged with the other end of the pushing part (32), and the second connecting part (22) has an end hinged with the base (1) and the other end hinged with an end of the moving arm (31) which is away from the housing (41), and the third connecting part (23) has an end hinged with the second connecting part (22) and the other end hinged with an end of the fourth connecting part (24), and the other end of the fourth connecting part (24) is hinged with the base (1), and an end of the damping mechanism (5) is coupled to the fourth connecting part (24), and an end of the second connecting part (22) proximate to the third connecting part (23) abuts an end of the buffering part (102) which is away from the buffer seat (101).
 8. The labor-saving device of claim 7, wherein the damping mechanism (5) comprises a first holder (51) coupled to the fourth connecting part (24), a second holder (52) installed at the base (1), and a spring (53) installed between the first holder (51) and the second holder (52), and the spring (53) has an end abutting the first holder (51) and the other end abutting the second holder (52).
 9. The labor-saving device of claim 8, wherein the fourth connecting part (24) comprises an adjusting assembly (7) installed thereto for adjusting the damping mechanism (5), and the adjusting assembly (7) comprises an adjusting seat (71) installed to the fourth connecting part (24), a thread adjusting shaft (72) installed to the adjusting seat (71), and a thread adjusting member (73) coupled to the thread adjusting shaft (72), and the thread adjusting member (73) is coupled to the first holder (51).
 10. A piece of furniture with a labor-saving device, comprising: the labor-saving device according to any one of claims 1 to 9, and further comprising a box (8) and a cover (9) for opening or closing the box (8), and the base (1) being installed to the box (8), and the cover (9) being coupled to the fixed mechanism (4).

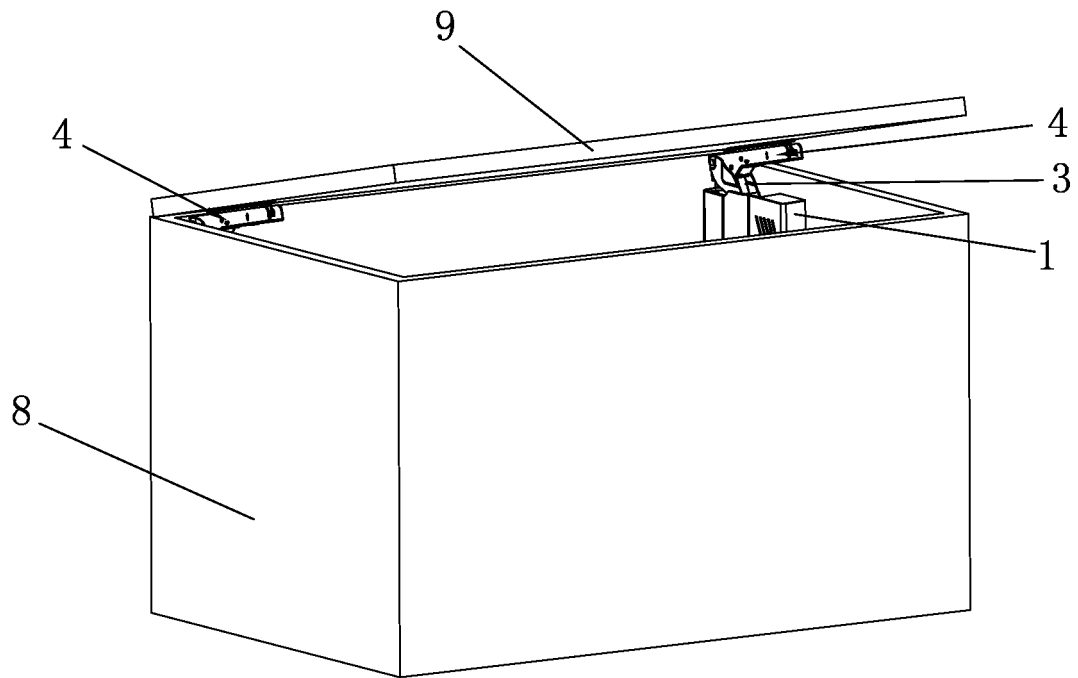


FIG.1

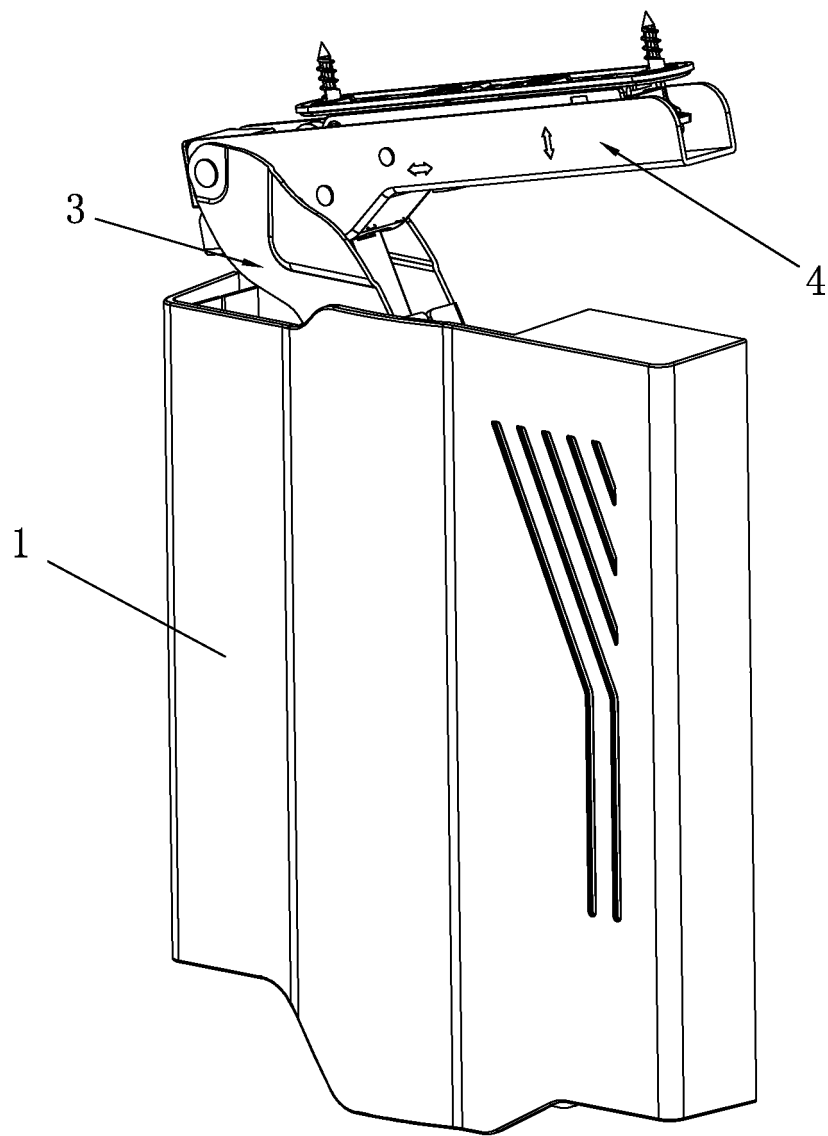


FIG.2

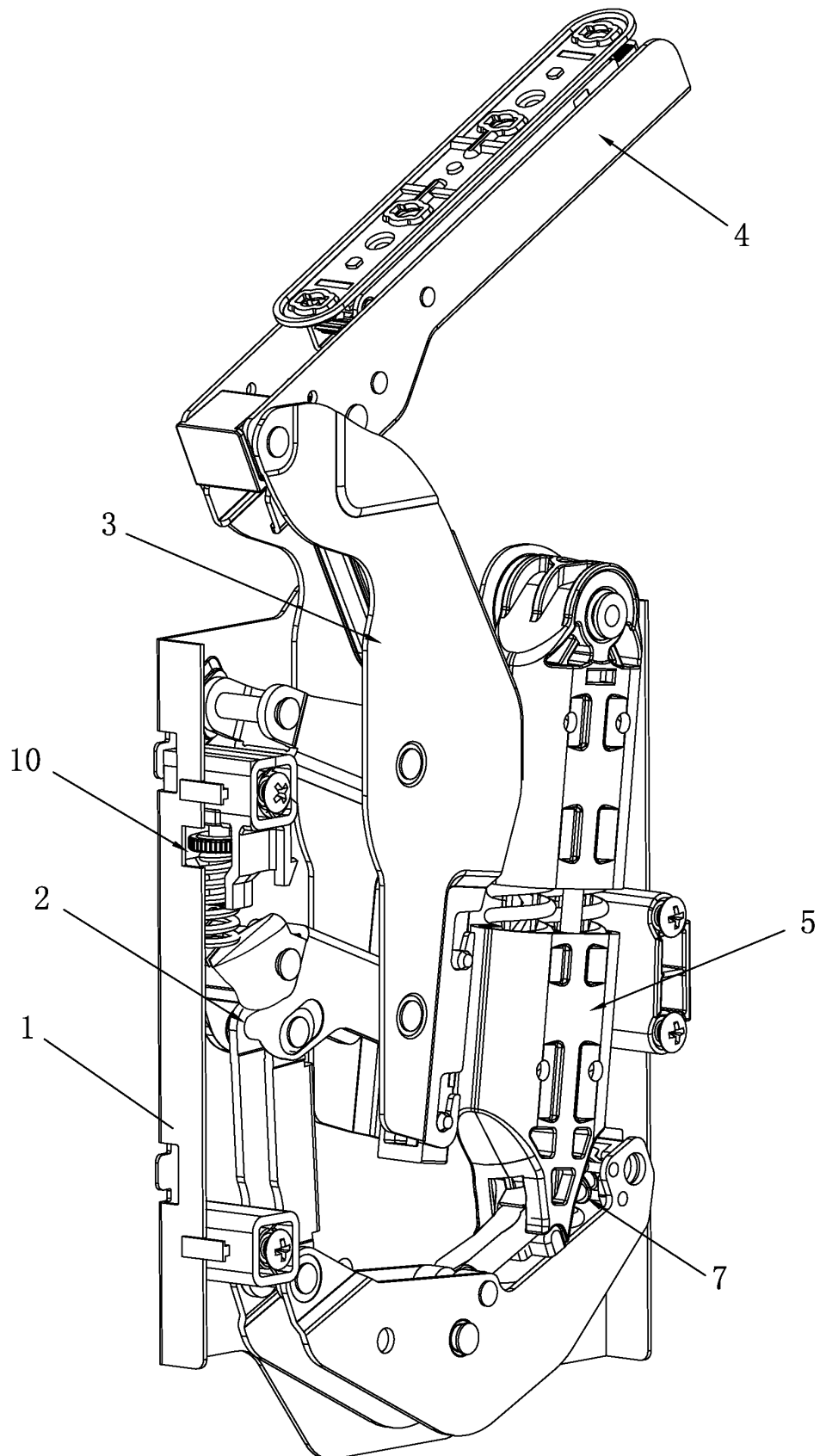


FIG.3

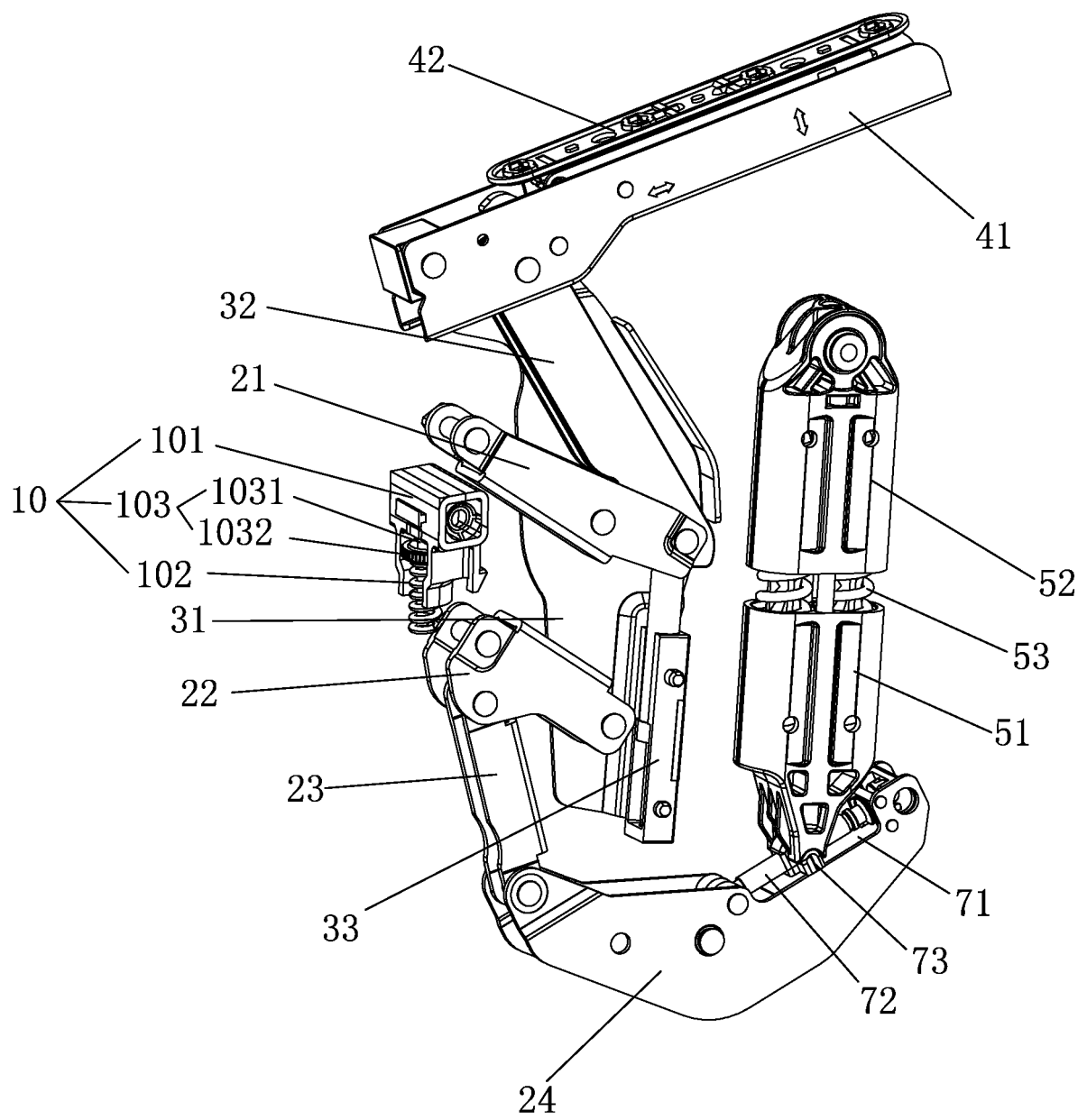


FIG.4

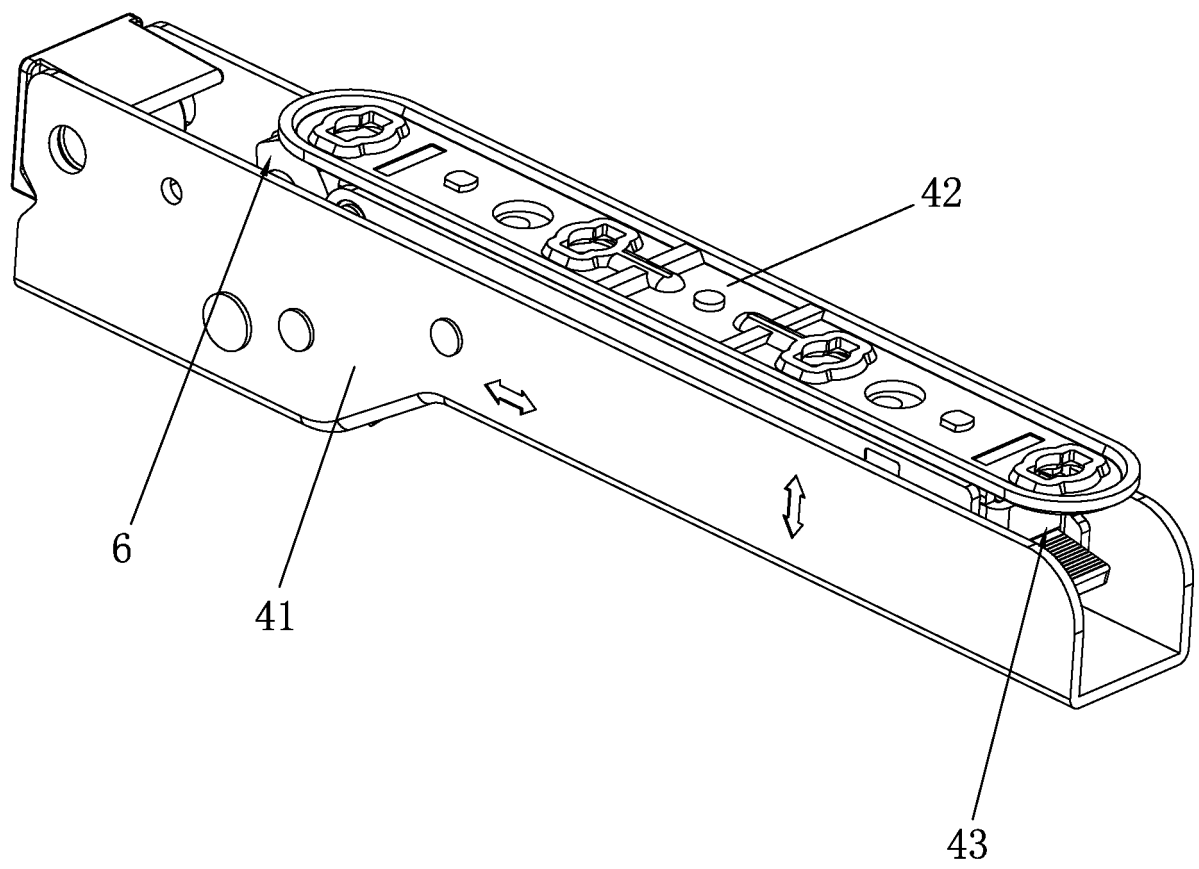


FIG.5

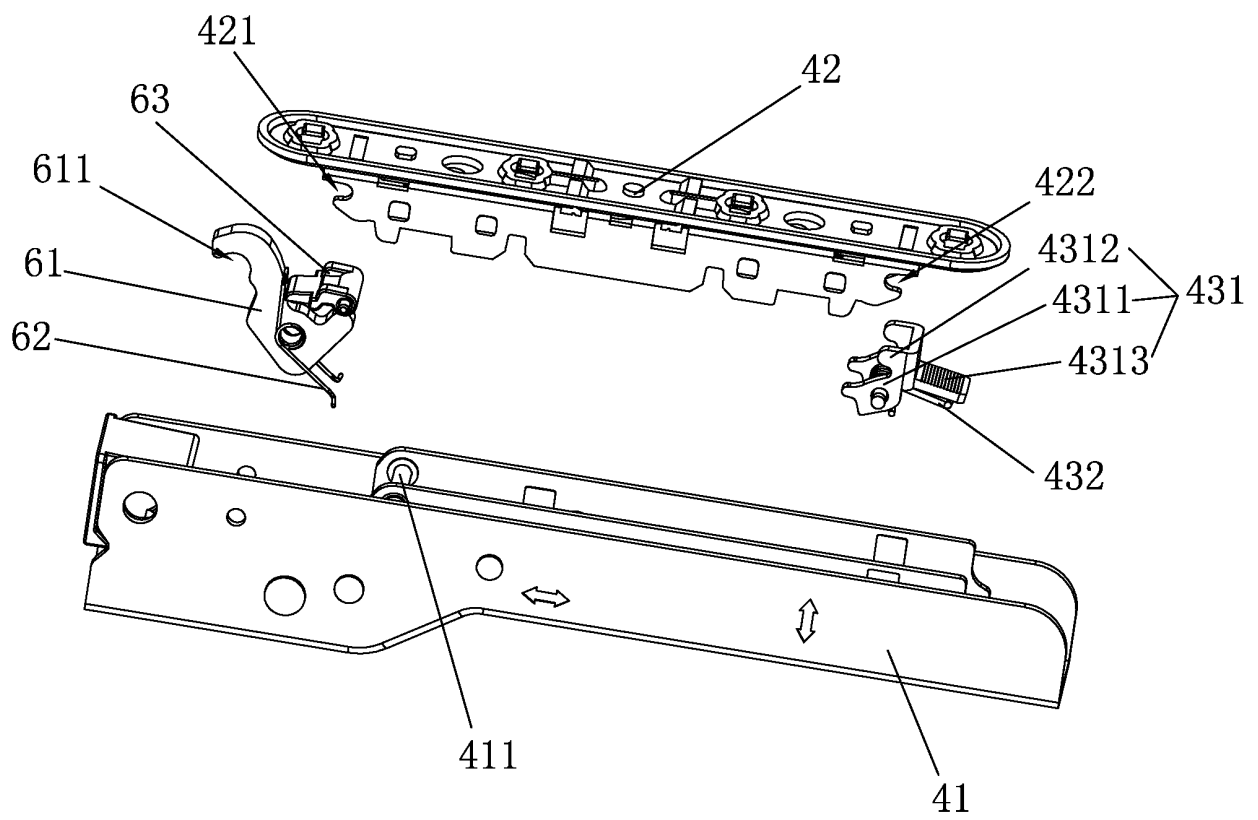
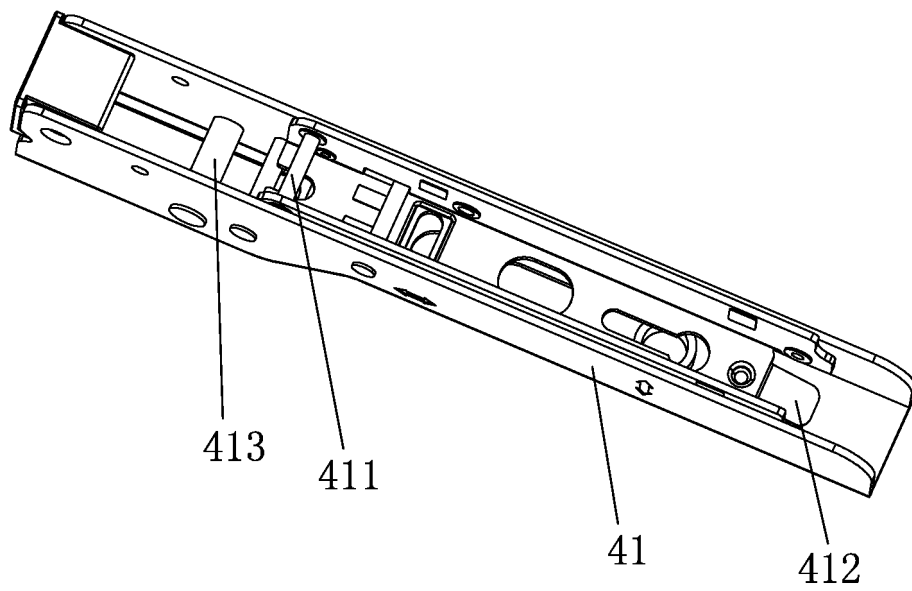


FIG.6



INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2018/096426

A. CLASSIFICATION OF SUBJECT MATTER E05D 5/02(2006.01)i; E05F 1/14(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) E05D; E05F Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched																		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WPI, EPODOC, CNPAT, CNKI; 省力, 缓冲, 阻尼, 阻力, 翻转, 开闭, 家具, 箱子, 柜子, decreas+, power+, cushion+, damp+, turn+, switch+, furnitur+, cabinet+																		
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>CN 207453728 U (DONGGUAN COOMO HOUSEHOLD GOODS MANUFACTURING CO., LTD.) 05 June 2018 (2018-06-05) description, paragraphs 0003-0045, and figures 1-7</td> <td>1-10</td> </tr> <tr> <td>Y</td> <td>CN 207453737 U (DONGGUAN COOMO HOUSEHOLD GOODS MANUFACTURING CO., LTD.) 05 June 2018 (2018-06-05) description, paragraphs 0003-0056, and figures 1-9</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>CN 201649929 U (HUO, TAIAN) 24 November 2010 (2010-11-24) entire document</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>CN 106223760 A (WU, ZHIYONG) 14 December 2016 (2016-12-14) entire document</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>US 4947516 A (WHIRLPOOL CORPORATION) 14 August 1990 (1990-08-14) entire document</td> <td>1-10</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	Y	CN 207453728 U (DONGGUAN COOMO HOUSEHOLD GOODS MANUFACTURING CO., LTD.) 05 June 2018 (2018-06-05) description, paragraphs 0003-0045, and figures 1-7	1-10	Y	CN 207453737 U (DONGGUAN COOMO HOUSEHOLD GOODS MANUFACTURING CO., LTD.) 05 June 2018 (2018-06-05) description, paragraphs 0003-0056, and figures 1-9	1-10	A	CN 201649929 U (HUO, TAIAN) 24 November 2010 (2010-11-24) entire document	1-10	A	CN 106223760 A (WU, ZHIYONG) 14 December 2016 (2016-12-14) entire document	1-10	A	US 4947516 A (WHIRLPOOL CORPORATION) 14 August 1990 (1990-08-14) entire document	1-10
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.																		
<table border="1"> <tr> <td data-bbox="256 1626 810 1910"> * Special categories of cited documents: “A” document defining the general state of the art which is not considered to be of particular relevance “E” earlier application or patent but published on or after the international filing date “L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) “O” document referring to an oral disclosure, use, exhibition or other means “P” document published prior to the international filing date but later than the priority date claimed </td> <td data-bbox="810 1626 1359 1910"> “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 </td> </tr> <tr> <td data-bbox="256 1626 810 1720"> Date of the actual completion of the international search 15 February 2019 </td> <td data-bbox="810 1626 1359 1720"> Date of mailing of the international search report 11 March 2019 </td> </tr> <tr> <td data-bbox="256 1720 810 1910"> Name and mailing address of the ISA/CN State Intellectual Property Office of the P. R. China (ISA/CN) No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088 China Facsimile No. (86-10)62019451 </td> <td data-bbox="810 1720 1359 1910"> Authorized officer Telephone No. </td> </tr> </table>	* Special categories of cited documents: “A” document defining the general state of the art which is not considered to be of particular relevance “E” earlier application or patent but published on or after the international filing date “L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) “O” document referring to an oral disclosure, use, exhibition or other means “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 15 February 2019	Date of mailing of the international search report 11 March 2019	Name and mailing address of the ISA/CN State Intellectual Property Office of the P. R. China (ISA/CN) No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088 China Facsimile No. (86-10)62019451	Authorized officer Telephone No.												
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2018/096426

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Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
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CN	207453737	U	05 June 2018	None	
CN	201649929	U	24 November 2010	None	
CN	106223760	A	14 December 2016	CN 106223760 B	13 October 2017
US	4947516	A	14 August 1990	None	

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