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(54) EFFORT-SAVING ADJUSTABLE MECHANISM FOR UPTURNING AND SUPPORTING OF FURNITURE

(57) The present invention relates to household articles, and more particularly to an adjustable effort-saving mechanism for furniture flip-up support. The adjustable effort-saving mechanism comprises a base (1), a fixing member (2), a first link (3), a connecting assembly (4), and an elastic assembly (5). One end of the first link (3) is hinged to one end of the fixing member (2), and another end of the first link (3) is hinged to one end of the connecting assembly (4). Another end of the connecting assembly (4) is hinged to the base (1). One end of the elastic assembly (5) is hinged to the base (1), and another end of the elastic assembly (5) is hinged to the connecting assembly (4). The elastic assembly (5) provides the user with assistance in opening and closing the furniture, thereby enabling the user to open and close the furniture in an effort-saving manner.

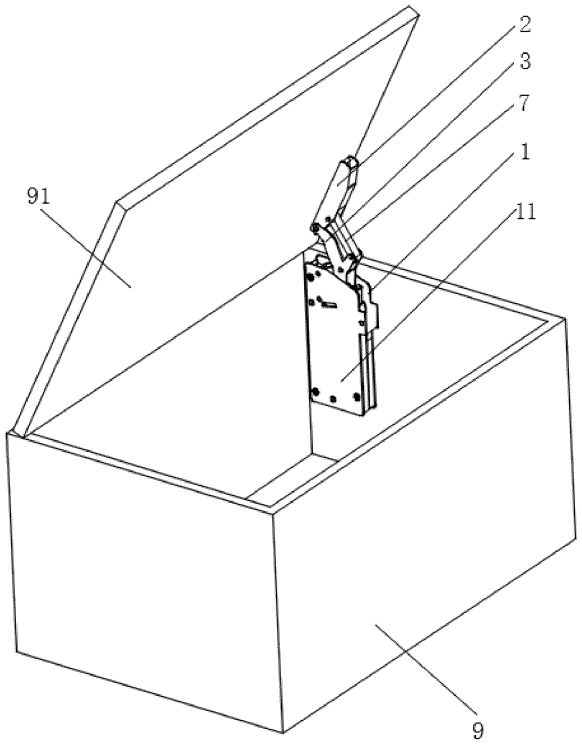

FIG. 1

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to household articles, and more particularly to an adjustable effort-saving mechanism for furniture flip-up support.

BACKGROUND OF THE INVENTION

[0002] Boxes, cabinets, etc. are essential household articles for every family. These household articles can be opened and closed. The user needs to pull a cover or cabinet door for opening or closing the household articles. However, it is laborious to open and close the existing furniture, and the use is inconvenient.

SUMMARY OF THE INVENTION

[0003] The technical problem to be solved by the present invention is to provide an adjustable effort-saving mechanism for furniture flip-up support, which enables the user to open and close the furniture in an effort-saving manner so that it is more convenient to use the furniture.

[0004] In order to solve the above technical problem, the present invention adopts the following technical solutions:

[0005] An adjustable effort-saving mechanism for furniture flip-up support comprises a base, a fixing member, a first link, a connecting assembly, and an elastic assembly. One end of the first link is hinged to one end of the fixing member, and another end of the first link is hinged to one end of the connecting assembly. Another end of the connecting assembly is hinged to the base. One end of the elastic assembly is hinged to the base, and another end of the elastic assembly is hinged to the connecting assembly.

[0006] Preferably, the adjustable effort-saving mechanism further comprises a second link and a third link. One end of the second link is hinged to the base, and another end of the second link is hinged to one end of the third link. A middle portion of the second link is hinged to a middle portion of the first link. Another end of the third link is hinged to the fixing member.

[0007] Preferably, the adjustable effort-saving mechanism further comprises a buffer assembly. The buffer assembly includes a buffer elastic member. One end of the buffer elastic member is fixed to the base, and another end of the buffer elastic member is configured to be in contact with the other end of the second link.

[0008] Preferably, the connecting assembly includes a fourth link, a screw rotatably connected to the fourth link, and a slider threadedly connected to the screw. The other end of the elastic assembly is hinged to the slider. One end of the fourth link is hinged to the other end of the first link, and another end of the fourth link is hinged to the base.

[0009] Preferably, the slider is provided with a boss having a circular cross section. The other end of the elastic assembly is recessed to form a recess for accommodating the boss.

[0010] Preferably, the fourth link includes a first clamping portion and a second clamping portion. The first clamping portion and the second clamping portion are configured to clamp the other end of the elastic assembly. The first clamping portion is provided with a slide slot. The boss is slidably connected to the slide slot. The slide slot and the screw are disposed obliquely and parallel to each other.

[0011] Preferably, the fourth link includes a first limit post and a second limit post. The screw includes a screw rod and a screw head connected to the screw rod. One end of the screw rod, away from the screw head, passes between the first limit post and the second limit post and is threadedly connected to the slider. The screw head is in contact with the first limit post and the second limit post. The fourth link is formed with a screw hole for the screw head to be exposed outside the fourth link.

[0012] Preferably, the elastic assembly includes a spring, a connecting block, a connecting seat hinged to the base, and a guide post inserted inside the spring. One end of the spring and one end of the guide post are connected to the connecting seat. Another end of the spring is connected to one end of the connecting block. Another end of the connecting block is hinged to the connecting assembly.

[0013] Preferably, the adjustable effort-saving mechanism further comprises a cover plate that is detachably connected to the base. The connecting assembly and the elastic assembly are disposed between the cover plate and the base.

[0014] The beneficial effect of the invention is that the elastic assembly provides the user with assistance in opening and closing the furniture, thereby enabling the user to open and close the furniture in an effort-saving manner so that the furniture can be used more easily.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

FIG. 1 is a perspective view of the present invention;

FIG. 2 is a front view of the effort-saving mechanism of the present invention when the cover plate is removed;

FIG. 3 is a perspective view of the connecting assembly and the elastic assembly of the present invention;

FIG. 4 is an exploded view of the elastic assembly of the present invention; and

FIG. 5 is an exploded view of the connecting assembly of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] In order to understand the present invention, embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings. The following embodiments are intended to illustrate the present invention but are not intended to limit the scope of the present invention.

[0017] As shown in FIG. 1 and FIG. 2, an adjustable effort-saving mechanism for furniture flip-up support comprises a base 1, a fixing member 2, a first link 3, a connecting assembly 4, and an elastic assembly 5. One end of the first link 3 is hinged to one end of the fixing member 2, and another end of the first link 3 is hinged to one end of the connecting assembly 4. Another end of the connecting assembly 4 is hinged to the base 1. One end of the elastic assembly 5 is hinged to the base 1, and another end of the elastic assembly 5 is hinged to the connecting assembly 4.

[0018] With the direction shown in FIG. 2 as the reference direction, when the furniture is in a closed state, the fixing member 2 is parallel to the horizontal plane, and the elastic assembly 5 is in a compressed state. In the process of opening the furniture, the fixing member 2 gradually rotates with the rotating axle when the furniture is opened and closed as a central axis. The fixing member 2 drives the connecting assembly 4 to rotate through the first link 3. The elastic assembly 5 is driven by the connecting assembly 4 to turn clockwise and gradually recover the elastic deformation. The elastic potential energy of the elastic assembly 5 provides an upward force to the connecting assembly 4, the first link 3 and the fixing member 2, thereby enabling the user to open the furniture upwards in an effort-saving manner. The operation is time-saving and effort-saving. This embodiment can achieve the effect of automatically maintaining the furniture at a certain opening angle. Since the elastic potential energy is gradually reduced in the process of restoring the deformation of the elastic assembly 5, if the elastic assembly 5 cannot turn, that is, when the angle between the elastic assembly 5 and the connecting assembly 4 cannot be changed, the force in the vertical direction provided by the elastic assembly 5 to the connecting assembly 4, the first link 3 and the fixing member 2 is gradually reduced. Thus, the cover 91, the connecting assembly 4, the first link 3 and the fixing member 2 are automatically turned down under the influence of gravity. However, in this embodiment, when the furniture is opened, the elastic assembly 5 is driven by the connecting assembly 4 to turn, and the elastic assembly 5 approaches a position perpendicular to the horizontal plane at a position inclined with respect to the horizontal plane, and the force provided by the elastic assembly 5 to the other parts is divided into a horizontal component and a vertical component. It can be seen that during the movement of the elastic assembly 5, the vertical component provided by the elastic assembly 5 is gradually increased. Since the elastic potential energy of the elastic assembly 5 is gradually reduced (that is, the total force provided by the elastic assembly 5 to the other parts is gradually reduced), the force in the vertical direction provided by the elastic assembly 5 to the connecting assembly 4, the first link 3 and the fixing member 2 is unchanged. The force in the vertical direction provided by the elastic assembly 5 to the connecting assembly 4, the first link 3 and the fixing member 2 is equal to the sum of the gravity of the connecting assembly 4, the first link 3, the fixing member 2, and the cover 91 of the furniture. Therefore, it can be ensured that the connecting assembly 4, the first link 3 and the fixing member 2 are not automatically turned down under the influence of gravity, that is, when the user opens the cover 91 to a set angle, the cover 91 of the furniture can be automatically kept at the opening angle. Specifically, when the opening angle is greater than 20°, the cover 91 will stay at any angle. When the opening angle is less than or equal to 20°, the cover 91 will be slowly closed.

[0019] As shown in FIG. 1 and FIG. 2, the effort-saving mechanism further includes a second link 6 and a third link 7. One end of the second link 6 is hinged to the base 1, and another end of the second link 6 is hinged to one end of the third link 7. A middle portion of the second link 6 is hinged to a middle portion of the first link 3. Another end of the third link 7 is hinged to the fixing member 2, so that the first link 3 and the fixing member 2 can be turned more stably.

[0020] As shown in FIG. 2, the effort-saving mechanism further includes a buffer assembly 8. The buffer assembly 8 includes a buffer elastic member 81. One end of the buffer elastic member 81 is fixed to the base 1, and another end of the buffer elastic member 81 is configured to be in contact with the other end of the second link 6. When the furniture is closed, the buffer elastic member 81 abuts against the second link 6 to provide a buffering effect, thereby preventing great impact when the furniture is closed and reducing the sound when the furniture is closed. Preferably, the buffer elastic member 81 is a damper.

[0021] As shown in FIG. 3, the connecting assembly 4 includes a fourth link 41, a screw 42 rotatably connected to the fourth link 41, and a slider 43 threadedly connected to the screw 42. The other end of the elastic assembly 5 is hinged to the slider 43. One end of the fourth link 41 is hinged to the other end of the first link 3, and another end of the fourth link 41 is hinged to the base 1. When the furniture uses the cover 91 of a different material or size, the gravity of the cover 91 will be different. The user can move the slider 43 by screwing the screw 42 to adjust the initial angle of the elastic assembly 5 with respect to the connecting assembly 4, that is, the force provided by the elastic assembly 5 to the connecting assembly 4, the first link 3 and the fixing member 2 is adjusted, thereby ensuring that the force in the vertical direction provided by the elastic assembly 5 to the connecting assembly 4, the first link 3 and the fixing member 2 is equal to the

sum of the gravity of the connecting assembly 4, the first link 3, the fixing member 2, and the cover 91 of the furniture. In addition, the screw 42 and the slider 43 are integrated in the fourth link 41. On the one hand, it is convenient to adjust the output force of the elastic assembly 5 acting on the connecting assembly 4. On the other hand, it saves the use of spare parts, reduces the size of the effort-saving mechanism, and reduces the space occupied by furniture. The power storage device of the conventional effort-saving mechanism needs an additional link for the output force to act on the connecting assembly 4. The structure of the effort-saving mechanism of the present invention is simple, the manufacturing cost is reduced, the space occupied by the furniture is reduced, and it is convenient for strength adjustment.

[0022] As shown in FIGS. 3-5, the slider 43 is provided with a boss 431 having a circular cross section. The other end of the elastic assembly 5 is recessed to form a recess 51 for accommodating the boss 431. The slider 43 is hinged to the other end of the elastic member 5 through the boss 431 and the recess 51. The structure is simple and practical and easy to assemble.

[0023] As shown in FIG. 3 and FIG. 5, the fourth link 41 includes a first clamping portion 411 and a second clamping portion 412. The first clamping portion 411 and the second clamping portion 412 are configured to clamp the other end of the elastic assembly 5. The first clamping portion 411 is provided with a slide slot 4111. The boss 431 is slidably connected to the slide slot 4111. The slide slot 4111 and the screw 42 are disposed obliquely and parallel to each other. The side wall of the slide slot 4111 is in contact with the boss 431 to confine the boss 431, so that the first clamping portion 411 and the second clamping portion 412 can confine the elastic assembly 5, and it is ensured that the boss 431 and the elastic member 5 move along an immovable trajectory.

[0024] As shown in FIG. 3 and FIG. 5, the fourth link 41 includes a first limit post 413 and a second limit post 414. The screw 42 includes a screw rod 421 and a screw head 422 connected to the screw rod 421. One end of the screw rod 421, away from the screw head 422, passes between the first limit post 413 and the second limit post 414 and is threadedly connected to the slider 43. The screw head 422 is in contact with the first limit post 413 and the second limit post 414. The fourth link 41 is formed with a screw hole 415 for the screw head 422 to be exposed outside the fourth link 41. The first limit post 413 and the second limit post 414 are configured to limit the screw 42 to ensure that the screw 42 can rotate and that the screw 42 does not shift by itself. The structure is simple and practical. The screw hole 415 facilitates the user to rotate the screw 42.

[0025] As shown in FIG. 4, the elastic assembly 5 includes a spring 52, a connecting block 53, a connecting seat 54 hinged to the base 1, and a guide post 55 inserted inside the spring 52. One end of the spring 52 and one end of the guide post 55 are connected to the connecting seat 54. Another end of the spring 52 is connected to one end of the connecting block 53. Another end of the connecting block 53 is hinged to the connecting assembly 4. The spring 52 may bend itself during use, making it difficult to apply force to the connecting assembly 4. In this embodiment, the spring 52 is subject to the guide post 55, which can ensure that the power storage elasticity is in a linear state during use, and the elastic force is applied to the connecting assembly 4 stably.

[0026] As shown in FIG. 1, the effort-saving mechanism further includes a cover plate 11 that is detachably connected to the base 1. The connecting assembly 4 and the elastic assembly 5 are disposed between the cover plate 11 and the base 1, thereby reducing dust entering the connecting assembly 4 and the elastic assembly 5. When there are objects, such as clothes that are easily hooked, in the furniture, the cover plate 11 can also prevent the connecting assembly 4 and the elastic member 5 from hooking the objects.

[0027] Because the furniture uses the cover 91 of a different material or size, the gravity of the cover 91 will be different. Therefore, the user needs to adjust the output force of the elastic assembly 5 acting on the connecting assembly 4 according to the cover 91 of a different material or size. If it is required to reduce the output force of the elastic assembly 5 acting on the connecting assembly 4, the user may use a tool to screw the screw 42 via the screw hole 415. Since the screw 42 is threadedly connected to the slider 43, the rotating screw 42 causes the slider 43 to slide downward obliquely along the screw rod 421. The boss 431 of the slider 43 that slides downward obliquely slides in the slide slot 4111 to push the connecting block 53 downward obliquely. The connecting block 53 that slides downward obliquely causes the entire elastic assembly 5 to rotate clockwise by a set angle. At the same time, the fourth link 41 swings downward, so that the side wall of the slide slot 4111 of the fourth link 41 always abuts against the boss 431 of the slider 43, ensuring that the output force of the elastic assembly 5 can always act on the connecting assembly 4. Since the elastic assembly 5 rotates clockwise by a set angle, the force in the vertical direction provided by the elastic assembly 5 to the connecting assembly 4, the first link 3, and the fixing member 2 is gradually reduced. Therefore, the output force of the elastic assembly 5 acting on the connecting assembly 4 is reduced, so that the output force of the elastic assembly 5 acting on the connecting assembly 4 is adjusted. The adjustment is convenient, and the operation is simple.

[0028] The present invention can adjust the torque to change the torsion, so as to achieve a torsion balance with the cover 91, thereby providing an effort-saving effect.

[0029] Although particular embodiments of the present invention have been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the present invention. Accordingly, the present invention is not to be limited except as by the appended claims.

Claims

1. An adjustable effort-saving mechanism for furniture flip-up support, comprising a base (1), a fixing member (2), a first link (3), a connecting assembly (4), and an elastic assembly (5); one end of the first link (3) being hinged to one end of the fixing member (2), another end of the first link (3) being hinged to one end of the connecting assembly (4); another end of the connecting assembly (4) being hinged to the base (1); one end of the elastic assembly (5) being hinged to the base (1), another end of the elastic assembly (5) being hinged to the connecting assembly (4).

2. The adjustable effort-saving mechanism as claimed in claim 1, further comprising a second link (6) and a third link (7), wherein one end of the second link (6) is hinged to the base (1), another end of the second link (6) is hinged to one end of the third link (7), a middle portion of the second link (6) is hinged to a middle portion of the first link (3), and another end of the third link (7) is hinged to the fixing member (2).

3. The adjustable effort-saving mechanism as claimed in claim 2, further comprising a buffer assembly (8), wherein the buffer assembly (8) includes a buffer elastic member (81), one end of the buffer elastic member (81) is fixed to the base (1), and another end of the buffer elastic member (81) is configured to be in contact with the other end of the second link (6).

4. The adjustable effort-saving mechanism as claimed in claim 1, wherein the connecting assembly (4) includes a fourth link (41), a screw (42) rotatably connected to the fourth link (41), and a slider (43) threadedly connected to the screw (42), the other end of the elastic assembly (5) is hinged to the slider (43), one end of the fourth link (41) is hinged to the other end of the first link (3), and another end of the fourth link (41) is hinged to the base (1).

5. The adjustable effort-saving mechanism as claimed in claim 4, wherein the slider (43) is provided with a boss (431) having a circular cross section, and the other end of the elastic assembly (5) is recessed to form a recess (51) for accommodating the boss (431).

6. The adjustable effort-saving mechanism as claimed in claim 5, wherein the fourth link (41) includes a first clamping portion (411) and a second clamping portion (412), the first clamping portion (411) and the second clamping portion (412) are configured to clamp the other end of the elastic assembly (5), the first clamping portion (411) is provided with a slide slot (4111), the boss (431) is slidably connected to the slide slot (4111), the slide slot (4111) and the screw (42) are disposed obliquely and parallel to each other.

7. The adjustable effort-saving mechanism as claimed in claim 4, wherein the fourth link (41) includes a first limit post (413) and a second limit post (414), the screw (42) includes a screw rod (421) and a screw head (422) connected to the screw rod (421), one end of the screw rod (421), away from the screw head (422), passes between the first limit post (413) and the second limit post (414) and is threadedly connected to the slider (43), the screw head (422) is in contact with the first limit post (413) and the second limit post (414); and the fourth link (41) is formed with a screw hole (415) for the screw head (422) to be exposed outside the fourth link (41).

8. The adjustable effort-saving mechanism as claimed in claim 1, wherein the elastic assembly (5) includes a spring (52), a connecting block (53), a connecting seat (54) hinged to the base (1), and a guide post (55) inserted inside the spring (52); one end of the spring (52) and one end of the guide post (55) are connected to the connecting seat (54), another end of the spring (52) is connected to one end of the connecting block (53), and another end of the connecting block (53) is hinged to the connecting assembly (4).

9. The adjustable effort-saving mechanism as claimed in claim 1, further comprising a cover plate (11) that is detachably connected to the base (1), wherein the connecting assembly (4) and the elastic assembly (5) are disposed between the cover plate (11) and the base (1).

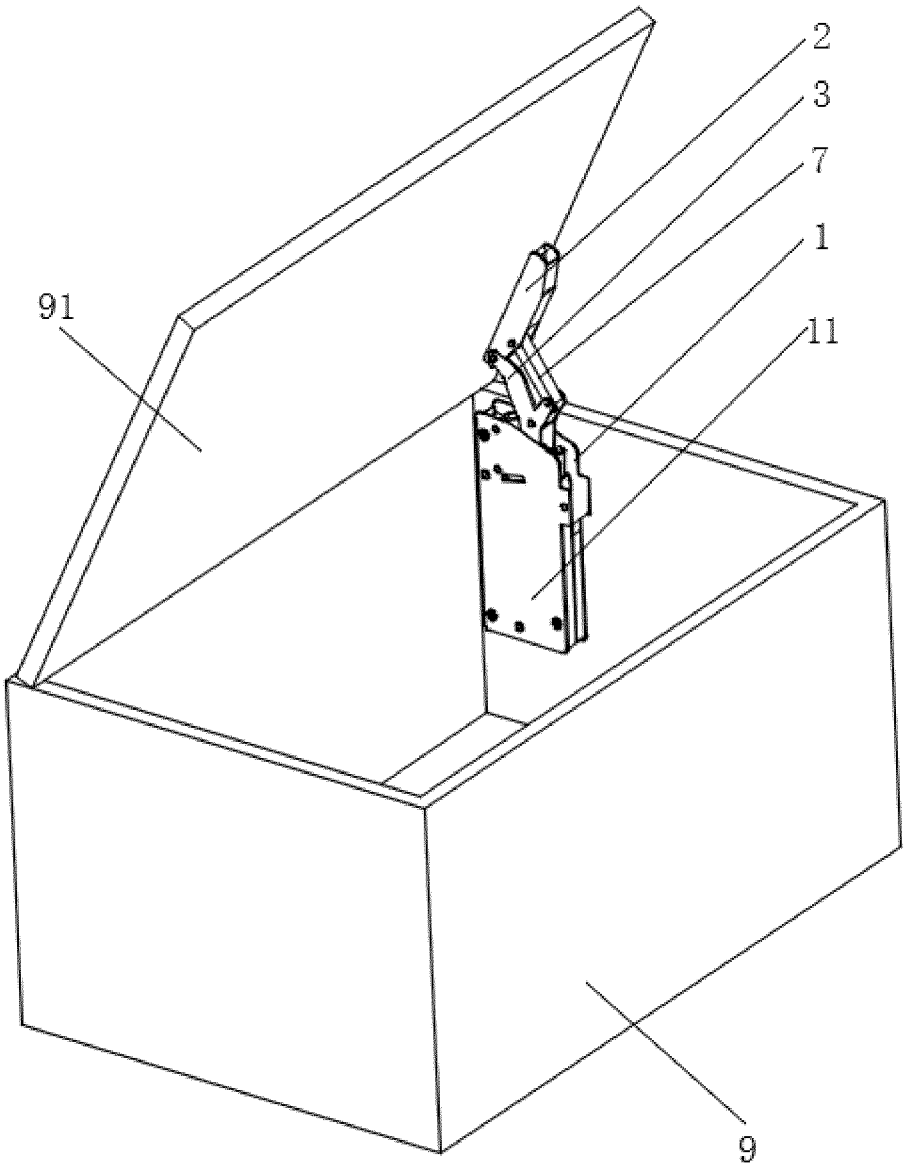

FIG. 1

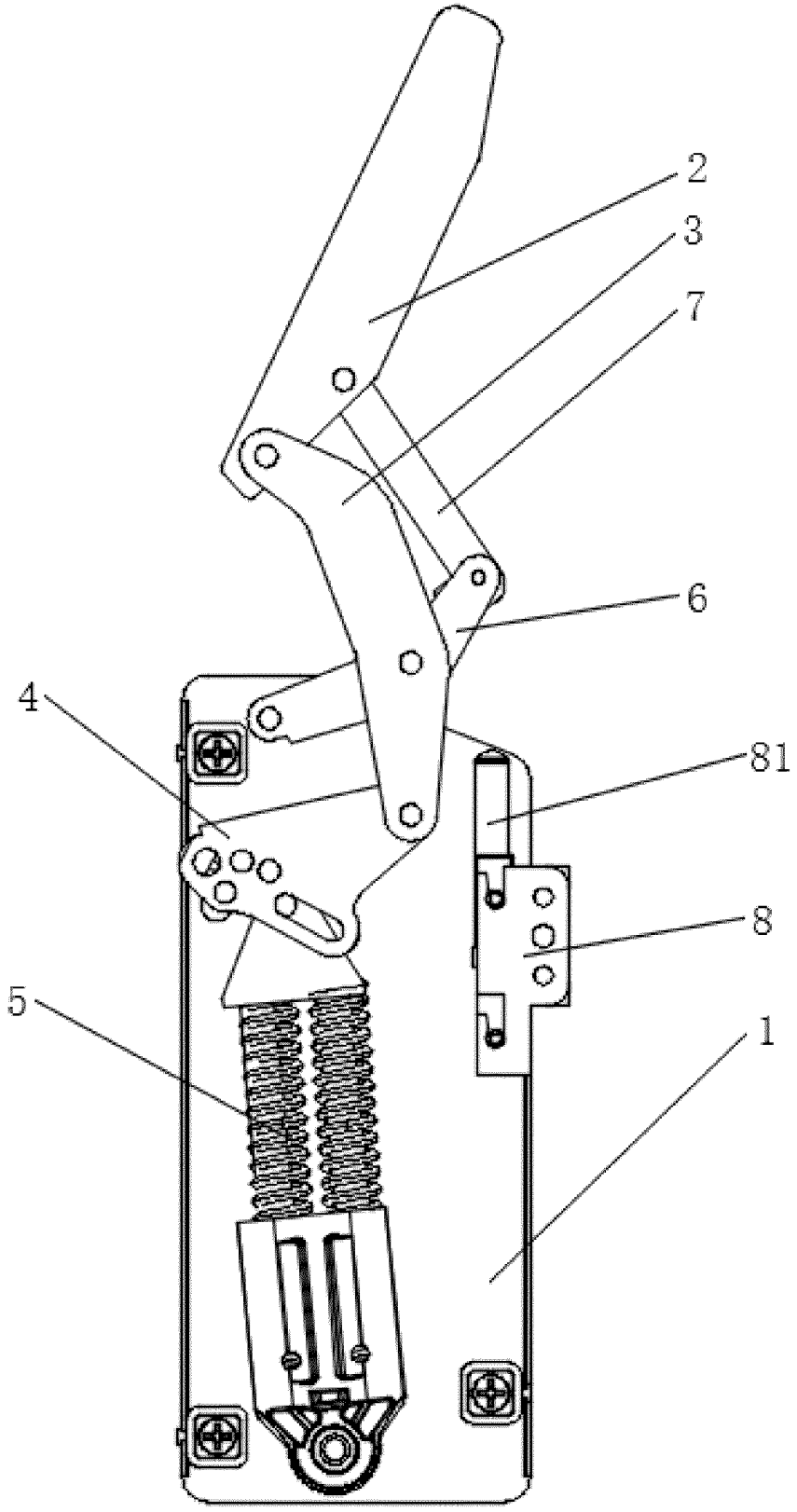

FIG. 2

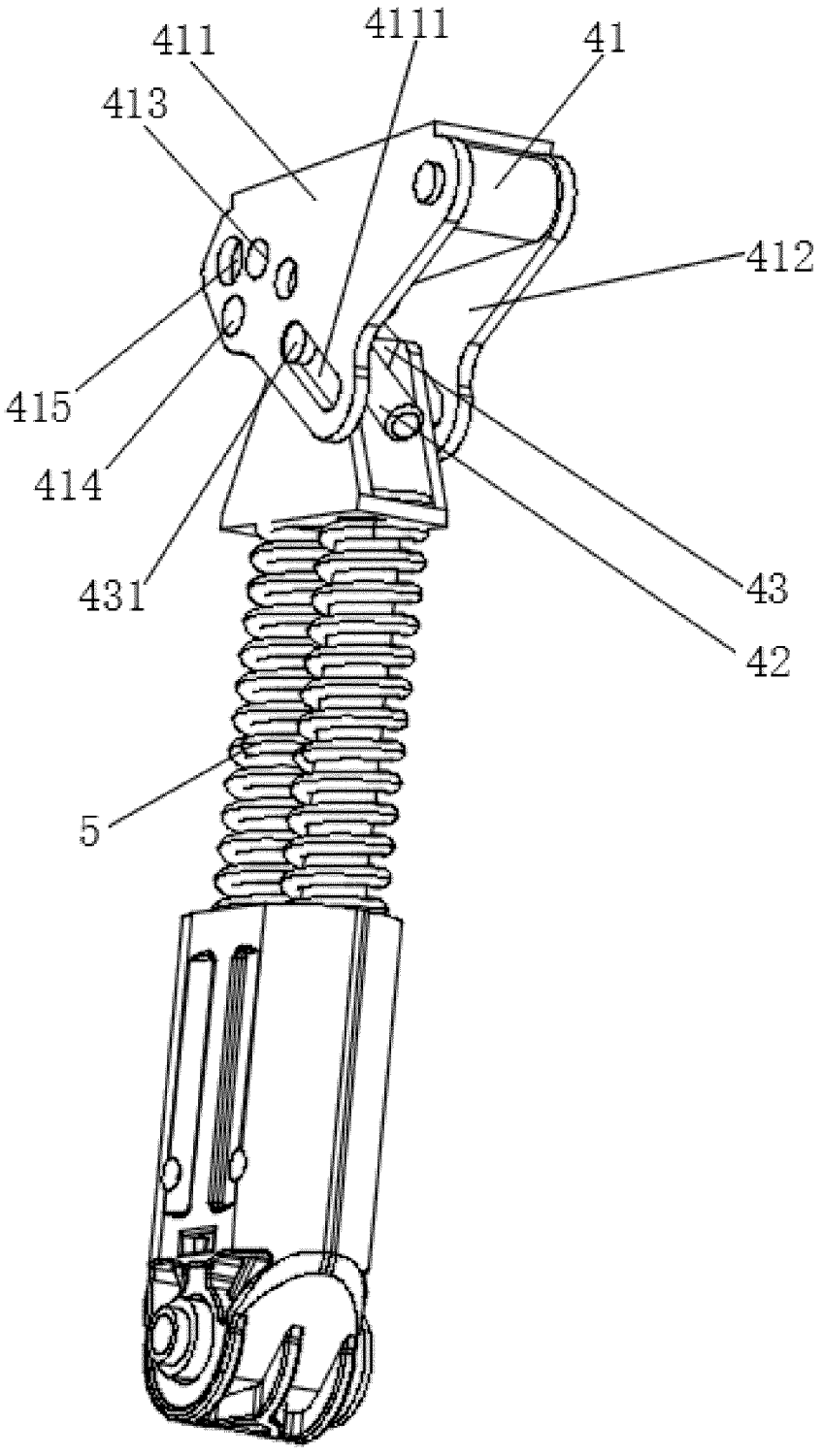

FIG. 3

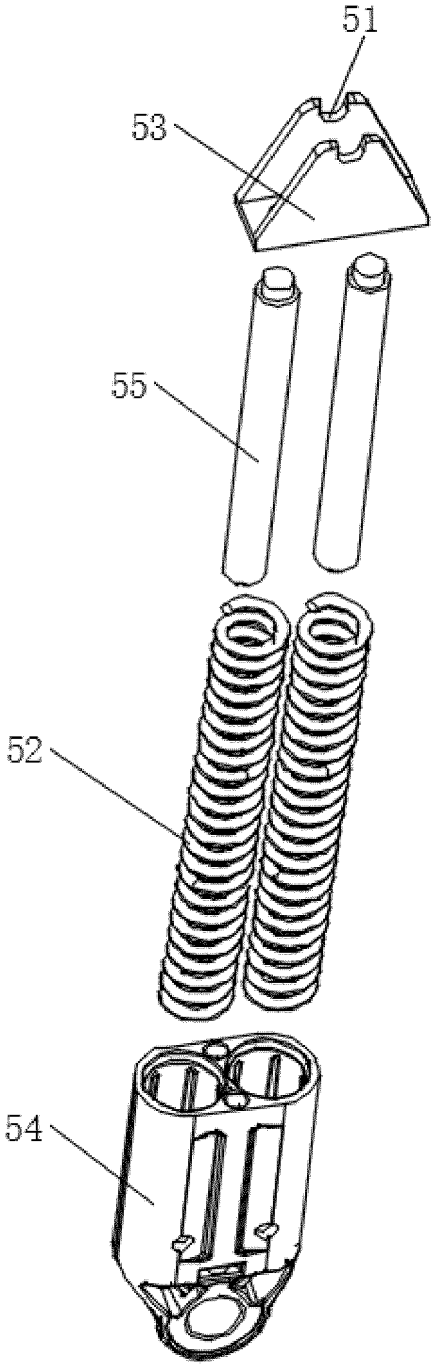

FIG. 4

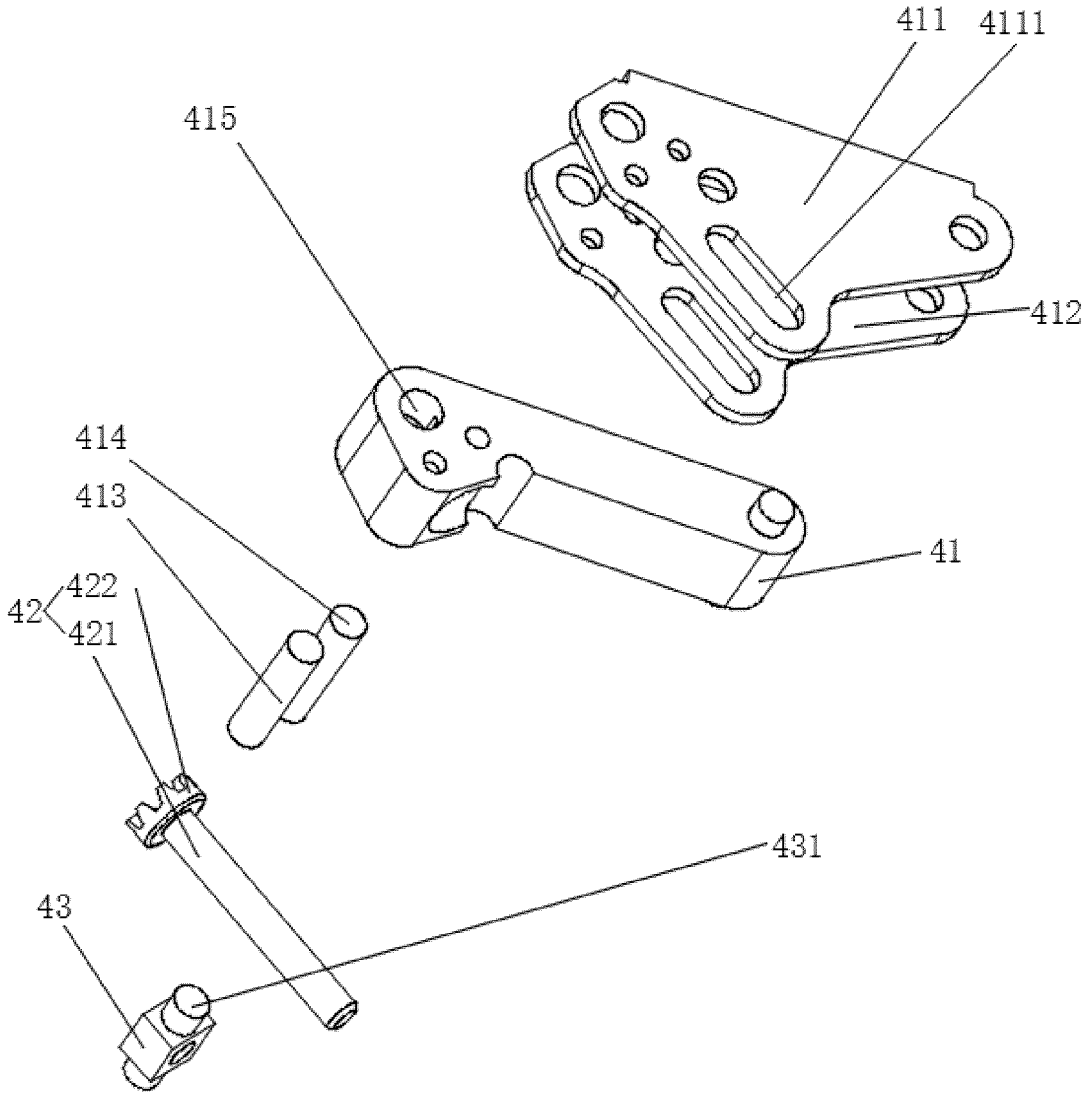

FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER

E05C 17/00(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)

E05C, 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)

EPODOC, DWPI, CNABS, CNTXT, CNKI: 铰链, 家具, 助力, 省力, 上翻, 连杆, 连接臂, 基座, 安装座, 弹簧, 铰接, hinge, furniture, cabinet, upturn, effort, saving, boost, connect, base, arm, link+, mount, spring, hinged, pivot

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 110284785 A (DONGGUAN COOMO HOUSEHOLD GOODS MANUFACTURING CO., LTD.) 27 September 2019 (2019-09-27) claims 1-9, and figures 1-5	1-9
A	CN 109779434 A (GUANGDONG SACA PRECISION MANUFACTURING CO., LTD.) 21 May 2019 (2019-05-21) entire document	1-9
A	CN 207761481 U (DONGGUAN COOMO HOUSEHOLD GOODS MANUFACTURING CO., LTD.) 24 August 2018 (2018-08-24) entire document	1-9
A	CN 207499672 U (GUANGDONG KUBO PRECISION TECH CO., LTD.) 15 June 2018 (2018-06-15) entire document	1-9
A	CN 208441673 U (DONGGUAN COOMO HOUSEHOLD GOODS MANUFACTURING CO., LTD.) 29 January 2019 (2019-01-29) entire document	1-9

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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Date of the actual completion of the international search	Date of mailing of the international search report
24 February 2020	**28 February 2020**

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China National Intellectual Property Administration (ISA/CN) **No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088** **China**	
Facsimile No. **(86-10)62019451**	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2019/110922

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	CN 105201317 A (WU, Zhiyong) 30 December 2015 (2015-12-30) entire document	1-9
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2019/110922

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 110284785 A	27 September 2019	None	
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CN 207499672 U	15 June 2018	None	
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