



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
29.09.2010 Bulletin 2010/39

(51) Int Cl.:
A47B 88/16 (2006.01)

(21) Application number: **09703286.6**

(86) International application number:
PCT/CN2009/000061

(22) Date of filing: **16.01.2009**

(87) International publication number:
WO 2009/092290 (30.07.2009 Gazette 2009/31)

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL
PT RO SE SI SK TR
Designated Extension States:
AL BA RS

(72) Inventor: **YANG, Jui-Lien**
Songshan District
Taipei City
Taiwan (CN)

(30) Priority: **18.01.2008 CN 200820003089 U**

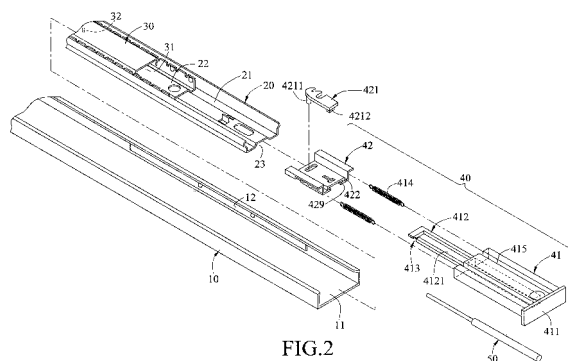
(74) Representative: **Viering, Jentschura & Partner**
Grillparzerstrasse 14
81675 München (DE)

(71) Applicant: **Ulike Corporation**
Sijhih City, Taipei County, Taiwan (CN)

(54) **SLIDE RAIL STRUCTURE**

(57) A rail assembly includes an outer rail, a middle rail, an inner rail, and a restoring unit. The outer rail has an outer rail space, the middle rail slides in the outer rail space, the inner rail slides in a middle rail space, and a receiving space is disposed at a bottom of the middle rail. The restoring unit is assembled on one end of the outer rail space, and includes: a fixing part, disposed in the outer rail space, such that one end of the outer rail is made into a closed end; a sliding track, disposed on one end of the fixing part and located in the outer rail space; a buckling track, disposed on the sliding track; a buckling slot, disposed on the buckling track; a moving part, sliding along the sliding track; a buckling part, disposed on the moving part; a guiding part, disposed on the inner rail and temporarily snapped with the buckling part; and at least one elastic part, disposed between the fixing part and the moving part. When the inner rail slides in the outer rail space, one end of the buckling part passes through the moving part and slides along the buckling track, and the other end of the buckling part is snapped with the guiding part disposed on the inner rail, such that the moving part is temporarily fixed on the sliding track. The sliding track is pivoted in the receiving space at the bottom of the middle rail. In this manner, the inner rail is not obstructed by the sliding track when sliding in the outer rail space. Through the open-type sliding track, the moving part slides in the outer rail space, thereby increasing a restoring stroke of the moving part and a sliding scope of the middle rail. Therefore, a length of the middle rail is increased, and two receiving slots in the outer rail

space are respectively disposed on two sides of the fixing part and the moving part. Thus, when sliding in the outer rail space, the inner rail spans across the receiving slot and reaches the closed end of the outer rail, such that the length of the inner rail is the same as that of the outer rail, thereby increasing an overall telescoped length and a loading force of the rail assembly.



Description

Field of Invention

[0001] The present invention relates to a rail assembly, in particular, to a rail assembly having a larger restoring stroke.

Related Art

[0002] Recently, as for common drawers and keyboard drawers etc., in order to be conveniently pulled and restored, a rail assembly configured with inner, middle, and outer rails is assembled. The rail assembly is fastened on a bookshelf or a bottom of a desk by using the outer rail, and the inner rail thereof is assembled with an outer side edge of the drawer and the keyboard drawer. Thus, on the basis of the outer rail fastened on the book shelf and the desk, the drawer and the keyboard drawer can be easily pulled and restored by using steel balls accommodated between each two of the middle, inner, and outer rails.

[0003] In the structure of the prior art, in order to provide positioning and automatically restoring effects when the middle and inner rails are accommodated in the outer rail, a restoring unit is generally disposed at a bottom of the outer rail to achieve the above effects. However, the restoring unit further needs to occupy a certain length space at the bottom of the outer rail, and thus, in order to cater to the space occupied by the restoring unit, the lengths of the middle and inner rails must be shorter than that of the outer rail; otherwise, the middle and inner rails cannot be totally accommodated in the outer rail. As the lengths of the middle and inner rails must be shorter than that of the outer rail, when the outer, middle, and inner rails in the structure of the prior art are totally telescope, the total length thereof is inevitably smaller than a desirable telescoped length. The so-called desirable telescoped length is three times of the length of the outer rail. If the actual telescoped length approaches the desirable telescoped length, the telescope ratio is preferred. Thus, the better extending effect can be obtained simply by using a smaller length, without shortening the lengths of the middle rail and the inner rail to sacrifice the strength of the middle rail. As for a rail assembly with a buffer mechanism, the middle rail is configured into a recessed shape on one end contacting with the buffer mechanism, so as to accommodate the buffer mechanism to increase the length of the middle rail. Such a rail assembly achieves desirable extending effects with a longer telescoped length and a higher strength, which further realizes the maximum extending effect and a higher utility among slide rails.

[0004] As for a rail assembly in the prior art, referring to FIG. 1, a rail assembly 9 mainly comprises: an outer rail 90, a middle rail 91, an inner rail 92, a sliding track 93, and a buffer 94. The outer rail 90 has a U-shaped cross section, and the outer rail 90 is enclosed with a

sliding space 903 by using a stopping block 901 and a fixing base 902 for sealing two opening ends thereof. Due to being limited by the sliding track 93, the middle rail 91 is opened with a notch 910. The inner rail 92 is accommodated in the sliding space 903 and freely slides with respect to the outer rail 90, and is disposed with a hooking part 920 on one end of the inner rail 92 corresponding to the fixing base 902. The sliding track 93 is fixed on the fixing base 902 and accommodated in the sliding space 903 between the inner rail 92 and the fixing base 902, such the sliding track 93 is a closed track, and when the middle rail 91 slides, the sliding track 93 is accommodated in the notch 910. The sliding track 93 and the hooking part 920 of the inner rail 92 forms a linking relation with a preset distance there-between through a positioning part 930 disposed on the sliding track 93 (i.e. the sliding stroke of the positioning part 930 is limited by the closed sliding track 93). The buffer 94 is disposed on the fixing base 902.

[0005] A notch 910 is opened on one end of the middle rail 91 in the prior art, which results in sacrificing the length and the structure of the middle rail 91, and it is rather inconvenient in usage. Furthermore, the inner rail 92 does not have an additional matching design, such that the inner rail 92 cannot be effectively extended or shrunk. Therefore, the rail assembly 9 in the prior art still has the defect of a poor extending length.

[0006] From another aspect, although the rail assembly 9 in the prior art has the automatically restoring and buffering effects, the buffer 94 is disposed at the bottom end of the outer rail 90, and the buffer 94 usually has an air chamber, in which the air chamber is pressed by using a push rod, so as to obtain a counteraction force, thereby providing a buffering effect. The buffer 94 itself and the push rod have certain lengths, so as to occupy a part of the length of the outer rail 90. When the inner rail 92 automatically restores, it needs to indirectly push the buffer 94 to achieve the buffering effect, so that the length of the inner rail 92 is restricted, and thus the telescoped length of the main body is also limited, and such design of the prior art is not practical.

[0007] Furthermore, considering the total design of the rail assembly, in addition to the overall telescoped length, the size adaptability for the restoring unit and the outer rail is also another point to be considered. Generally, the restoring unit takes an inner wall of the outer rail as a track, such that the restoring unit must be matched with an inner diameter and a width of the outer rail; otherwise, the restoring unit cannot move along the outer rail. In this manner, in order to match with the outer rails with different sizes, the restoring units with different sizes must be designed, which is rather inconvenient in terms of storage and manufacturing. In view that the overall telescoped length and the size adaptability of the rail assembly cannot be considered at the same time, the applicant(s) of the present invention proposes the present invention through making research and modification, and intends to eliminate the defects in the prior art through the struc-

ture of the present invention.

SUMMARY OF THE INVENTION

[0008] Accordingly, the present invention is a rail assembly, which has a desirable overall telescoped length ratio of a rail assembly, stable structure, and strong size adaptability.

[0009] Other objectives and efficacies of the present invention can be further understood from the technical features of the present invention.

[0010] In order to achieve the above objective, the present invention adopts the technical solution as follows. A rail assembly is provided, which comprises an outer rail, a middle rail, an inner rail, and a restoring unit. The outer rail has an outer rail space for accommodating the middle rail, the inner rail, and the restoring unit. The middle rail extends in the outer rail space, and has a middle rail space capable of accommodating the inner rail. The inner rail is accommodated in the middle rail, and extends in the middle rail space. The restoring unit is assembled on one end of the outer rail space, and comprises: a fixing part, disposed in the outer rail space, such that one end of the outer rail space is made into a closed end; a sliding track, disposed on one end of the fixing part, and disposed in a receiving space at a bottom of the middle rail; a moving part, disposed in the outer rail space and sliding along the sliding track, in which the moving part slides in the outer rail space through the sliding track; a buckling part, disposed on the moving part; at least one elastic part, disposed between the fixing part and the moving part; a guiding part, disposed on the inner rail; wherein as the receiving space is disposed at the bottom of the middle rail, when the inner rail slides in the outer rail space, the middle rail extends over the sliding track to increase a sliding scope of the middle rail and increase a length of the middle rail. In the outer rail space, two receiving slots are respectively disposed on two sides of the fixing part and the moving part, in which when the inner rail extends in the outer rail space, the inner rail extends through the receiving slots and reaches the closed end of the outer rail, such that a length of the inner rail is the same as that of the outer rail.

[0011] As compared with the prior art, in the restoring unit of the rail assembly of the present invention, the sliding track is disposed on the fixing part, such that the moving part is not required to match with a width of an inner wall of the outer rail. Thus, the restoring units in one specification can be matched with the outer rails with various sizes in usage, so it is helpful for eliminating the troubles on the storage and manufacturing, to lower the stock, and to reduce the manufacturing cost. The sliding track corresponds to the receiving space of the middle rail, such that the middle rail is not obstructed by the sliding track and effectively extends into the outer rail space and close to the end of the outer rail space. Furthermore, with the receiving slots designed on the restoring unit, the inner rail can also be shrunk to the end of the outer rail

space. The outer rail has better accommodation features, so that the lengths of the middle rail and the inner rail can be increased. Thus, when the structure of the present invention is telescoped, it has a better total length, and the overall telescope ratio is increased. In the present invention, a buffer part is further disposed, and the buffer part and the restoring unit may be disposed on the same end or different ends of the outer rail. Through the buffering function provided by the buffer part, a shrinking speed of the elastic part may be tempered. The sliding track is disposed in the receiving space at the bottom of the middle rail, so the length of the restoring unit may be appropriately reduced, so as to increase the sliding scope of the middle rail. Thus, a longer middle rail may be adopted, such that the main body has a better overall telescoped length. Therefore, the present invention has utility and a creative step, which is worthy of being promoted in the industry and popularized among the masses in the society.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The present invention will become more fully understood from the detailed description given herein below for illustration only, which thus is not limitative of the present invention, and wherein:

FIG. 1 is a schematic view of a structure in the prior art;

FIG. 2 is a schematic exploded view of a first embodiment of the present invention;

FIG. 3 is a schematic combined view of the first embodiment of the present invention;

FIGs. 4 and 5 are schematic views of using states according to the first embodiment of the present invention;

FIG. 6 is a schematic exploded view of a second embodiment of the present invention;

FIGs. 7A to 7C are schematic views of using states according to the second embodiment of the present invention;

FIG. 8 is a schematic exploded view of a third embodiment of the present invention;

FIG. 9 is a schematic three-dimensional view of a moving part according to the third embodiment of the present invention;

FIGs. 10 to 13 are schematic views of using states according to the third embodiment of the present invention;

FIG. 14 is a schematic exploded view of a fourth embodiment of the present invention;

FIG. 15 is a schematic exploded view of a fifth embodiment of the present invention;

FIG. 16 is a schematic exploded view of a sixth embodiment of the present invention;

FIG. 17 is a schematic combined view of the sixth embodiment of the present invention;

FIG. 18 is a schematic exploded top view of a seventh embodiment of the present invention;

FIG. 19 is a schematic exploded bottom view of the seventh embodiment of the present invention;

FIG. 20 is a schematic combined view of the seventh embodiment of the present invention; and

FIGs. 21 to 23 are schematic views of using states according to the seventh embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0013] FIGs. 2 and 3 are respectively a schematic exploded view and a schematic combined view of a first embodiment of the present invention. Referring to FIGs. 2 and 3, a rail assembly according to the first embodiment of the present invention comprises an outer rail 10, a middle rail 20, an inner rail 30, a restoring unit 40, and a buffer part 50. Some of the structural elements and actuation manners are known in the prior art, and are not taken as the subject matters of the present invention, so that the actuation principles thereof are not described in detail, but the present invention is not limited hereby.

[0014] The outer rail 10 is approximately configured into a recessed elongated structure, and has an outer rail space 11 therein. A ball set 12 is disposed in the outer rail space 11, and the middle rail 20, the inner rail 30 and the restoring unit 40 are assembled in the outer rail space 11. The middle rail 20 and the outer rail 10 are in a sliding combined state through the ball set 12.

[0015] The middle rail 20 is also approximately configured into a recessed elongated structure, and the width of the middle rail 20 is slightly smaller than that of the ball set 12, such that the middle rail 20 is accommodated in the ball set 12, the middle rail 20 and the outer rail 10 are in a sliding combined state, and the middle rail 20 slides in the outer rail space 11. The middle rail 20 has a middle rail space 21. Another ball set 22 is disposed in the middle rail space 21, and the inner rail 30 is assembled in the middle rail space 21, so that the inner rail 30 and the middle rail 20 are in a sliding combined state through the ball set 22. A receiving space 23 is disposed at a bottom of the middle rail 20.

[0016] The inner rail 30 has an inner rail space 31. The inner rail 30 is also approximately configured into a recessed elongated structure, but the recessed direction thereof is opposite to that of the outer rail 10 and the middle rail 20. The width of the inner rail 30 is slightly smaller than that of the ball set 22 in the middle rail space 21, such that the inner rail 30 is accommodated in the ball set 22. The inner rail 30 and the middle rail 20 are in a sliding combined state, and the inner rail 30 slides in the middle rail space 21.

[0017] The restoring unit 40 is assembled on one end of the outer rail 10, and comprises a fixing part 41, a sliding track 412, two elastic parts 414, a moving part 42, and a guiding part 32. The fixing part 41 is fixed in the outer rail space 11 of the outer rail 10, and forms a stopping edge 411 at one end of the fixing part 41, so as to seal one end of the outer rail space 11. The sliding track 412 is protruded from the open-end of the fixing part 41 opposite to the stopping edge 411, that is, the sliding track 412 in this embodiment is connected to the fixing part 41. Definitely, the sliding track 412 may also be formed on the outer rail 10, and particularly, the sliding track 412 in other embodiments may be alternatively configured (not shown) on the outer rail 10. The elastic part 414 is respectively disposed on two sides of the fixing part 41, and the elastic part 414 is connected to the moving part 42, so as to provide a resilient force for restoring the moving part 42.

[0018] The sliding track 412 is provided for assembling the moving part 42, and enables the moving part 42 to slide along the sliding track 412 in the open end of the outer rail space 11. A buckling track 4121 is disposed on the sliding track 412, and a buckling slot 413 (or a connecting mechanism) is formed on a front end of the buckling track 4121, and thus the moving part 42 is temporarily fixed on a front end of the sliding track 412 through the buckling slot 413. The width of the sliding track 412 is smaller than that of the receiving space 23 of the middle rail 20, such that the sliding track 412 corresponds to the receiving space 23, and thus, the middle rail 20 is not obstructed by the sliding track 412 when sliding in the outer rail space 11.

[0019] Through the configuration manner of the open-type sliding track 412, the moving part 42 is enabled to slide in the outer rail space 11, so as to increase a restoring stroke of the moving part 42, enlarge a sliding scope of the middle rail 20, and increase a length of the middle rail and the overall telescoped length of the rail assembly.

[0020] Referring to FIGs. 2 and 3, a buckling part 421 is disposed on the moving part 42. The buckling part 421 is assembled on the moving part 42 in a pivoting manner. Two snapping columns 4211 and 4212 are disposed on a bottom end of the buckling part 421, and a guiding part 32 is disposed on an inner side of the inner rail 30 and adopts a protruding rod structure, so as to be engaged with the buckling part 421. Referring to FIG. 6, when the inner rail 30 and the moving part 42 are stacked, the

guiding part 32 is engaged with the buckling part 421 to generate a snapping unit, such that the inner rail 30 is temporarily combined with the moving part 42, and the snapping columns 4211 and 4212 of the buckling part 421 are engaged with the buckling track 4121 disposed on the sliding track 412, so as to enhance the stability.

[0021] When the moving part 42 is stretched outwards, the snapping column 4211 on the bottom end of the buckling part 421 slides into the buckling slot 413 at the front end of the buckling track 4121, so as to fix the moving part 42 on the front end of the sliding track 412. The inner rail 30 is separated from the buckling part 421 and is pulled out. On the contrary, when the inner rail 30 is pushed inwards, the guiding part 32 of the inner rail 30 contacts with the buckling part 421, and pushes the snapping column 4211 on the bottom end of the buckling part 421 out of the buckling slot 413, such that the moving part 42 and the inner rail 30 are combined and restored. In the outer rail space, two receiving slots 415 and 422 are respectively disposed on two sides of the fixing part 41 and the moving part 42, the two receiving slots 415 and 422 correspond to the inner rail 30, and the wall surface of the inner slide rail 30 extends through the two receiving slots 415 and 422, such that the inner rail 30 reaches the closed end of the outer rail space 11 without being obstructed, so as to increase the sliding scope of the inner rail 30 in the outer rail space 11 and increase the overall telescoped length and loading force of the rail assembly. Meanwhile, the elastic part 414 is just located on two outer sides of the receiving slots 415 and 422, so as not to obstruct the moving motion of the inner rail 30.

[0022] The buffer part 50 is fixed on one end of the outer rail 10. In this embodiment, referring to FIG. 2, the buffer part 50 is a gas lift, which has one end fixed on the fixing part 41 and the other end contacting with the moving part 42 and supported against by the moving part 42, so as to provide a buffering effect for the moving part 42. The buffer part 50 may be replaced by other elements with a damping coefficient or capable of providing a buffering effect.

[0023] FIGs. 4 and 5 are schematic views of using states according to the first embodiment of the present invention. Referring to FIGs. 4 and 5, when the middle rail 20 and the inner rail 30 are accommodated in the outer rail space 11 of the outer rail 10, the receiving space 23 of the middle rail 20 corresponds to the sliding track 412, such that the middle rail 20 effectively telescope to the end of the outer rail 10 without being obstructed by the sliding track 412, and the inner rail 30 successfully telescoped to the end of the outer rail 10 through the receiving slots 415 and 422. In this case, the inner rail 30 is buckled with the buckling part 421 of the moving part 42 through the guiding part 32 and is temporarily combined with the moving part 42. Thus, when the inner rail 30 is pulled outwards, the moving part 42 is pulled out along the sliding track 412, and the moving part 42 is temporarily fixed on the front end of the sliding track 412 through the buckling slot 413 on the front end of the

buckling track 4121. In the present invention, both the middle rail 20 and the inner rail 30 can effectively telescope to the end of the outer rail 10 or even totally extend into the end of the outer rail 10. Therefore, the middle rail 20 and the inner rail 30 may have longer lengths, so as to increase the overall telescoped length of the rail assembly, thereby improving the shrinking and extending ratio.

[0024] Referring to FIGs. 4 and 5, when it intends to telescope the middle rail 20 and the inner rail 30, the middle rail 20 firstly stops against the moving part 42 of the restoring unit 40. Then, when the inner rail 30 and the moving part 42 are stacked, the guiding part 32 and the buckling part 421 are jointed with each other, so that the inner rail 30 is temporarily combined with the moving part 42, and the inner rail 30 further drives the moving part 42 to release from the buckling slot 413 (not shown) on the front end of the buckling track 4121. When the moving part 42 is released from the buckling slot 413 of the buckling track 4121, the moving part 42 is pulled by the elastic part 414, and slides towards the end of the outer rail space 11 of the outer rail 10, and automatically restores. At this time, the buffering function provided by the buffer part 50 tempers the shrinking speed of the elastic part 414, such that the moving part 42 and the inner rail 30 move and restore towards the end direction of the outer rail 10 at a tempered speed, so as to avoid collisions caused by an excessive force. In this manner, as the moving part 42 is pulled by the elastic part 414, the inner rail 30 and the middle rail 20 telescope to the end of the outer rail space 11, so as to form a shrunk state for being used next time, in which the shrunk state is shown in FIG. 4.

[0025] Although the rail assembly according to the embodiment of the present invention is not shown, the middle rail 20 may be omitted, and instead of the rail assembly is formed by the inner rail 30 and the outer rail 10. Similarly, through the receiving slots 415 and 422 in the outer rail space 11 respectively disposed on two sides of the fixing part 41 and the moving part 42, the inner rail 30 extends into the end of the outer rail space 11 when being accommodated and restoring. Thus, different configurations can be provided, such that the rail assembly has a better overall telescoped length.

[0026] FIG. 6 is a schematic exploded view of a second embodiment of the present invention. Referring to FIG. 6, the second embodiment and the first embodiment of the present invention are substantially the same in terms of the structure, so merely the differences there-between are described as follows.

[0027] Referring to FIG. 6, the rail assembly according to the second embodiment of the present invention has a buffer unit, which comprises a buffer part 50 and a blocking part 52 (or a corresponding mechanism). The buffer part 50 is fixed in the receiving space 23 at the bottom of the middle rail 20, that is, the buffer part 50 is located on the other end of the outer rail 10. In this embodiment, the buffer part 50 is configured as a gas lift,

but it is not limited to a gas lift, and may be any other element having a damping coefficient or capable of providing a buffering effect. Furthermore, the blocking part 52 is a blocking sheet disposed on the front end of the sliding track 412, and the blocking part 52 corresponds to the buffer part 50. In this manner, when the inner rail 30 interacts with the moving part 42 for restoring, the buffer part 50 is blocked by the blocking part 52 and provides the buffering effect. In addition, the buffer part 50 may also be disposed in the middle rail 20 and the inner rail space 31, and the blocking part 52 (not shown) is disposed in the inner rail space 31. When the inner rail 30 interacts with the moving part 42 for restoring, the buffer part 50 supports against the blocking part 52, so as to provide the buffering effect.

[0028] Referring to FIGs. 7A and 7C, when the inner rail 30 is pushed to restore, the guiding part 32 located on the inner side of the inner rail 30 is engaged with the buckling part 421, and forces the buckling part 421 to release from a buckling state with the buckling slot 413. In this case, both the inner rail 30 and the moving part 42 are dramatically pulled by the elastic part 414 under a shrinking state, and the buffer part 50 bears against the blocking part 52, such that the buffer part 50 provides the buffering effect for the moving part 42.

[0029] Furthermore, due the buffer part 50 in this embodiment is disposed in the receiving space 23 at the bottom of the middle rail 20, so that the restoring unit 40 can appropriately reduce the length, so as to increase the sliding scope of the middle rail 20. Thus, a middle rail 20 with a larger length may be adopted, so that the rail assembly has a better overall telescoped length.

[0030] In the first embodiment, the moving part 42 may be a metal part, and the buckling part 421 on the moving part 42 may be a plastic part. In the second embodiment, the moving part 42 and the buckling part 421 may be both plastic parts. Since the moving part 42 is made of different materials in the two embodiments, the appearance of the moving part 42 shown in FIG. 2 is slightly different from that shown in FIG. 6, but the basic structure and functions thereof are the same in the two embodiments. Meanwhile, in the following different embodiments, the basic structure and functions of the moving part 42 are also equivalent to that of the moving part 42 of the first and second embodiments, which does not affect the essence of the present invention.

[0031] FIG. 8 is a schematic exploded view of a third embodiment of the present invention. Referring to FIG. 8, the rail assembly according to the third embodiment of the present invention comprises an outer rail 10, a middle rail 20, an inner rail 30, and a restoring unit 40. The outer rail 10 has an outer rail space 11, and the outer rail space 11 is provided for accommodating the middle rail 20, the inner rail 30, and the restoring unit 40. The middle rail 20 slides in the outer rail space 11, and has a middle rail space 21 for accommodating the inner rail 30. A receiving space 23 is disposed at a bottom of the middle rail 20. The inner rail 30 slides in the middle rail

space 21, and a guiding part 32 is disposed on the inner rail 30.

[0032] The restoring unit 40 comprises a fixing part 41, a sliding track 412, a moving part 42, a buckling part 421, and at least one elastic part 414. The fixing part 41 is disposed on one end of the outer rail space 11, such that one end of the outer rail space 11 is made into a closed end. The sliding track 412 is disposed on open end of the fixing part 41, and has a buckling track 4121 disposed thereon. Two buckling slots 413 are disposed on the buckling track 4121, and the buckling slots 413 are respectively located on two sides of the buckling track 4121. The sliding track 412 is disposed in the receiving space 23 at the bottom of the middle rail 20, and the sliding track 412 may be connected with the fixing part 41 together or separated from each other. The moving part 42 is disposed in the outer rail space 11 and slides in the outer rail space 11 through the sliding track 412. A sliding slot 429 is disposed under the moving part 42, and is matched with the sliding track 412, such that the moving part 42 is enabled to slide along the sliding track 412. The buckling part 421 is pivoted to the moving part 42, and a combining shaft 43 is adopted to pass through the buckling part 421, such that the buckling part 421 is pivoted to the moving part 42. Two snapping columns 4211 and 4212 are disposed on the buckling part 421, which pass through the moving part 42 and are matched with the buckling track 4121. Meanwhile, a guiding slot 4214 is disposed on the buckling part 421 (as shown in FIG. 9). At least one elastic part 414 is disposed between the fixing part 41 and the moving part 42, so as to automatically generate a resilient force when restoring the moving part 42.

[0033] The inner rail 30 has a guiding part 32 corresponding to the guiding slot 4214 of the buckling part 421. When the inner rail 30 starts to be stretched outwards, the guiding part 32 is snapped with the guiding slot 4214, so as to drive the buckling part 421 and the moving part 42 to slide along the buckling track 4121, and to drive the middle rail 20 to slide in the outer rail space 11. When the buckling part 421 slides to the buckling slot 413, the snapping columns 4211 and 4212 of the buckling part 421 are snapped with the buckling slot 413, such that the moving part 42 is fixed on the buckling slot 413, and the guiding part 32 is released from the guiding slot 4214 and slides outwards.

[0034] The sliding track 412 is disposed in the receiving space 23 at the bottom of the middle rail 20, such that the middle rail 20 is not obstructed by the sliding track 412 when sliding in the outer rail space 11. The rail assembly further comprises a buffer unit, which comprises a buffer part 50 and a blocking part 52 (or a corresponding mechanism) corresponding to the buffer part 50. The blocking part 52 may be a contact portion of the moving part 42 or a blocking sheet disposed on the front end of the sliding track 412. The buffer part 50 may be disposed on the fixing part 41 or disposed on the middle rail 20, or disposed in the receiving space 23 between the middle

rail 20 and the outer rail 10, so as to generate a buffering effect when restoring the rail assembly.

[0035] Through the structure of the open-type sliding track 412, the moving part 42 is enabled to slide in the outer rail space 11, so as to increase the restoring stroke of the moving part 42 and increase the sliding scope of the middle rail 20, thereby increasing the length of the middle rail 20 and the overall telescoped length of the rail assembly.

[0036] In the outer rail space 11, both of the fixing part 41 and the moving part 42 are disposed with the receiving slots 415 and 422 on two sides, and the receiving slots 415 and 422 correspond to the inner rail 30, such that the inner rail 30 reaches the closed end of the outer rail space 11 without being obstructed, and thus the length of the inner rail 30 is enabled to be the same as that of the outer rail 10, so as to increase the overall telescoped length and the loading force of the rail assembly.

[0037] Referring to FIG. 9, in the restoring unit 40, an elastic arm 4213 is disposed on the buckling part 421, and a stopping portion 428 corresponding to the elastic arm 4213 is disposed on the moving part 42. Once the buckling part 421 is released from the buckling slot 413 and rotates, the buckling part 421 generates a buffering effect with respect to the moving part 42. When the moving part 42 enters the buckling slot 413, the buckling part 421 generates a stable snapping effect with respect to the moving part 42.

[0038] FIGs. 10 to 13 are schematic views of using states according to a third embodiment of the present invention. Referring to FIGs. 10 to 12, in the outer rail space 11, two receiving slots 415 and 422 are respectively disposed on two sides of the fixing part 41 and the moving part 42, the wall surface of the inner rail 30 is enabled to extend through the two receiving slots 415 and 422, such that the inner rail 30 reaches the closed end of the outer rail space 11 without being obstructed. When the inner rail 30 is stretched outwards to reach one end of the sliding track 412, the snapping columns 4211 and 4212 of the buckling part 421 are snapped with the buckling slot 413, so that the moving part 42 is fixed on the buckling slot 413. When the inner rail 30 restores inwards, the guiding part 32 is snapped with the guiding slot 4214, so as to force the buckling part 421 to rotate with respect to the moving part 42. Accordingly, the snapping columns 4211 and 4212 are separated from the buckling slot 413. At this time, the moving part 42 is stretched under the resilient force of the elastic part 414, such that the rail assembly generates an automatically restoring function. The moving part 42 drives the buckling part 421 to move inwards along the buckling track 4121, and meanwhile, the buffer part 50 produces resistances for the moving part 42, thereby generating the buffering effect for the rail assembly.

[0039] Referring to FIG. 13, in the restoring unit 40, the guiding slot 4214 enables the buckling part 421 to be snapped with the guiding part 32. When the moving part 42 carelessly drops out and automatically restores, an

external force may be applied to restore the inner rail 30, such that the guiding part 32 is snapped with the guiding slot 4214, and the moving part 42 restores to the normal buckling state.

[0040] In a fourth embodiment of the present invention, referring to FIG. 14, those parts and features the same as that in the third embodiment are not described repeatedly, and only the differences there-between are demonstrated below. In this embodiment, a sliding track 418 is formed by the outer rail 10. The buckling track 4121 is located in the receiving space 23 at the bottom of the middle rail 20, a buckling slot 413 is disposed on the buckling track 4121, and the buckling track 4121 and the fixing part 41 may be connected together or separated from each other. The moving part 42 slides along the sliding track 418 in the open end of the outer rail space 11. A sliding slot 429 is disposed under the moving part 42, and is matched with the buckling track 4121. When the rail assembly is pulled outwards, the buckling part 421 drives the moving part 42 to slide along the buckling track 4121, and drives the middle rail 20 to slide in the outer rail space 11. The buckling part 421 may be selectively snapped with the buckling slot 413, and when the buckling part 421 slides into the buckling slot 413, the moving part 42 is temporarily fixed on the buckling slot 413. The buckling track 4121 is disposed in the receiving space 23 at the bottom of the middle rail 20, such that the middle rail 20 is not obstructed by the buckling track 4121 when sliding in the outer rail space 11.

[0041] Through the open-type sliding track structure, the moving part slides in the open end of the outer rail space, so as to increase the restoring stroke of the moving part and increase the sliding scope of the middle rail, thereby increasing the length of the middle rail and the overall telescoped length of the rail assembly.

[0042] In a fifth embodiment of the present invention, referring to FIG. 15, those parts and features the same as that in the third embodiment are not described repeatedly, and only the differences there-between are demonstrated below. In this embodiment, the restoring unit 40 comprises a fixing part 41, a moving part 42, a buckling part 421, and an elastic part 414. A sliding track 412 is disposed on the fixing part 41. An extending sliding slot 44 is disposed on one end of the moving part 42, and is matched with the sliding track 412, such that the moving part 42 slides in the open end of the outer rail space 11 along the sliding track 412. The sliding track 412 may be extended to the outer rail space 11, and the extended sliding track 412 is disposed in the receiving space 23 at the bottom of the middle rail 20.

[0043] Through the open-type sliding track structure, the moving part slides in the outer rail space, so as to increase the restoring stroke of the moving part and increase the sliding scope of the middle rail, thereby increasing the length of the middle rail and the overall telescoped length of the rail assembly.

[0044] In a sixth embodiment of the present invention, referring to FIGs. 16 and 17, those parts and features

the same as that in the third embodiment are not described repeatedly, and only the differences therebetween are demonstrated below. The restoring unit 40 comprises a fixing part 41, a moving part 42, a buckling part 421, and an elastic part 414. A slot-shaped sliding track 45 is disposed under the fixing part 41. An extending track 419 is disposed on one end of the moving part 42, and is matched with the sliding track 45, such that the moving part 42 is enabled to slide in the open end of the outer rail space 11. A movable slot 425 is disposed on the extending track 419 of the moving part 42. The snapping column 4211 on one end of the buckling part 421 passes through the movable slot 425 of the moving part 42, and the snapping column 4212 on the other end of the buckling part 421 passes through the buckling track 4121, and the buckling part 421 is enabled to move in the movable slot 425.

[0045] A buckling slot 413 is disposed on a front end of the buckling track 4121. When the inner rail 30 is stretched outwards, the guiding part 32 is engaged with the buckling part 421, so as to drive the buckling part 421 and the moving part 42 to slide along the buckling track 4121. When the buckling part 421 slides to reach the buckling slot 413, the snapping column 4212 is snapped with the buckling slot 413, so that the moving part 42 is temporarily fixed on the buckling slot 413, and the inner rail 30 continuously slides outwards.

[0046] Through the open-type sliding track structure, the moving part slides in the outer rail space, so as to increase the restoring stroke of the moving part and increase the sliding scope of the middle rail, thereby increasing the length of the middle rail and the overall telescoped length of the rail assembly.

[0047] In a seventh embodiment of the present invention, referring to FIGs. 18 to 23, those parts and features the same as that in the third embodiment are not described repeatedly, and only the differences therebetween are demonstrated below. In this embodiment, the restoring unit 40 further comprises a catching unit. The catching unit comprises a catching part 417, for connecting the moving part 42 to the fixing part 41, a limiting slot 423, disposed on the moving part 42, and a catching portion 4231, disposed in the limiting slot 423. The catching part 417 has a spindle column 4172 and a catching column 4171. The spindle column 4172 is rotationally pivoted to the fixing part 41, such that the catching column 4171 swings with respect to the spindle column 4172. The catching column 4171 is selectively snapped with the catching portion 4231, and the moving part 42 is stopped against the catching portion 4231, so as to limit the moving part 42 to slide along the sliding track 412. The elastic part 414 is disposed between the fixing part 41 and the moving part 42. In this embodiment, the elastic part 414 is demonstrated as a compression spring, which may be a tension spring (not shown), so as to automatically generate a restoring elastic force when restoring the moving part 42.

[0048] FIGs. 21 to 23 are schematic views of using

states according to the seventh embodiment of the present invention. Referring to FIGs. 21 to 23, when an external force is applied to the inner rail 30, the rail assembly is accommodated in the outer rail space 11 of the outer rail 10 and extends into the end of the outer rail 10. In this case, the inner rail 30 is snapped with the buckling part 421 through the guiding part 32, so as to drive the moving part 42 to compress the elastic part 414, such that the moving part 42 is temporarily fixed and snapped (not shown). Referring to FIG. 21, when the middle rail 20 and the inner rail 30 are telescoped into the end of the outer rail 10, the catching part 417 pivoted to the fixing part 41 enters the limiting slot 423 at the bottom of the moving part 42 through the catching column 4171, and is guided by the limiting slot 423 to swing to the catching portion 4231. Referring to FIG. 22, at this time, the external force applied to the inner rail 30 is removed, such that the moving part 42 slides towards the other end opposite to the fixing part 41 under the elastic force of the elastic part 414. The catching column 4171 is stopped at the catching portion 4231. Therefore, the sliding motion of the moving part 42 is limited, and the middle rail 20 and the inner rail 30 are both stopped in the outer rail space 11. Referring to FIGs. 22 and 23, when it intends to stretch the rail assembly, an external force is applied once again, such that the moving part 42 is made to move towards the direction of the fixing part 41. Accordingly, the catching column 4171 of the catching part 417 is guided by the limiting slot 423 and is released from the catching portion 4231, so as to release the stopping state between the moving part 42 and the fixing part 41. In this case, the moving part 42 is affected by the resilient force of the elastic part 414, such that the inner rail 30 is ejected to the buckling slot 413 on the buckling track 4121 along the sliding track 412. The moving part 42 is stopped on the buckling slot 413, and the inner rail 30 continuously slides outwards.

[0049] Through the open-type sliding track structure, the moving part slides in the outer rail space, so as to increase the restoring stroke of the moving part and increase the sliding scope of the middle rail, thereby increasing the length of the middle rail and the overall telescoped length of the rail assembly, and achieving a better ejecting effect.

Claims

1. A rail assembly, comprising: an outer rail, a middle rail, an inner rail, and a restoring unit, wherein the outer rail has an outer rail space for accommodating the middle rail, the inner rail, and the restoring unit; the middle rail slides in the outer rail space, and has a middle rail space capable of accommodating the inner rail; the inner rail is accommodated in the middle rail, and slides in the middle rail space; the restoring unit is assembled on one end of the outer rail space, and comprises: a fixing part, dis-

- posed in the outer rail space, such that one end of the outer rail space is made into a closed end; a sliding track, disposed on one end of the fixing part, and disposed in a receiving space at a bottom of the middle rail; a moving part, disposed in the outer rail space, and sliding along the sliding track; a buckling part, disposed on the moving part; at least one elastic part, disposed between the fixing part and the moving part; a guiding part, disposed on the inner rail; wherein as the receiving space is disposed at the bottom of the middle rail, when the inner rail slides in the outer rail space, the middle rail extends over the sliding track to increase a sliding scope of the middle rail and a length of the middle rail; and in the outer rail space, two receiving slots are respectively disposed on two sides of the fixing part and the moving part, wherein when the inner rail slides in the outer rail space, the inner rail extends through the receiving slots and reaches the closed end of the outer rail, such that a length of the inner rail is equal to that of the outer rail.
2. The rail assembly according to claim 1, wherein the elastic part is located on an outer side of the receiving slots.
 3. The rail assembly according to claim 1, wherein the sliding track is disposed with a buckling track, and a buckling slot is disposed on a front end of the buckling track, so that the moving part is positioned on the buckling track through the buckling slots.
 4. The rail assembly according to claim 1, wherein two snapping columns are disposed on the buckling part and passes through the moving part and is rotated corresponding to the moving part, and the two snapping columns sliding along the buckling track, and the moving part is temporarily fixed on the buckling slot through the snapping column to limit a sliding stroke of the moving part; a guiding slot is further disposed on the buckling part; the guiding slot is temporarily snapped with the guiding part, such that the inner rail and the moving part are connected, so as to drive the moving part to slide along the sliding track stably.
 5. The rail assembly according to claims 1, 2, wherein the sliding track is separated from the fixing part.
 6. The rail assembly according to claims 1, 3, wherein the sliding track is formed by the outer rail, and the buckling track are received in the receiving space at the bottom of the middle rail, such that the moving part slides in the outer rail space, so as to increase the sliding scope of the middle rail and a length of the middle rail.
 7. The rail assembly according to claim 6, wherein the buckling track is separated from the fixing part.
 8. The rail assembly according to claims 1, 3, wherein the sliding track is disposed on a side surface of the fixing part, the moving part has an extending track, and the extending track works together with the sliding track, such that the moving part slides in the outer rail space.
 9. The rail assembly according to claims 1, 2, 3, 4, 5, 8, wherein the fixing part, the sliding track, the moving part, and the elastic part are located in the receiving space between the middle rail and the outer rail; the restoring unit further comprises a second guiding part disposed at a bottom of the middle rail and a second buckling part disposed on the middle rail and located in the middle rail space; through the restoring unit, the guiding part disposed on the inner rail is temporarily snapped with the second buckling part, and the second guiding part is snapped with the buckling part disposed on the moving part; the restoring unit is connected to the inner rail and the middle rail, so as to drive the moving part and make the rail assembly generate an automatic restoring function; and the inner rail, the middle rail, and the outer rail have the same length, so that the rail assembly has an optimal overall telescoped length and a maximum loading force.
 10. The rail assembly according to claims 1, 5, 6, 7, 8, 9, further comprising a buffer unit, wherein the buffer unit comprises a buffer part and a mechanism corresponding to the buffer part, and the buffer part generates a buffering function through the corresponding mechanism.
 11. The rail assembly according to claim 10, wherein the buffer part and the corresponding mechanism are connected together.
 12. The rail assembly according to claims 1, 5, 6, 7, 8, 9, wherein a catching unit is disposed between the fixing part and the moving part and comprises: a catching part, for connecting the moving part to the fixing part, a limiting slot, disposed on the moving part, and a catching portion, disposed in the limiting slot, thereby limiting the moving part to slide along the sliding track.
 13. The rail assembly according to claim 1, wherein the property of the buckling part is elasticity, and the snapping unit is used for fixing the moving part is fixed in the buckling slot or released from the buckling slot; by the buckling part is engaged with the guiding part, and restoring the inner rail, when the moving part carelessly drops out and automatically restores, such that the guiding part is snapped with the buckling part, so as to drive the moving part to restore to

a normal snapping state.

14. The rail assembly according to claim 13, wherein the buckling part has an elastic part, and the moving part has a stopping portion corresponding to the elastic part; through an interaction function between the elastic part and the stopping portion, when the moving part is released from the buckling slot, the buckling part generates a buffering function with respect to the moving part; when the moving part enters the buckling slot, the buckling part is stably pivoted with respect to the moving part.

5

10

15

20

25

30

35

40

45

50

55

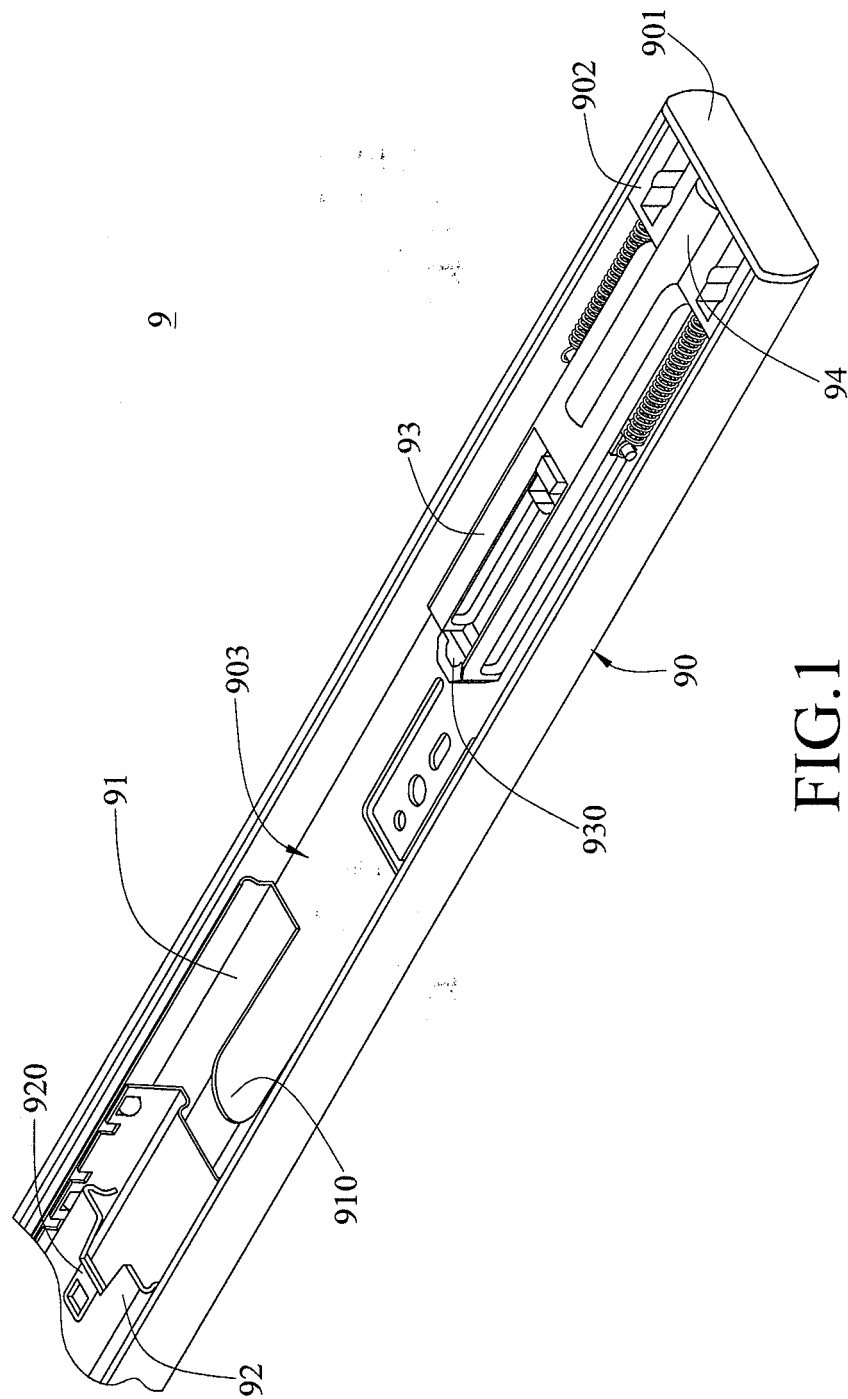


FIG.1
(PRIOR ART)

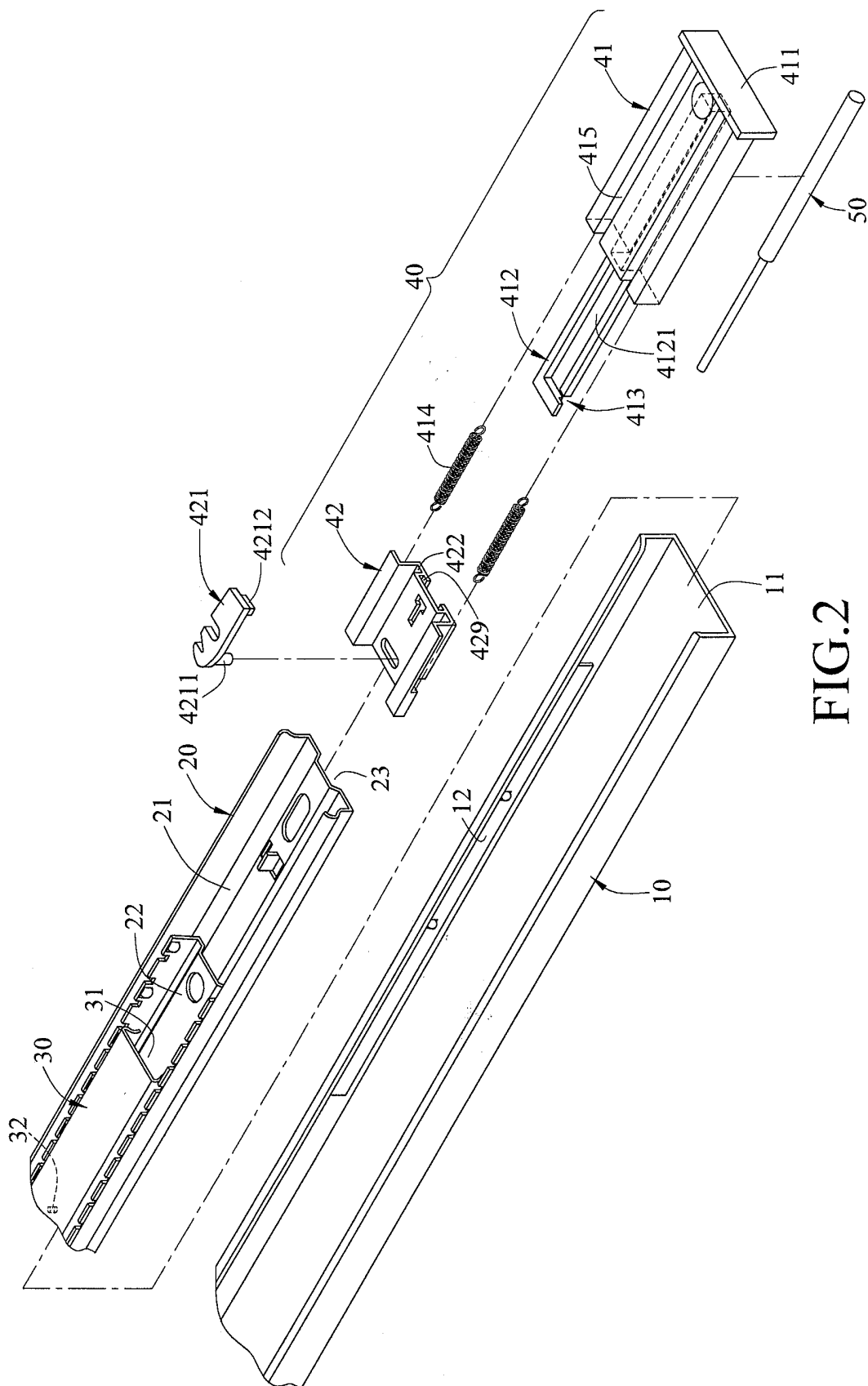


FIG. 2

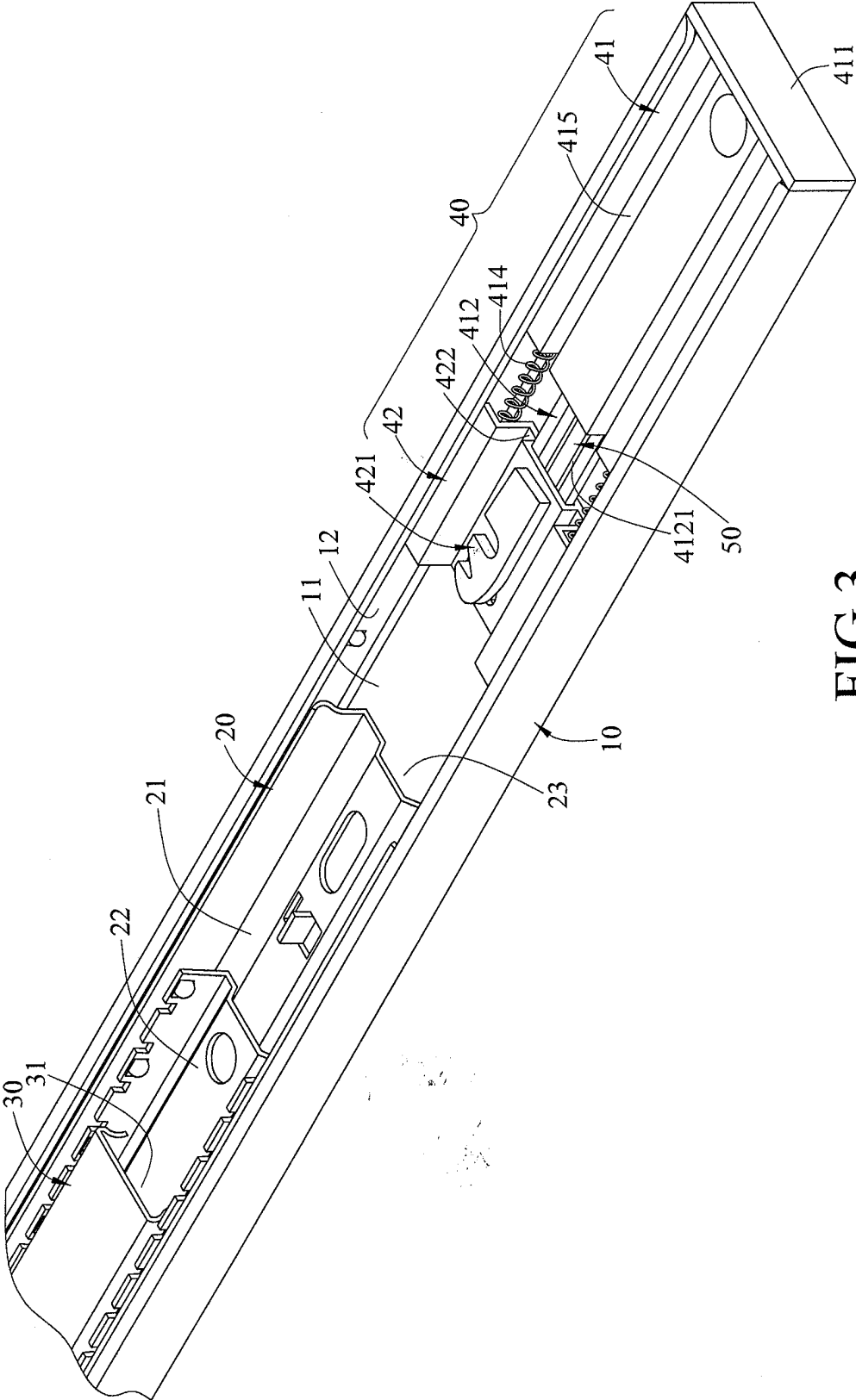


FIG.3

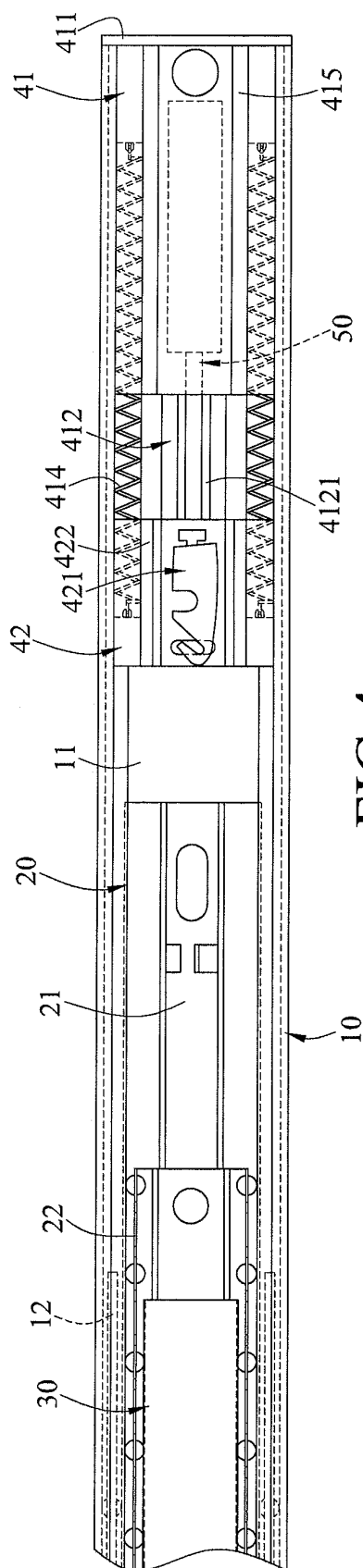


FIG. 4

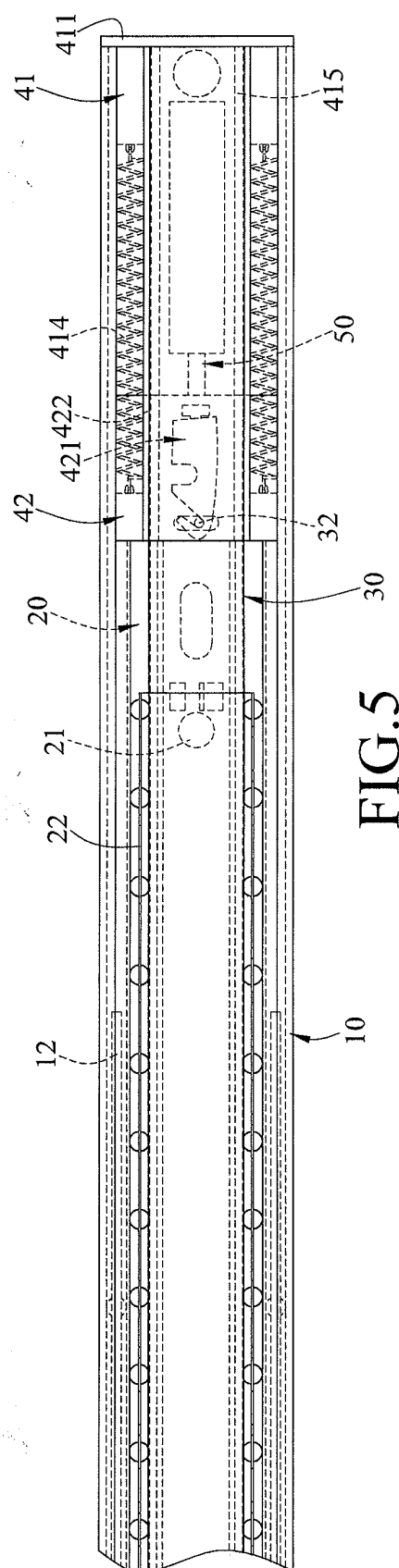


FIG. 5

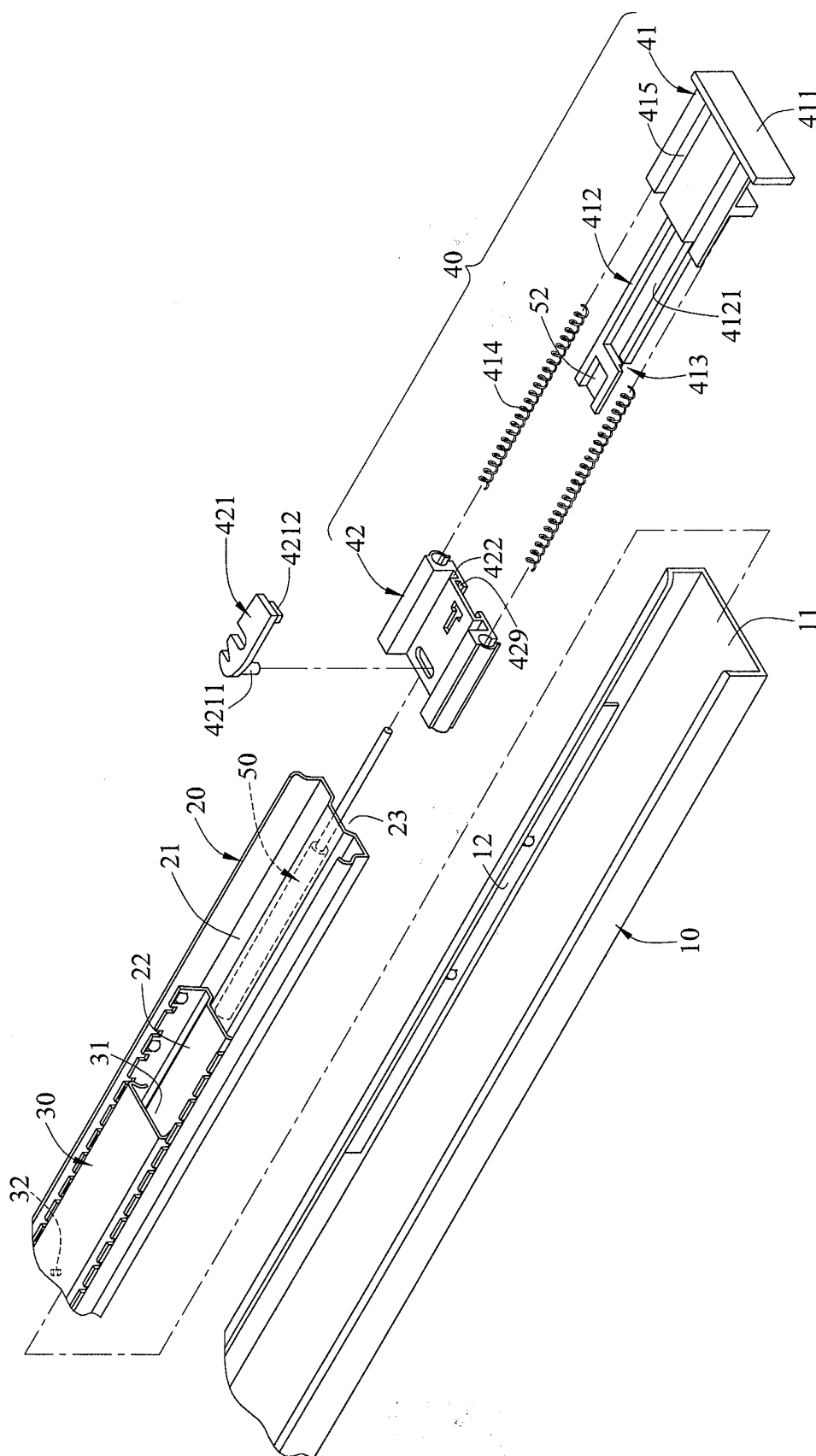
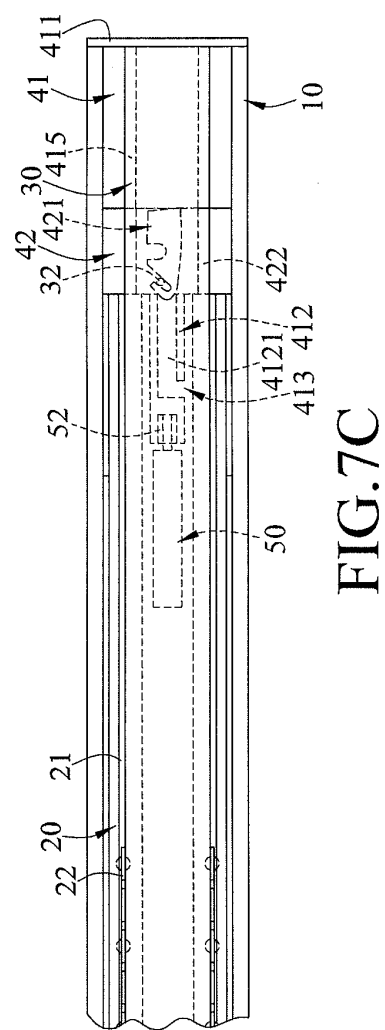
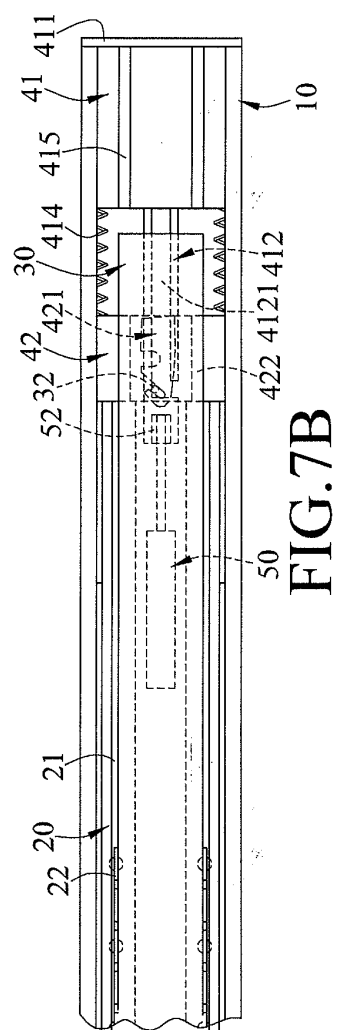
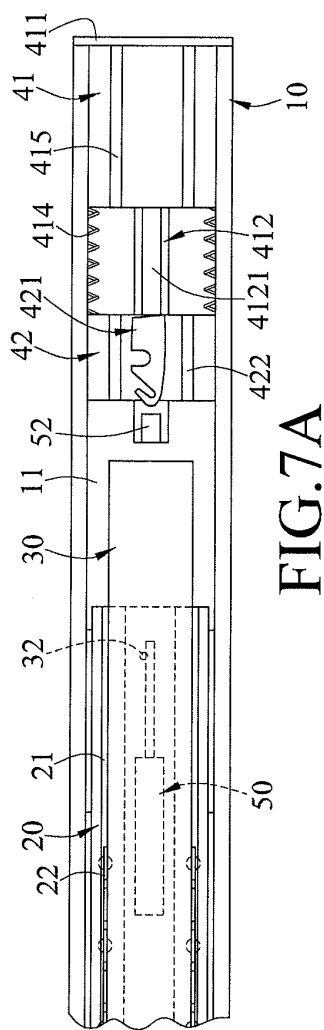


FIG.6



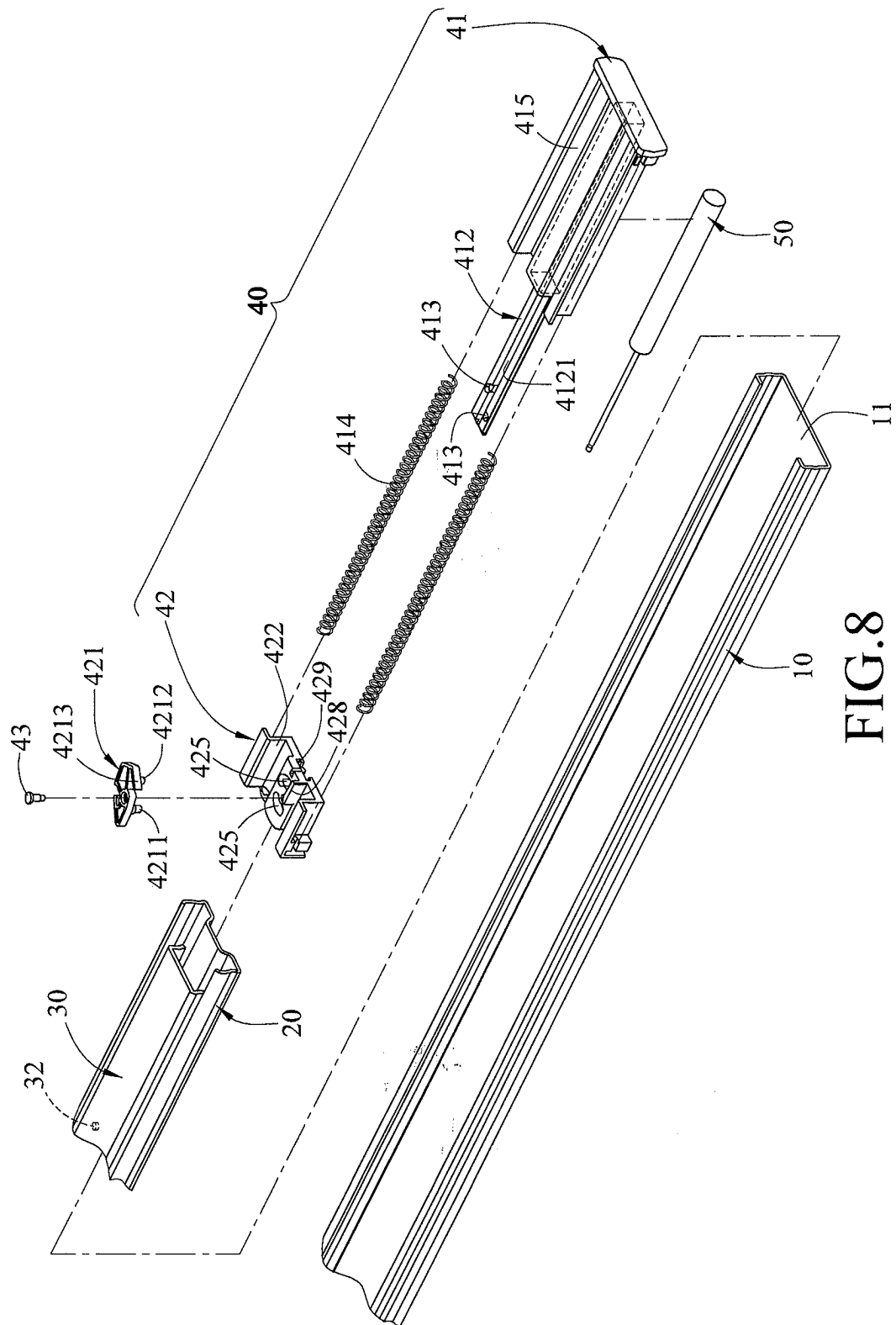


FIG. 8

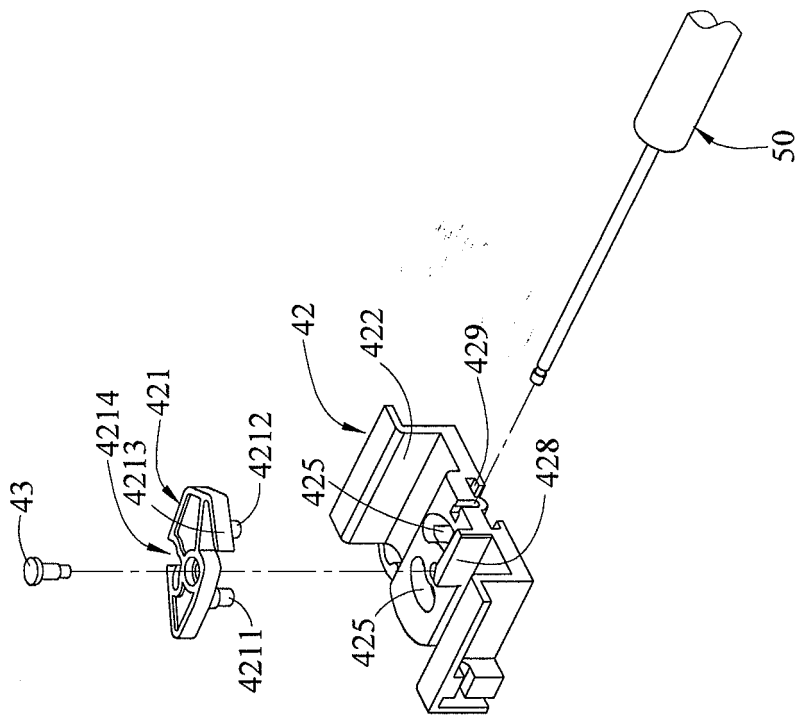


FIG.9

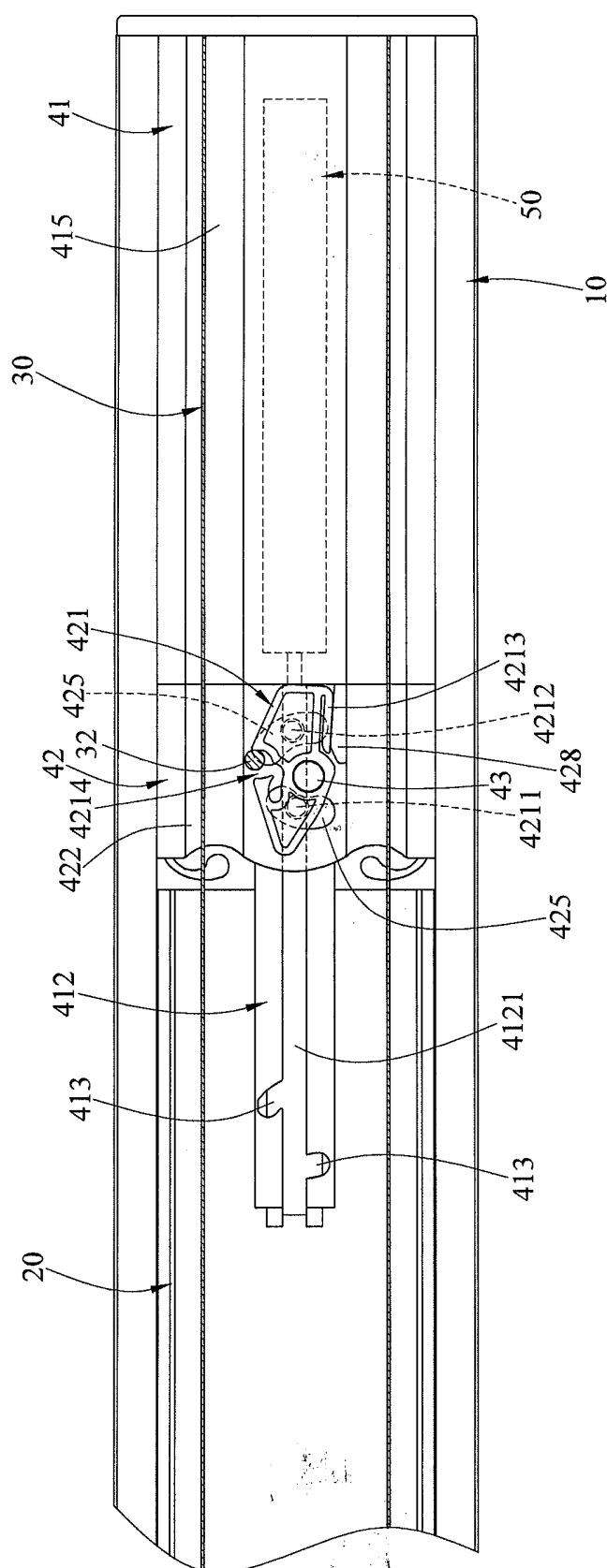


FIG. 10

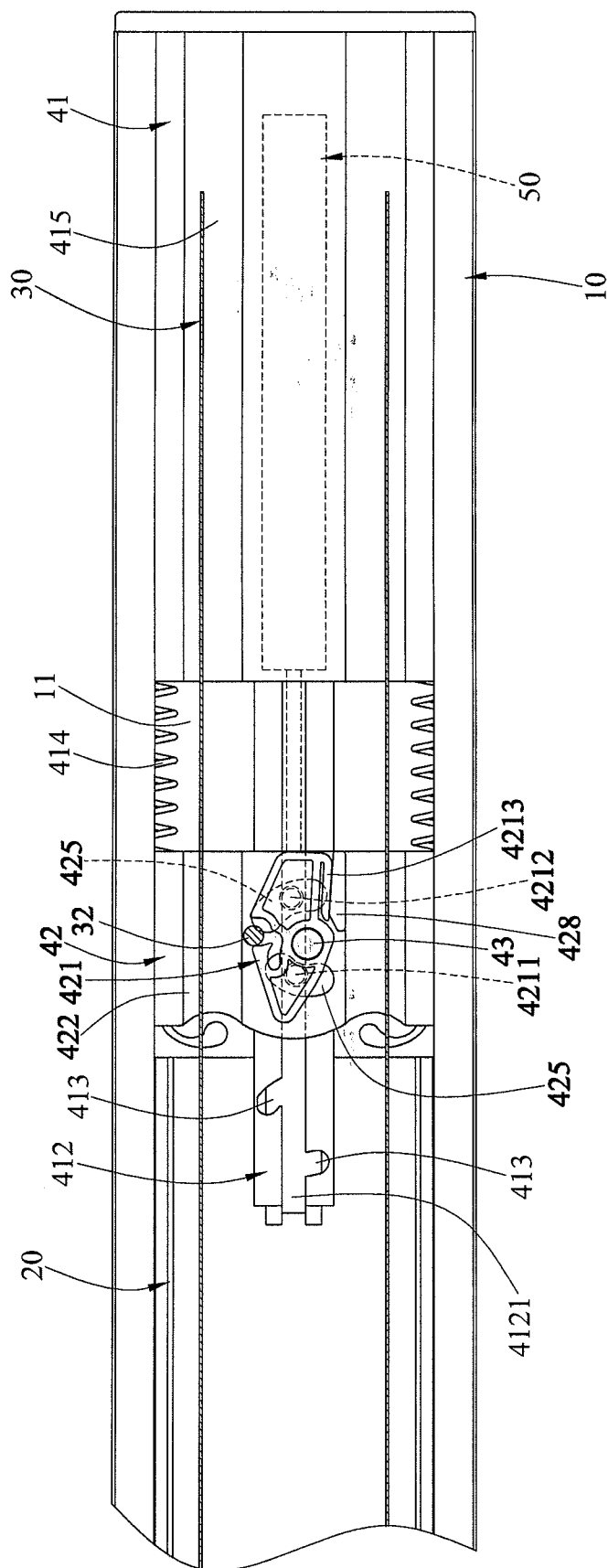


FIG. 11

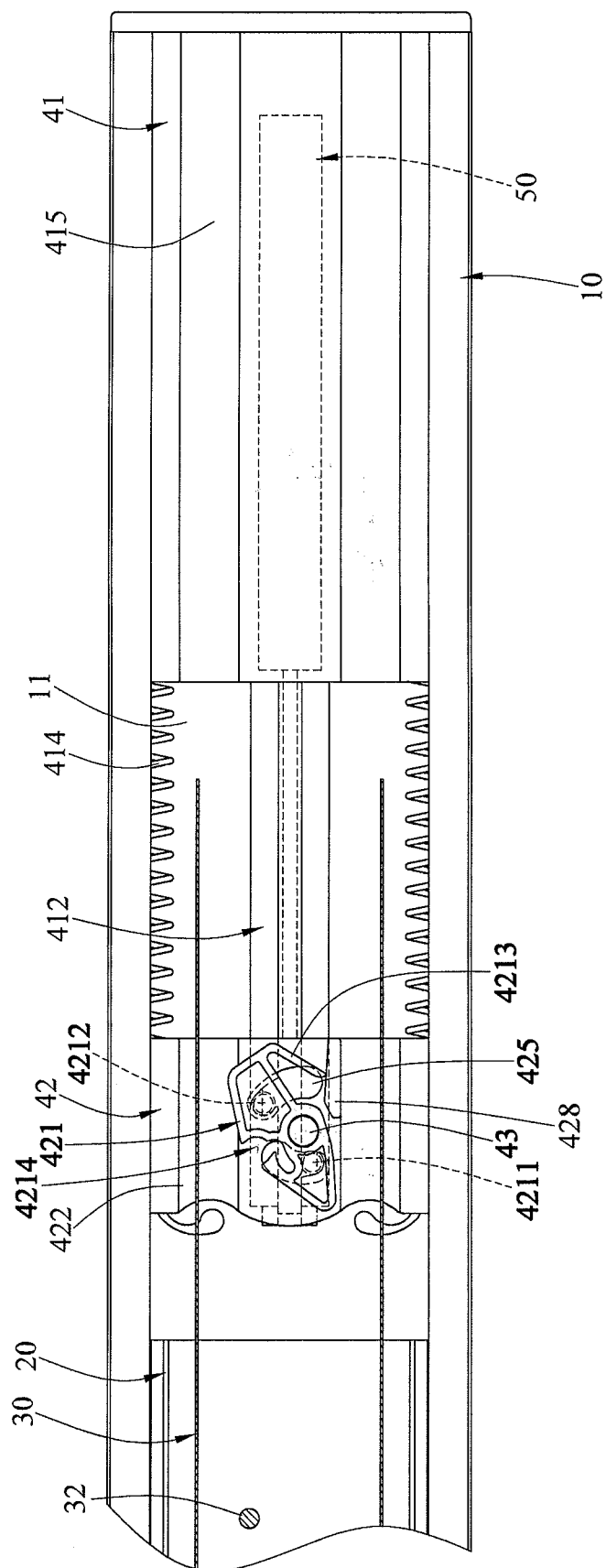


FIG.12

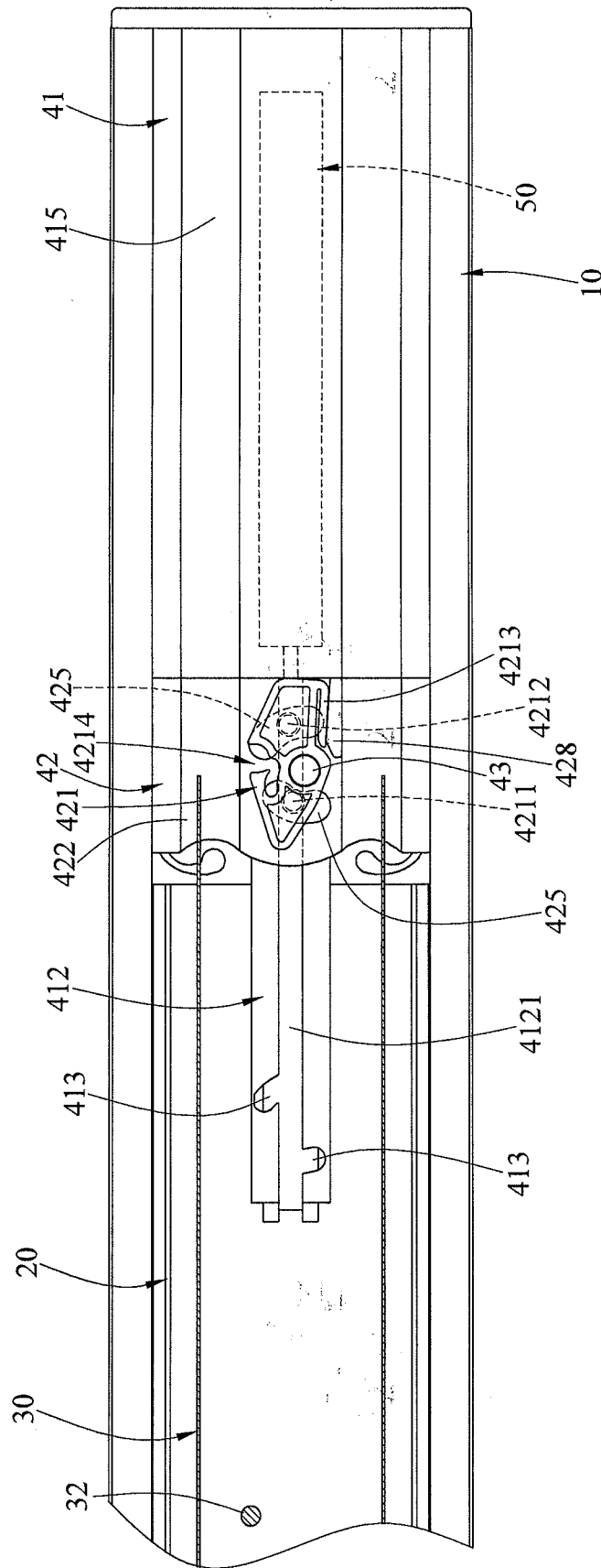


FIG. 13

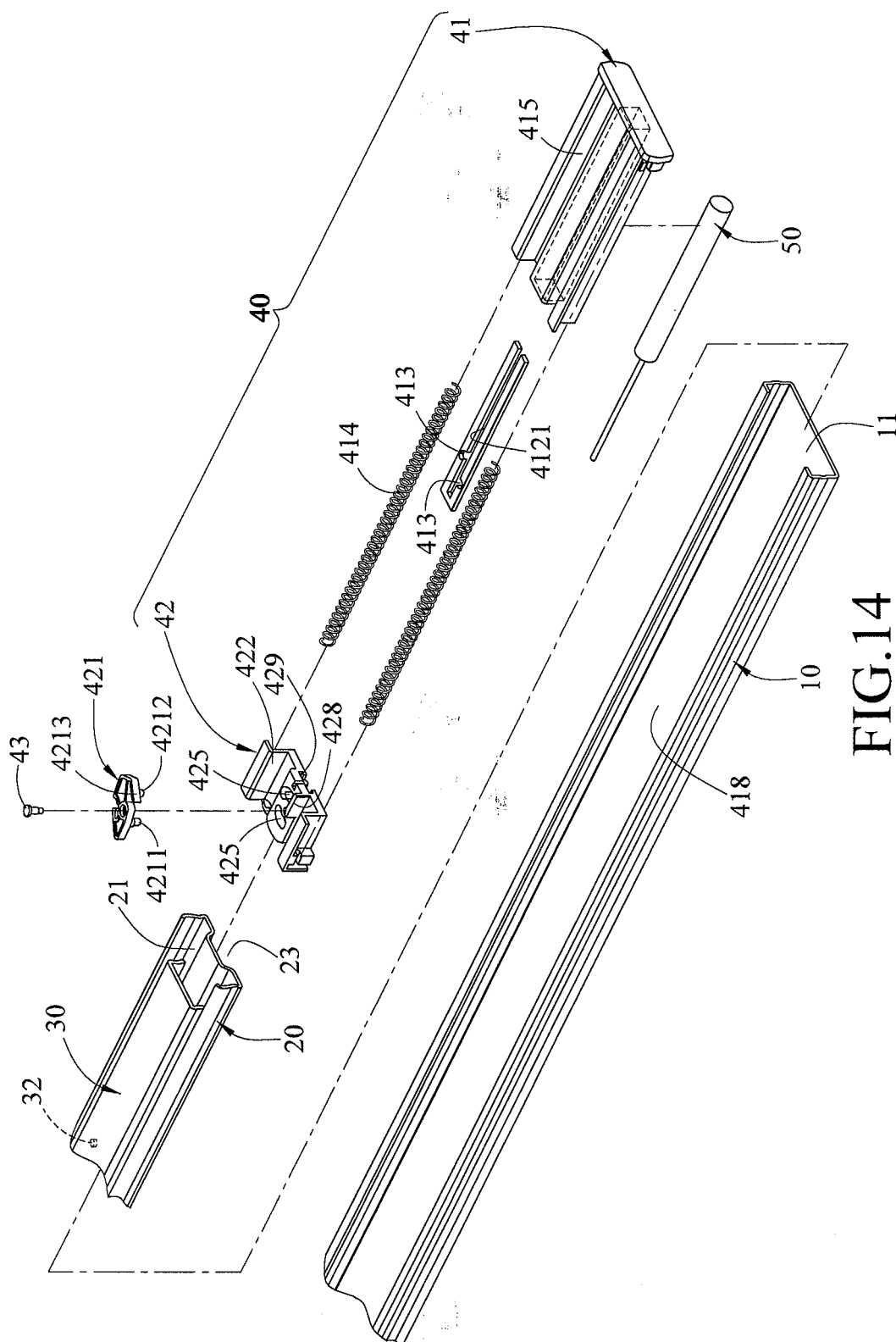
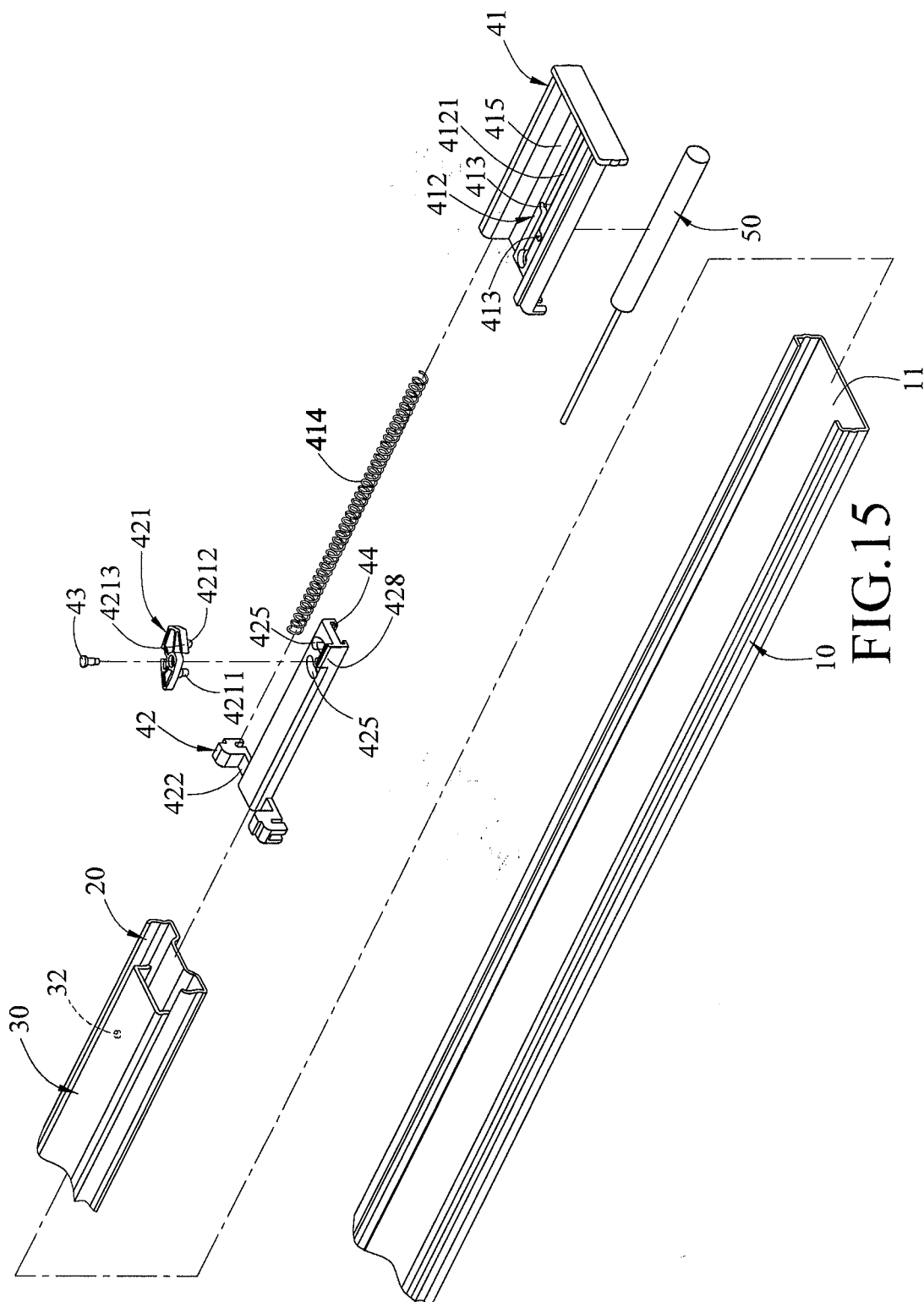


FIG.14



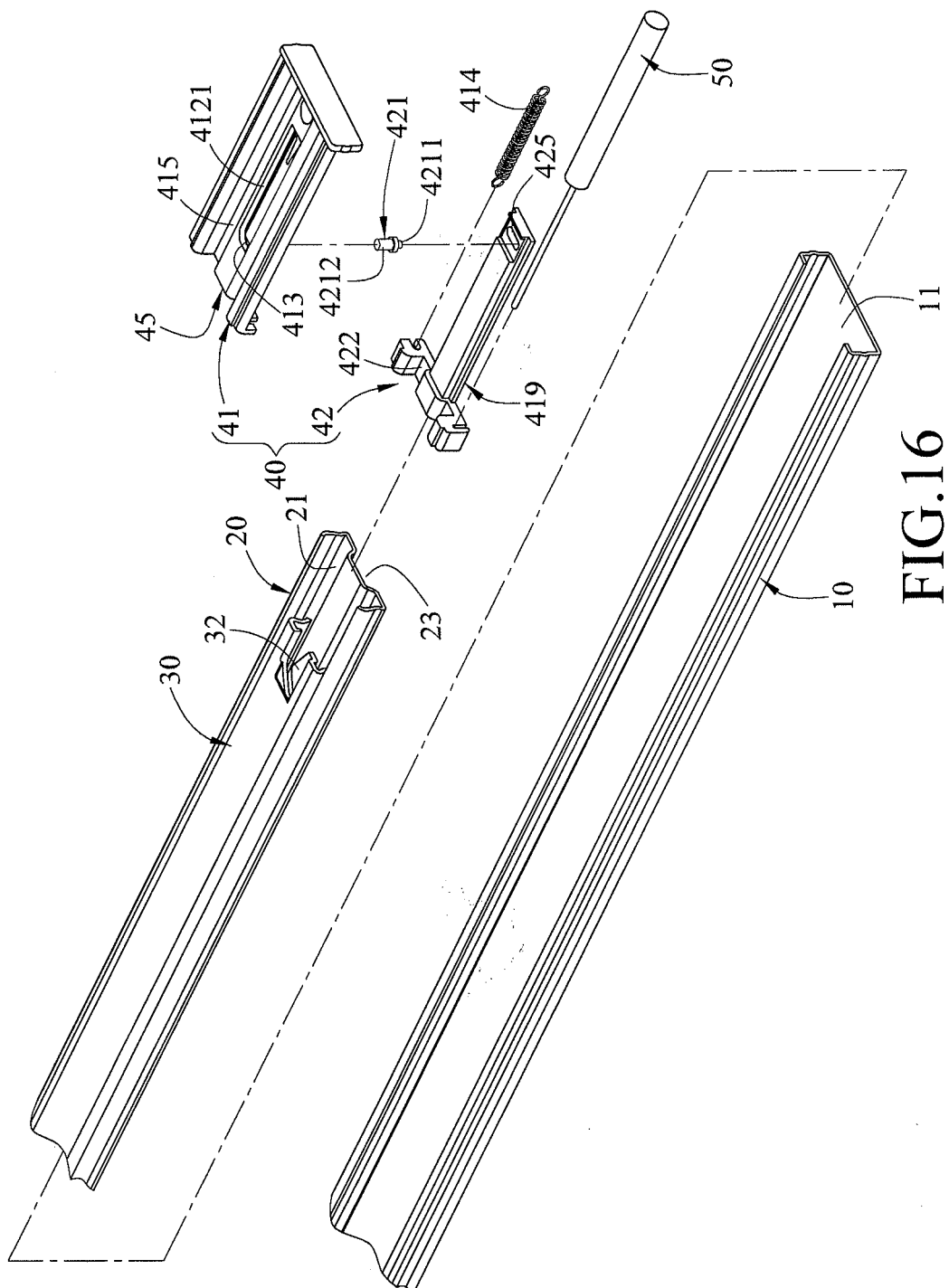


FIG.16

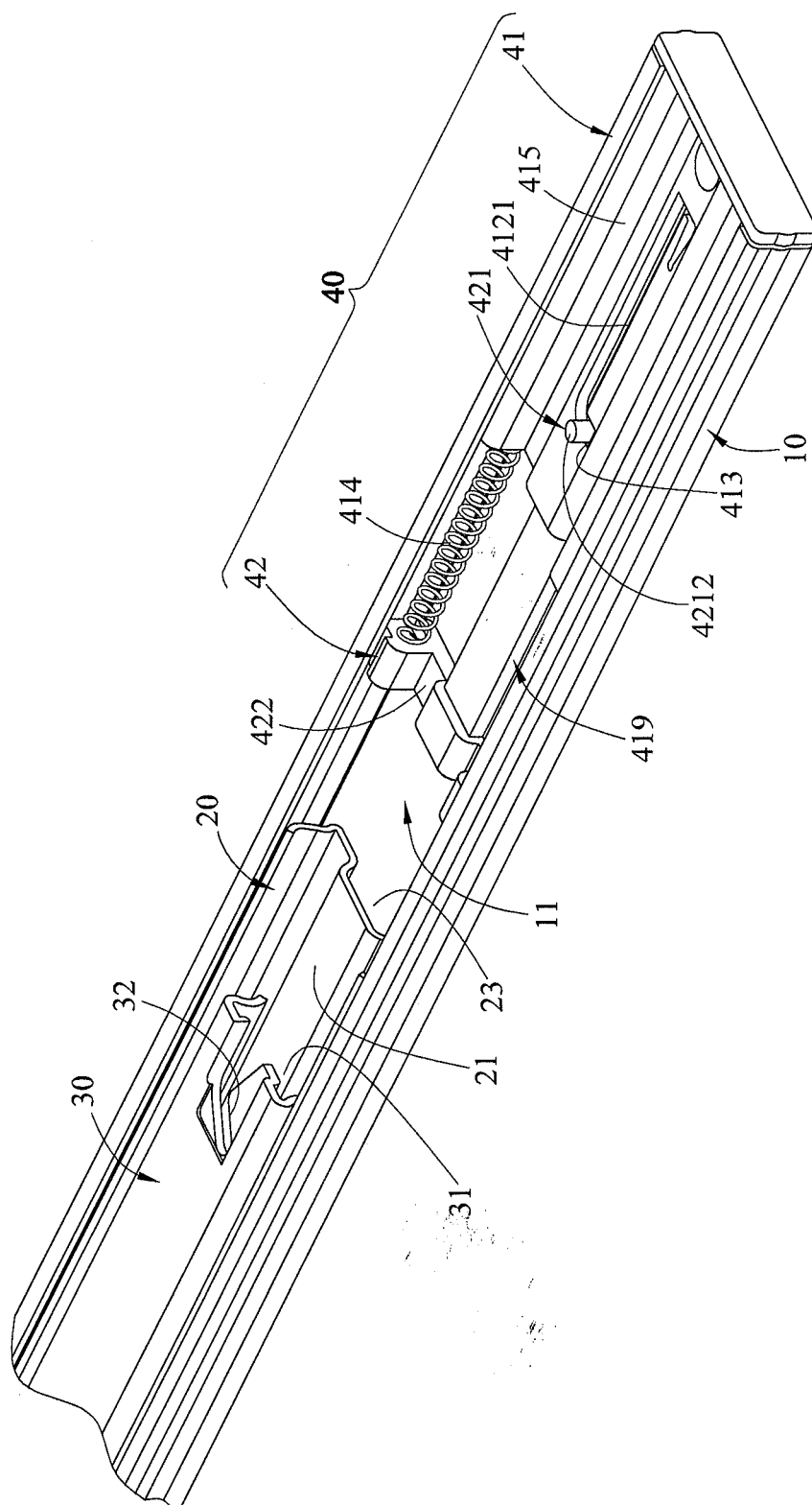


FIG.17

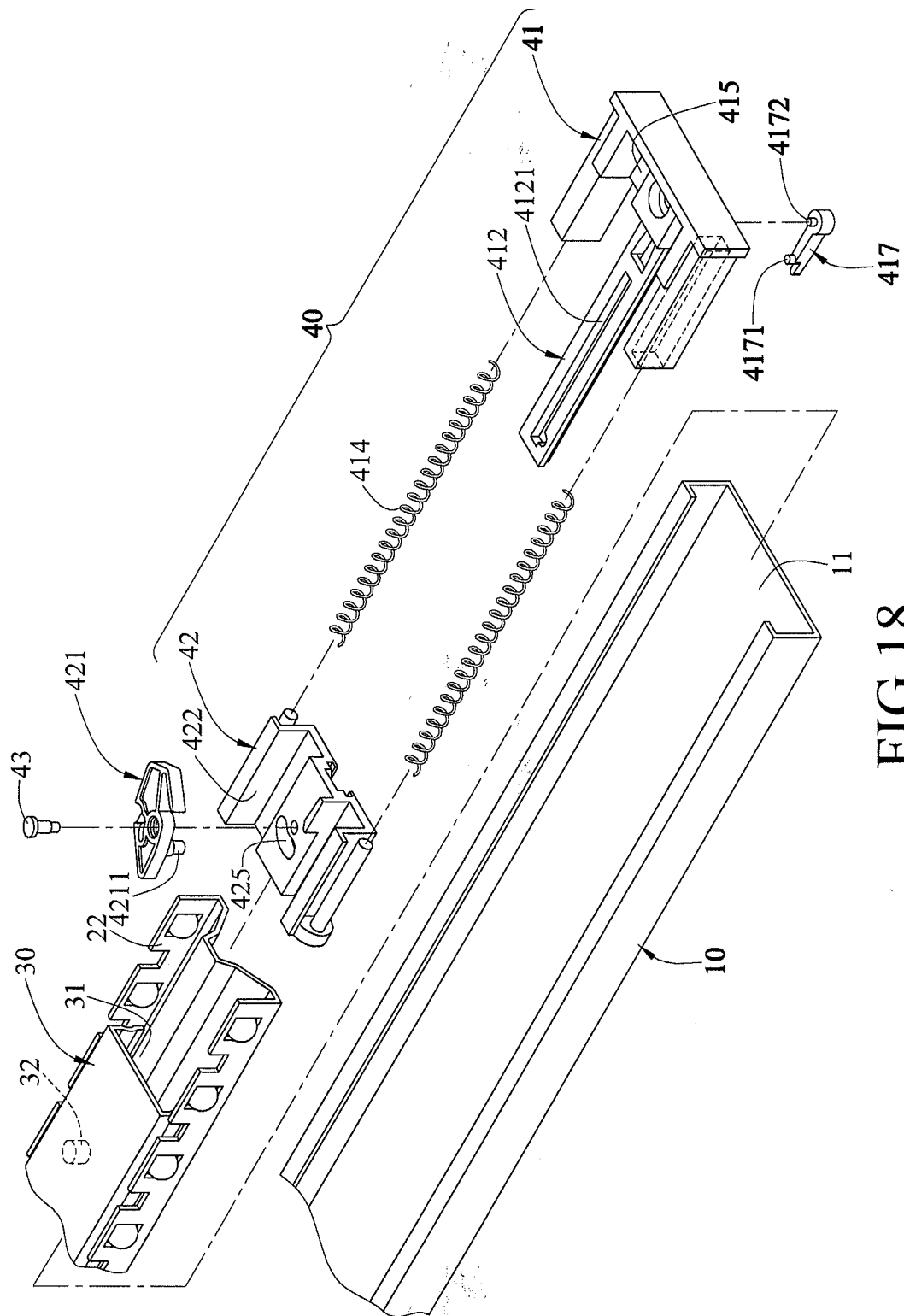


FIG. 18

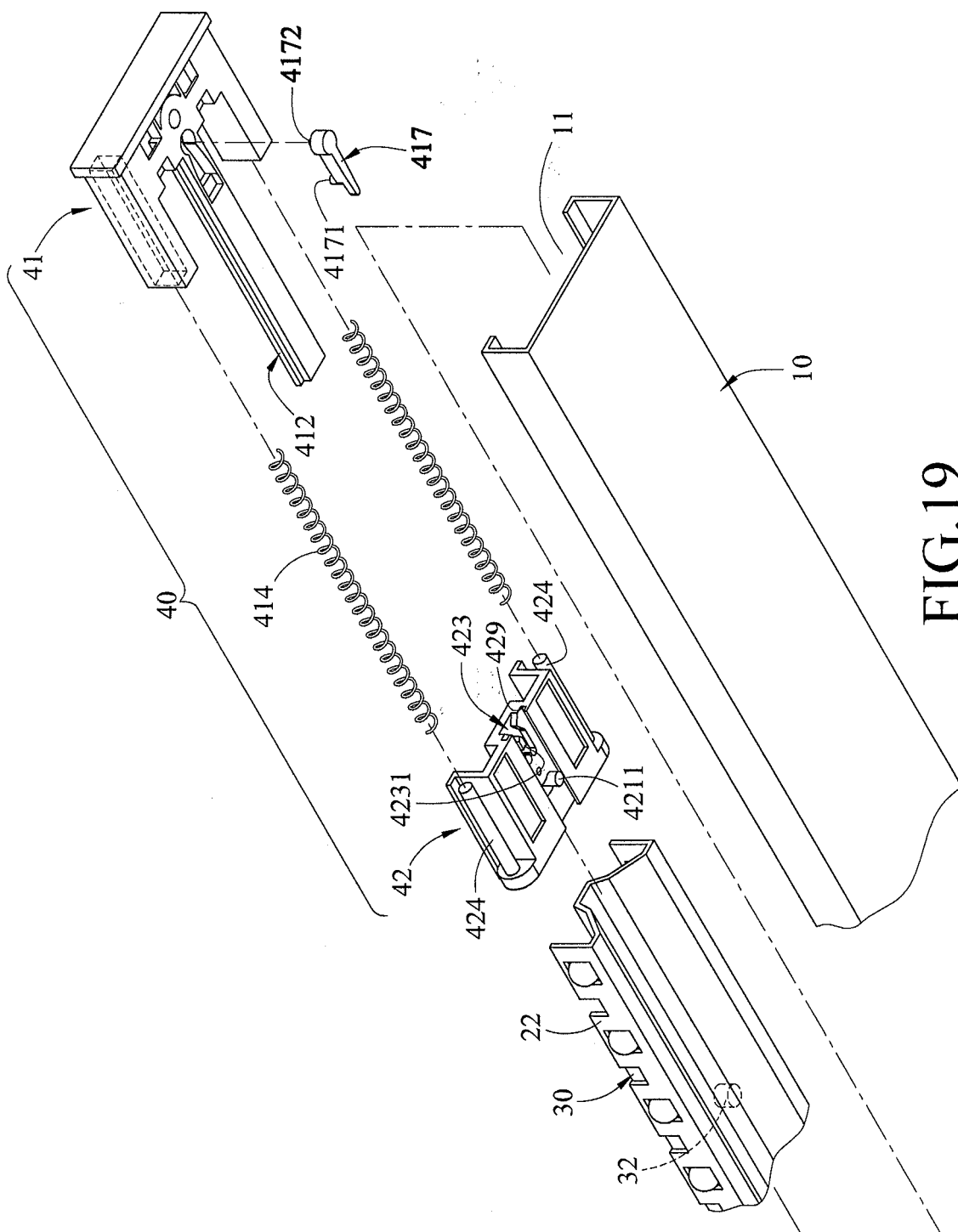


FIG. 19

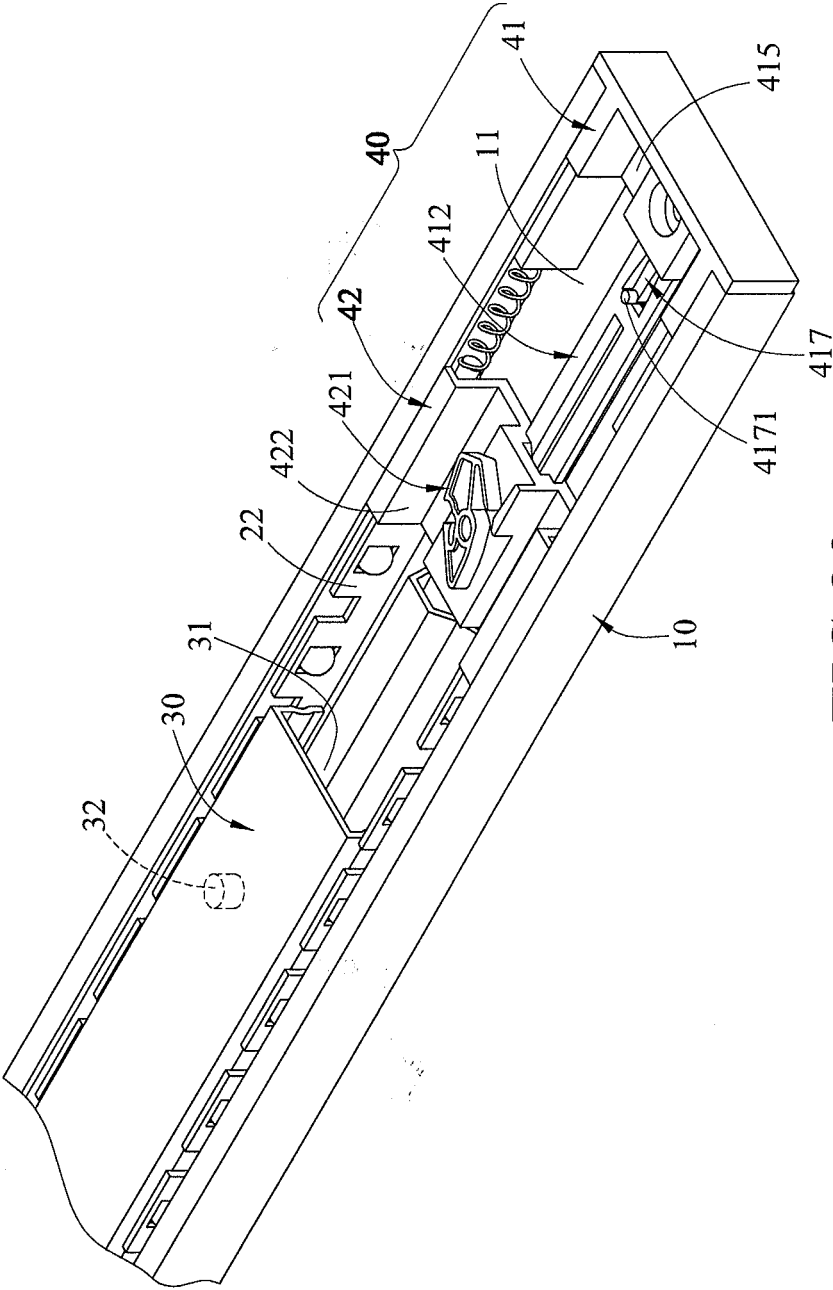


FIG. 20

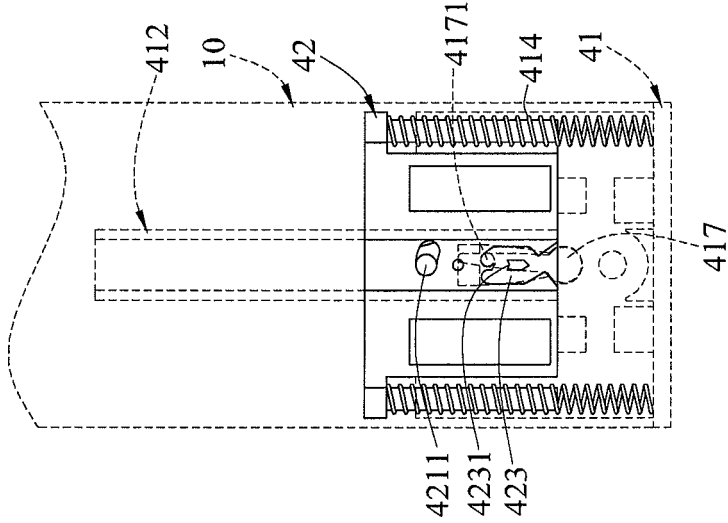


FIG. 21

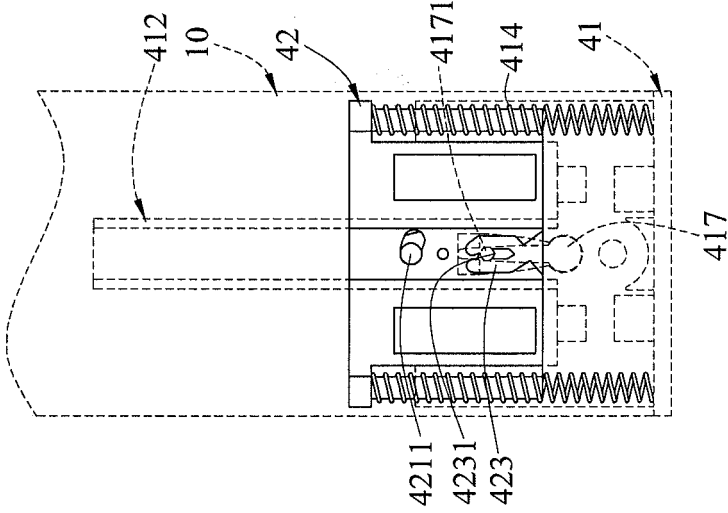


FIG. 22

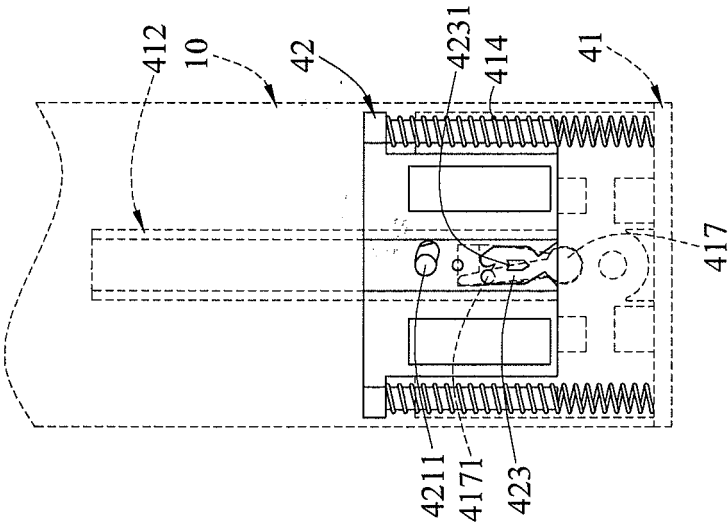


FIG. 23

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2009/000061

A. CLASSIFICATION OF SUBJECT MATTER

A47B88/16 (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)

IPC: A47B

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,PAJ,CNKI,CPRS,CNPAT: LENGTH, EXTENSION, RANGE, LONGNESS, EXPANSION, SAME, UNIFORM, EQUAL, TANTAMOUNT, AMOUNT, IMPROVE, INCREASE, ADD, ENHANCE, GUIDE, SLIDE, RAIL, SPACE, MID, MIDDLE, MEDIAL, INTERMED, SECOND, BOTTOM, BASE, UNDER, INSERT, STICK, INTERPOSE, SLIDE, SLIP, EXTEND, ENTER, CHANNEL, CHUNNEL, PASSAGE, PATH, ROUTE, FIXED, IMMOBILE, IMMOVABLE, APTOTIC, SETTLED, STAIID, STEADFAST, FORTH, ACTIVE, MOBILE, PORTABLE, REMOVABLE, UNFIXED, HOOK, CLOW, FASTEN

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 7159958 B1 (LU, Chunmin) 09.Jan 2007 (09.01.2007) the whole document	1-14
A	CN 1907178 A (ACCURIDE INT INC) 07.Feb 2007 (07.02.2007) the whole document	1-14
A	JP 2007000253 A (NIPPON AKYURAIIDO KK) 11.Jan 2007 (11.01.2007) the whole document	1-14
A	JP 2007330686 A (NIPPON AKYURAIIDO KK) 27.Dec 2007 (27.12.2007) the whole document	1-14

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

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"&" document member of the same patent family
"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	

Date of the actual completion of the international search
10.Apr 2009 (10.04.2009)

Date of mailing of the international search report
23 Apr. 2009 (23.04.2009)

Name and mailing address of the ISA/CN
The State Intellectual Property Office, the P.R.China
6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China
100088
Facsimile No. 86-10-62019451

Authorized officer

lvdong

Telephone No. (86-10)5805

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2009/000061

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2007090735 A1 (ACCURIDE INT INC et al.) 26.Apr 2007 (26.04.2007) the whole document	1-14
A	CN 2629540 Y (ZHENYUE CO LTD) 04.Aug 2004 (04.08.2004) the whole document	1-14

Form PCT/ISA/210 (continuation of second sheet) (April 2007)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/CN2009/000061

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
US 7159958 B1	09.01.2007	none	
CN 1907178 A	07.02.2007	US 2006082266 A1	20.04.2006
		KR 20070016917 A	08.02.2007
JP 2007000253 A	11.01.2007	none	
JP 2007330686 A	27.12.2007	none	
US 2007090735 A1	26.04.2007	WO 2007050737 A2	03.05.2007
		GB 2445334 A	02.07.2008
		KR 20080059470 A	27.06.2008
		CA2628092 A1	03.05.2007
		CN101330849 A	24.12.2008
CN 2629540 Y	04.08.2004	none	

Form PCT/ISA/210 (patent family annex) (April 2007)