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(54) **Side-locking ball bearing sliding rail assembly with auto-closing mechanism spring force adjustability**

(57) A side-locking ball bearing sliding rail assembly formed of a fixed rail, a movable rail, an auto-closing mechanism carrier plate, a sliding device, a linking member and a spring member is disclosed. The auto-closing mechanism carrier plate has a spring force adjustment member longitudinally adjustably mounted thereon and connected with an opposite end of the spring member for adjusting the restoring force of the at least one spring member. By means of adjusting the position of a spring

force adjustment member on the auto-closing mechanism carrier plate, the restoring force of the spring member is relatively adjusted to fit different requirements, and thus, the side-locking ball bearing sliding rail assembly can be used for carrying different loads or to fit different size tolerances without making any modifications, or changing the drawer or the spring member, assuring a high level of operating smoothness and accuracy.

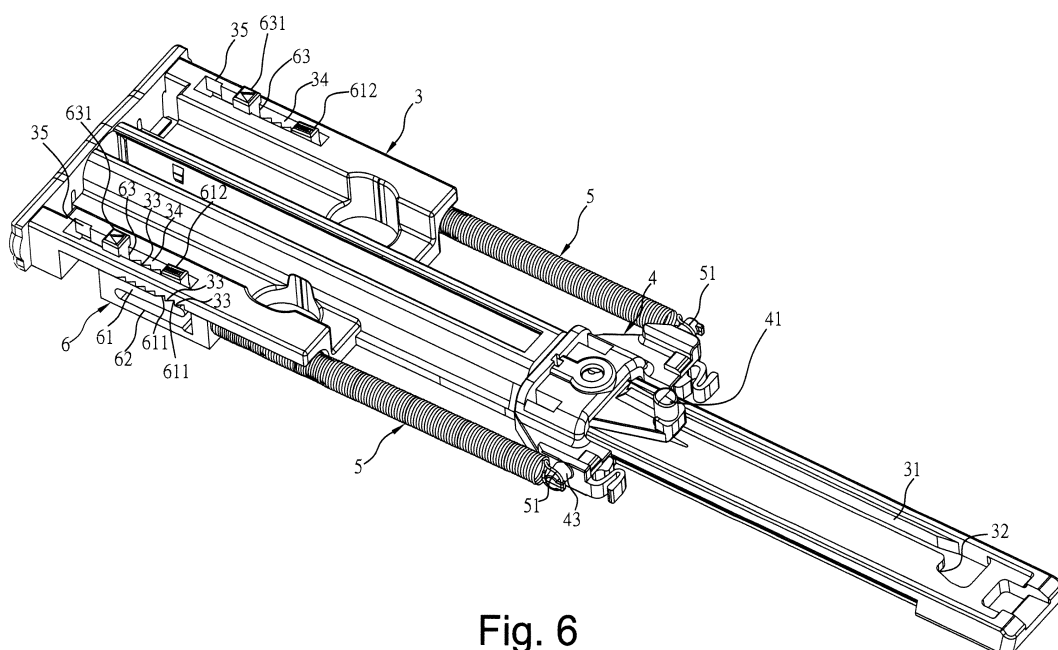


Fig. 6

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to side-locking ball bearing sliding rail assembly technology and more particularly, a side-locking ball bearing sliding rail assembly that allows fine adjustment of the restoring force of the loaded spring member.

2. Description of the Related Art

[0002] A conventional side-locking ball bearing sliding rail assembly 7 (see Fig. 1) is known comprising an auto-closing mechanism for automatically moving the movable rail 71 thereof with the connected drawer 81 backwards to the close position by means of the elastic restoring force of a spring member (not shown) thereof. Taiwan Utility M292955, issued to the present inventor, discloses a similar design capable of automatically closing the drawer and buffering the closing action. The known auto-closing mechanisms for side-locking ball bearing sliding rail assembly commonly use a spring member or multiple spring members for pulling back the movable rail and the connected drawer. However, the restoring force of the spring member(s) of the known designs is fixed and not adjustable. Therefore, the design of Taiwan Utility M292955 shown in Fig. 1 and other similar conventional designs commonly have the drawbacks as outlined hereinafter.

1. When carrying a heavy load, the restoring force of the spring member can be insufficient for effectively returning the movable rail 71 with the connected drawer 81 back to the closing position, and the user needs to replace the spring member with another one having a relatively larger restoring force; however, replacing the spring member is a complicated work and needs a special technique, bringing inconvenience to the user.

2. When carrying a light load, the restoring force of the spring member can pull the movable rail 71 with the connected drawer 81 back to the close position in a rush, causing noises and vibrations of the cabinet body 82, for example, bedside that accommodates the drawer; to solve this problem, the user needs to replace the spring member with another one having a relatively smaller restoring force; however, replacing the spring member is a complicated work and needs a special technique, bringing inconvenience to the user.

3. After installation of a side-locking ball bearing sliding rail assembly to have the movable rail 71 be affixed to one lateral panel of the drawer 72 and the

fixed rail 72 be affixed to an inner wall of the cabinet body 82, the drawer 81 with the movable rail 71 can be unable to move backwardly from the open position to the close position smoothly due to engineering problems in dimensions and tolerances. When this condition happens, the user needs to correct or replace the drawer, or to detach related components and replace the spring member.

SUMMARY OF THE INVENTION

[0003] The present invention has been accomplished under the circumstances in view. It is therefore the main object of the present invention to provide a side-locking ball bearing sliding rail assembly with auto-closing mechanism spring force adjustability that allows fine adjustment of the restoring force of the loaded spring member conveniently by means of adjusting the position of a spring force adjustment member.

[0004] It is another object of the present invention to provide a side-locking ball bearing sliding rail assembly with auto-closing mechanism spring force adjustability, which can be used for carrying different loads or to fit different size tolerances without making any modifications, changing the drawer or the spring member, assuring a high level of operating smoothness and accuracy.

[0005] To achieve these and other objects of the present invention, a side-locking ball bearing sliding rail assembly with auto-closing mechanism spring force adjustability of the invention formed of a fixed rail, a movable rail, an auto-closing mechanism carrier plate, a sliding device, a linking member and at least one spring member is characterized in that the side-locking ball bearing sliding rail assembly further comprises a spring force adjustment member longitudinally adjustably mounted at the auto-closing mechanism carrier plate and connected with an opposite end of each spring member for adjusting the restoring force of the at least one spring member. Thus, by means of adjusting the position of a spring force adjustment member, the restoring force of the at least one spring member is relatively adjusted to fit different requirements for carrying different loads.

BRIEF DESCRIPTION OF THE DRAWING

[0006]

Fig. 1 is a schematic front plain view illustrating a conventional side-locking ball bearing sliding rail assembly mounted between a cabinet and a drawer.

Fig. 2 is an oblique top elevational view, illustrating an auto-closing mechanism mounted in a fixed rail of a side-locking ball bearing sliding rail assembly in accordance with the present invention.

Fig. 3 is an oblique bottom elevational view of the movable rail of the side-locking ball bearing sliding

rail assembly in accordance with the present invention.

Fig. 4 is a schematic top plain view of the auto-closing mechanism of the side-locking ball bearing sliding rail assembly in accordance with the present invention, illustrating the movable rail moved backwards and the linking member kept away from the sliding device.

Fig. 5 is a schematic top plain view of the auto-closing mechanism of the side-locking ball bearing sliding rail assembly in accordance with the present invention, illustrating the movable rail returned to its former position.

Fig. 6 is an oblique top elevational view, in an enlarged scale, of a part of the present invention, illustrating the structure of the auto-closing mechanism.

Fig. 7 corresponds to Fig. 6 when viewed from another angle.

Fig. 8 is an exploded view of the auto-closing mechanism of the side-locking ball bearing sliding rail assembly in accordance with the present invention.

Fig. 9 is a side plain view of the auto-closing mechanism of the side-locking ball bearing sliding rail assembly in accordance with the present invention.

Fig. 10 corresponds to Fig. 9, illustrating the position of the spring force adjustment member adjusted.

Fig. 11 corresponds to Fig. 10, illustrating the hook block of the spring force adjustment member disengaged from the hook grooves of the auto-closing mechanism carrier plate.

Fig. 12 corresponds to Fig. 11, illustrating the spring force adjustment member moved forwards after disengagement of the hook block of the spring force adjustment member from the hook grooves of the auto-closing mechanism carrier plate.

DETAILED DESCRIPTION OF THE INVENTION

[0007] Referring to FIGS. 2-12, a side-locking ball bearing sliding rail assembly with auto-closing mechanism spring force adjustability in accordance with the present invention is shown. The side-locking ball bearing sliding rail assembly comprises:

a fixed rail **1** (see Figs. 2-5) affixed to an inner side-wall of a cabinet (not shown);

a movable rail **2** (see Fig. 1 and Fig. 5) affixed to a drawer (not shown) and mounted on and forwardly

and backwardly slidable relative to the fixed rail **1** to carry the drawer relative to the fixed rail **1**;

an auto-closing mechanism carrier plate **3** (see Fig. 2 and Figs. 4-8) fixedly fastened to one end of the fixed rail **1** and comprising at least one, for example, one longitudinally extending sliding slot **31** (see Figs. 6-8), and a retaining hole **32** disposed in communication with one end of the sliding slot **31**;

a sliding device **4** (see Fig. 2, Figs. 4-8) mounted on and forwardly and backwardly movable relative to the auto-closing mechanism carrier plate **3**, comprising a guide member **41** pivotally located at one end thereof and coupled to and slidable along the longitudinally extending sliding slot **31** of the auto-closing mechanism carrier plate **3**, a locating member **43** for the connection of one end of a spring member **5**;

a linking member **20** (see Fig. 3) mounted at one end of the movable rail **2** for linking the guide member **41** of the sliding device **4** to move the sliding device **4** into engagement with or away from the retaining hole **32** of the auto-closing mechanism carrier plate **3**; and

at least one, for example, one spring member **5** having one end thereof connected to the locating member **43** of the sliding device **4** such that the spring member **5** can be stretched out by the sliding device **4** and can then pull the sliding device **4** backward by means of its elastic restoring force after disappearance of the stretching force.

[0008] Based on the composition of the above-described component parts, when moving the drawer and the movable rail **2** backwardly to the position where the linking member **20** of the movable rail **2** is abutted against the guide member **41** of the sliding device **4**, the guide member **41** is disengaged from the retaining hole **32** of the auto-closing mechanism carrier plate **3**, causing the sliding device **4** to be forced by the elastic potential energy of the spring member **5** to move backwardly along the sliding slot **31** of the auto-closing mechanism carrier plate **3** and to further carry the movable rail **2** and the drawer to the close position in the cabinet (see Fig. 5), and thus the expected auto-closing function is achieved.

[0009] The main features of the present invention are outlined hereinafter.

[0010] The side-locking ball bearing sliding rail assembly further comprises a spring force adjustment member **6** longitudinally adjustably mounted at the auto-closing mechanism carrier plate **3** and connected with an opposite end **52** of the spring member **5** for adjusting the restoring force of the spring member **5**. The spring force adjustment member **6** comprises a retaining means **61**, for example, a hook block **611** (or hook groove) selectively engageable with one of a longitudinal series of hook

grooves (or hook blocks) **33** at the auto-closing mechanism carrier plate **3** to adjust the restoring force of the spring member **5**.

[0011] The spring force adjustment member **6** further comprises an opening **62** disposed adjacent to the retaining means **61** so that the retaining means **61** is elastically deformably movable in direction away from the auto-closing mechanism carrier plate (see Fig. 11) to disengage the at least one hook block (or hook groove) **611** thereof from the at least one hook groove (or hook block) **33** of the auto-closing mechanism carrier plate **3**.

[0012] The spring force adjustment member **6** further comprises a finger block **612** located at one side of the retaining means **61** for pressing by the user to move the retaining means **61** in direction away from the auto-closing mechanism carrier plate **3**.

[0013] The auto-closing mechanism carrier plate **3** further comprises a sub sliding slot **34** longitudinally disposed at one lateral side thereof. The spring force adjustment member **6** further comprises a sliding block **63** coupled to and movable along the sub sliding slot **34** of the auto-closing mechanism carrier plate **3**.

[0014] Further, the sliding block **63** of the spring force adjustment member **6** has an expanded head **631** larger than the width of the sub sliding slot **34** of the auto-closing mechanism carrier plate **3** for preventing the sliding block **63** from escaping out of the sub sliding slot **34**.

[0015] Further, the spring force adjustment member **6** comprises a locating member, for example, locating groove **64** (see Fig. 6 and Fig. 7) for the connection of the opposite end **52** of the spring member **5**.

[0016] Further, the sub sliding slot **34** of the auto-closing mechanism carrier plate **3** has an expanded end portion **35** located in one end thereof through which the expanded head **631** of the sliding block **63** of the spring force adjustment member **6** can be moved in and out of the sub sliding slot **34**.

[0017] When wishing to adjust the restoring force of the spring member **5**, push the expanded head **631** of the sliding block **63** of the spring force adjustment member **6** to move the spring force adjustment member **6** in direction reverse to the direction of hooking the hook block **611** (or hook groove) of the retaining means **61** in one hook groove **33** (or hook block) of the auto-closing mechanism carrier plate **3** (see Fig. 9 and Fig. 10), the spring member **5** is stretched, increasing the restoring force of the spring member **5**. When released the applied force from the expanded head **631** at this time, the hook block **611** (or hook groove) of the retaining means **61** is immediately forced into engagement with one hook groove **33** (or hook block) of the auto-closing mechanism carrier plate **3**; when the user imparts a downward pressure to the finger block **612** of the spring force adjustment member **6** to move the retaining means **61** in direction away from the auto-closing mechanism carrier plate **3** (see Fig. 11), the hook block **611** (or hook groove) of the retaining means **61** is disengaged from the hook grooves **33** (or hook blocks) of the auto-closing mechanism carrier

plate **3**, and the elastic potential energy of the spring member **5** causes the spring force adjustment member **6** to move in direction toward the one end **51** of the spring member **5** (see Fig. 12), and thus the hook block **611** (or hook groove) of the retaining means **61** of the spring force adjustment member **6** is forced into engagement with one hook groove **33**

[0018] (or hook block) (see Fig. 9). Thus, the restoring force of the spring member **5** is reduced.

[0019] As indicated above, the invention has the following features:

1. The user can easily and conveniently increase or reduce the restoring force of the spring member **5** by means of pressing the finger block **612** to adjust the position of the spring force adjustment member **6** on the auto-closing mechanism carrier plate **3**.

2. By means of adjusting the restoring force of the spring member **5**, the side-locking ball bearing sliding rail assembly can be used for carrying different loads or to fit different size tolerances without making any modifications, changing the drawer or the spring member **5**, assuring a high level of operating smoothness and accuracy.

[0020] Although a particular embodiment of the invention has been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.

Claims

1. A side-locking ball bearing sliding rail assembly, comprising:

- a fixed rail affixed to an inner sidewall of a cabinet;
- a movable rail affixed to a drawer and mounted on and forwardly and backwardly slidable relative to said fixed rail to carry said drawer relative to said fixed rail;
- an auto-closing mechanism carrier plate fixedly fastened to one end of said fixed rail, said auto-closing mechanism comprising a longitudinally extending sliding slot, and a retaining hole disposed in communication with one end of said sliding slot;
- a sliding device mounted on and forwardly and backwardly movable relative to said auto-closing mechanism carrier plate, said sliding device comprising a guide member pivotally located at one end thereof and coupled to and slidable along said longitudinally extending sliding slot of said auto-closing mechanism carrier plate, a

- locating member for the connection of one end of a spring member;
 a linking member mounted at one end of said movable rail for linking said guide member of said sliding device to move said sliding device into engagement with or away from said retaining hole of said auto-closing mechanism carrier plate; and
 at least one spring member, each said spring member having one end thereof connected to said locating member of said sliding device so that said at least one spring member is stretchable by said sliding device to pull said sliding device;
 wherein the side-locking ball bearing sliding rail assembly further comprises a spring force adjustment member longitudinally adjustably mounted at said auto-closing mechanism carrier plate and connected with an opposite end of each said spring member for adjusting the restoring force of said at least one spring member.
2. The side-locking ball bearing sliding rail assembly as claimed in claim 1, wherein said spring force adjustment member comprises a retaining means detachably fastenable to said auto-closing mechanism carrier plate in one of a longitudinal series of positions to adjust the restoring force of said at least one spring member.
3. The side-locking ball bearing sliding rail assembly as claimed in claim 2, wherein said auto-closing mechanism carrier plate comprises a longitudinal series of hook grooves or hook blocks; said retaining means of said spring force adjustment member comprises at least one hook block or hook groove selectively engageable with the longitudinal series of hook grooves or hook blocks of said auto-closing mechanism carrier plate.
4. The side-locking ball bearing sliding rail assembly as claimed in claim 3, wherein said spring force adjustment member further comprises an opening disposed adjacent to said retaining means so that said retaining means is elastically deformably movable in direction away from said auto-closing mechanism carrier plate to disengage the at least one hook block or hook groove thereof from the at least one hook groove or hook block of said auto-closing mechanism carrier plate.
5. The side-locking ball bearing sliding rail assembly as claimed in claim 4, wherein said spring force adjustment member further comprises a finger block located at one side of said retaining means for pressing by the user to move said retaining means in direction away from said auto-closing mechanism carrier plate.
6. The side-locking ball bearing sliding rail assembly as claimed in claim 5, wherein said auto-closing mechanism carrier plate further comprises a sub sliding slot longitudinally disposed at one lateral side thereof; said spring force adjustment member further comprises a sliding block coupled to and movable along said sub sliding slot of said auto-closing mechanism carrier plate.
7. The side-locking ball bearing sliding rail assembly as claimed in claim 6, wherein said sliding block of said spring force adjustment member has an expanded head larger than the width of said sub sliding slot of said auto-closing mechanism carrier plate for preventing said sliding block from escaping out of said sub sliding slot.
8. The side-locking ball bearing sliding rail assembly as claimed in claim 7, wherein said sub sliding slot of said auto-closing mechanism carrier plate has an expanded end portion located in one end thereof through which said expanded head of said sliding block of said spring force adjustment member is movable in and out of said sub sliding slot.
9. A side-locking ball bearing sliding rail assembly, comprising:
- a fixed rail affixed to an inner sidewall of a cabinet;
 - a movable rail affixed to a drawer and mounted on and forwardly and backwardly slidable relative to said fixed rail to carry said drawer relative to said fixed rail;
 - an auto-closing mechanism carrier plate fixedly fastened to one end of said fixed rail, said auto-closing mechanism comprising a longitudinally extending sliding slot, and a retaining hole disposed in communication with one end of said sliding slot;
 - a sliding device mounted on and forwardly and backwardly movable relative to said auto-closing mechanism carrier plate, said sliding device comprising a guide member pivotally located at one end thereof and coupled to and slidable along said longitudinally extending sliding slot of said auto-closing mechanism carrier plate, a locating member for the connection of one end of a spring member;
 - a linking member mounted at one end of said movable rail for linking said guide member of said sliding device to move said sliding device into engagement with or away from said retaining hole of said auto-closing mechanism carrier plate; and
 - at least one spring member, each said spring member having one end thereof connected to said locating member of said sliding device so

that said at least one spring member is stretchable by said sliding device to pull said sliding device;

wherein the side-locking ball bearing sliding rail assembly further comprises a spring force adjustment member longitudinally adjustably mounted at said auto-closing mechanism carrier plate and connected with an opposite end of each said spring member for adjusting the restoring force of said at least one spring member, said spring force adjustment member comprising a retaining means detachably fastenable to said auto-closing mechanism carrier plate in one of a longitudinal series of positions to adjust the restoring force of said at least one spring member.

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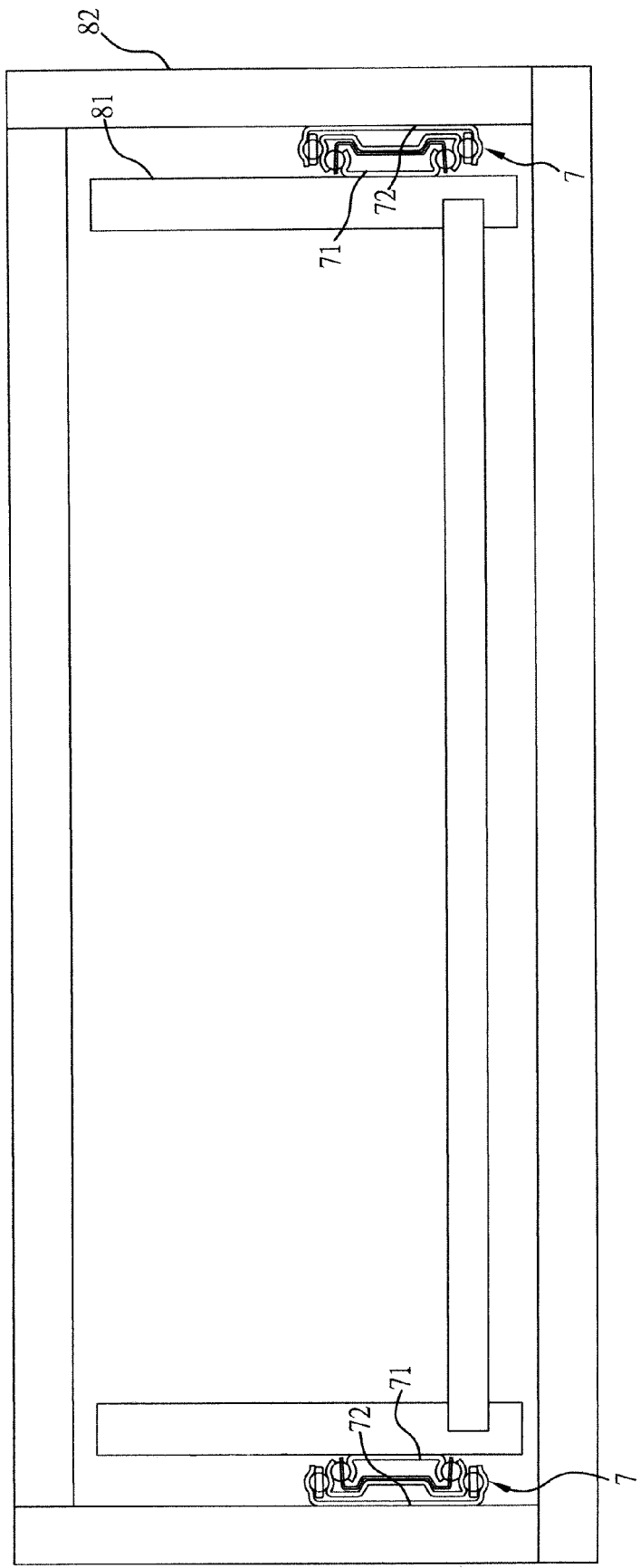


Fig. 1

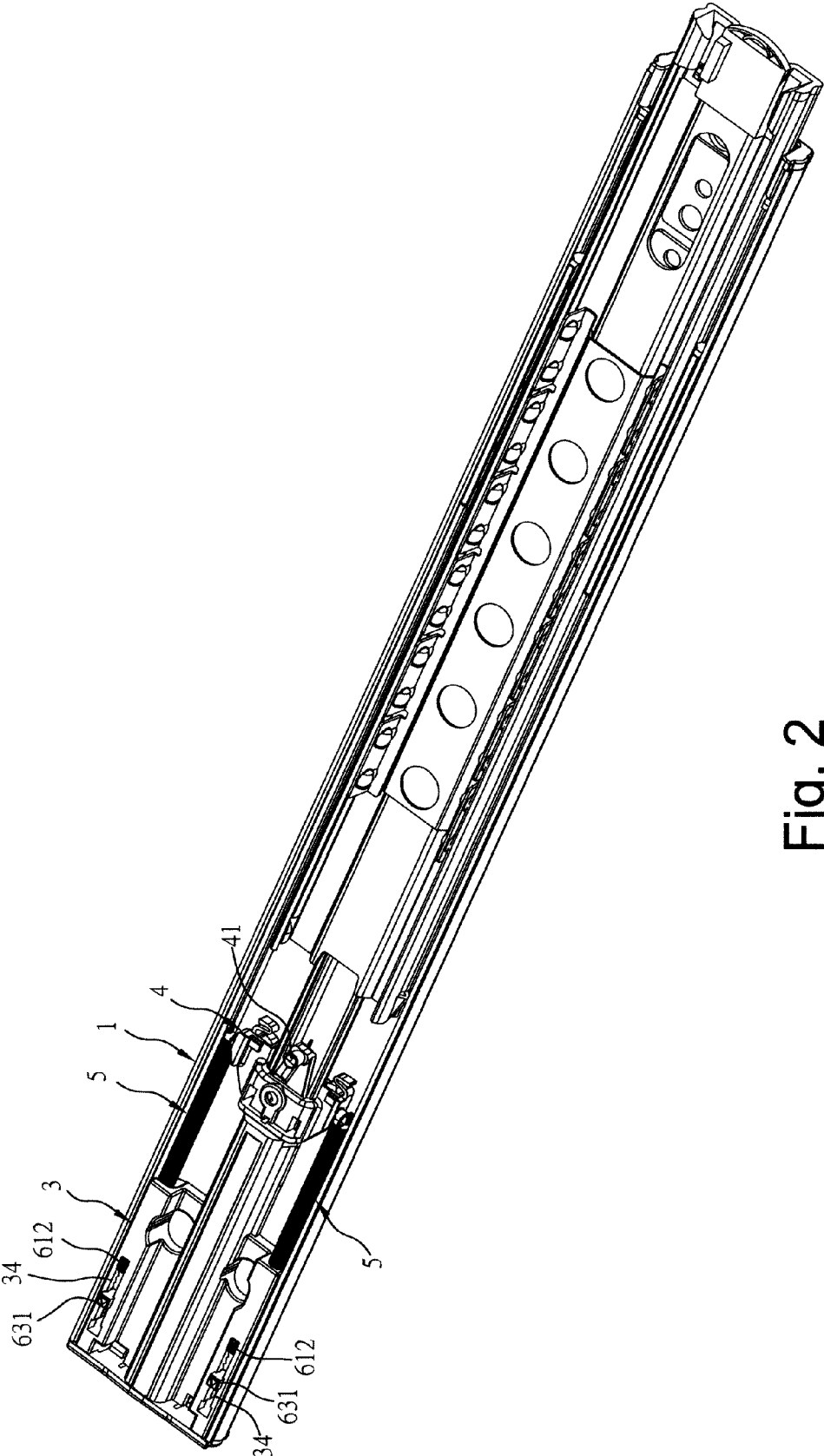


Fig. 2

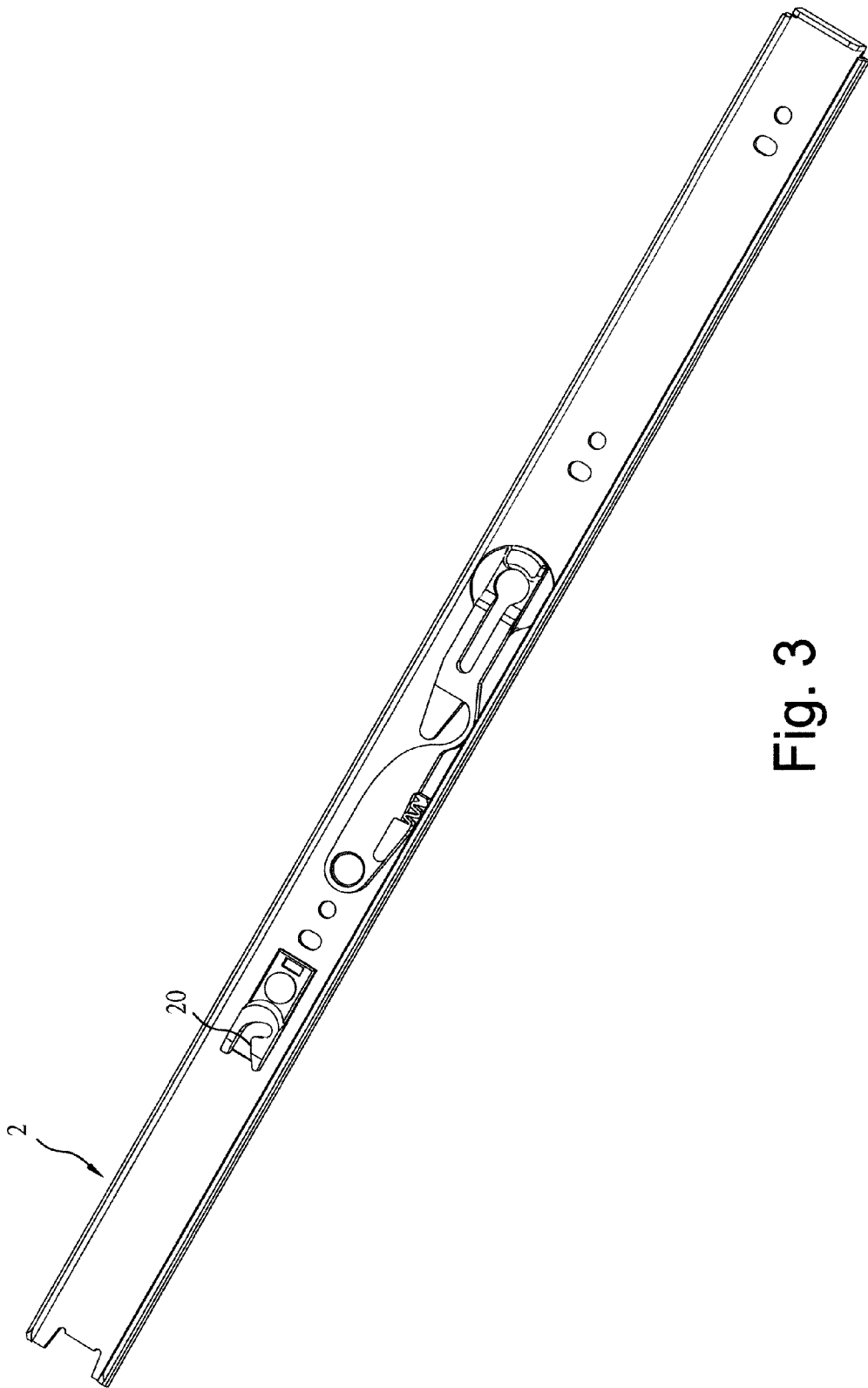


Fig. 3

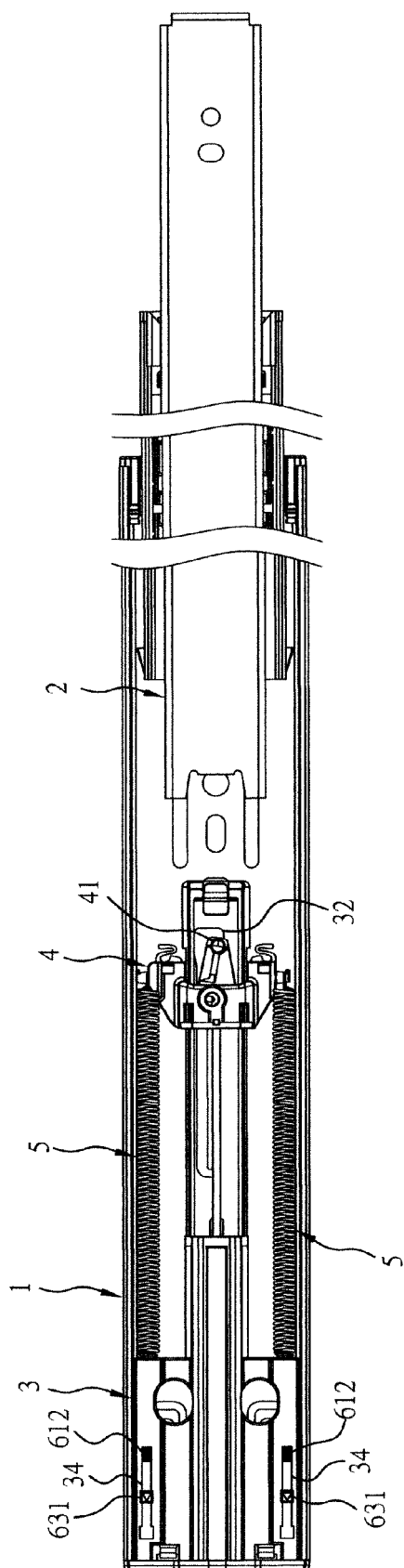


Fig. 4

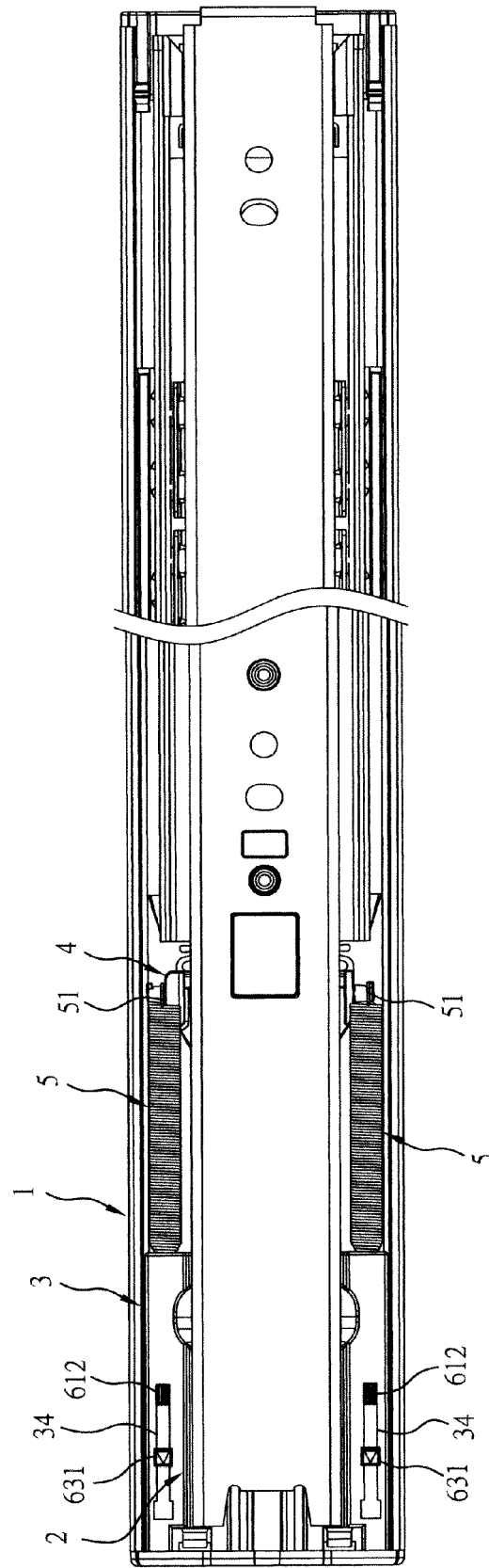


Fig. 5

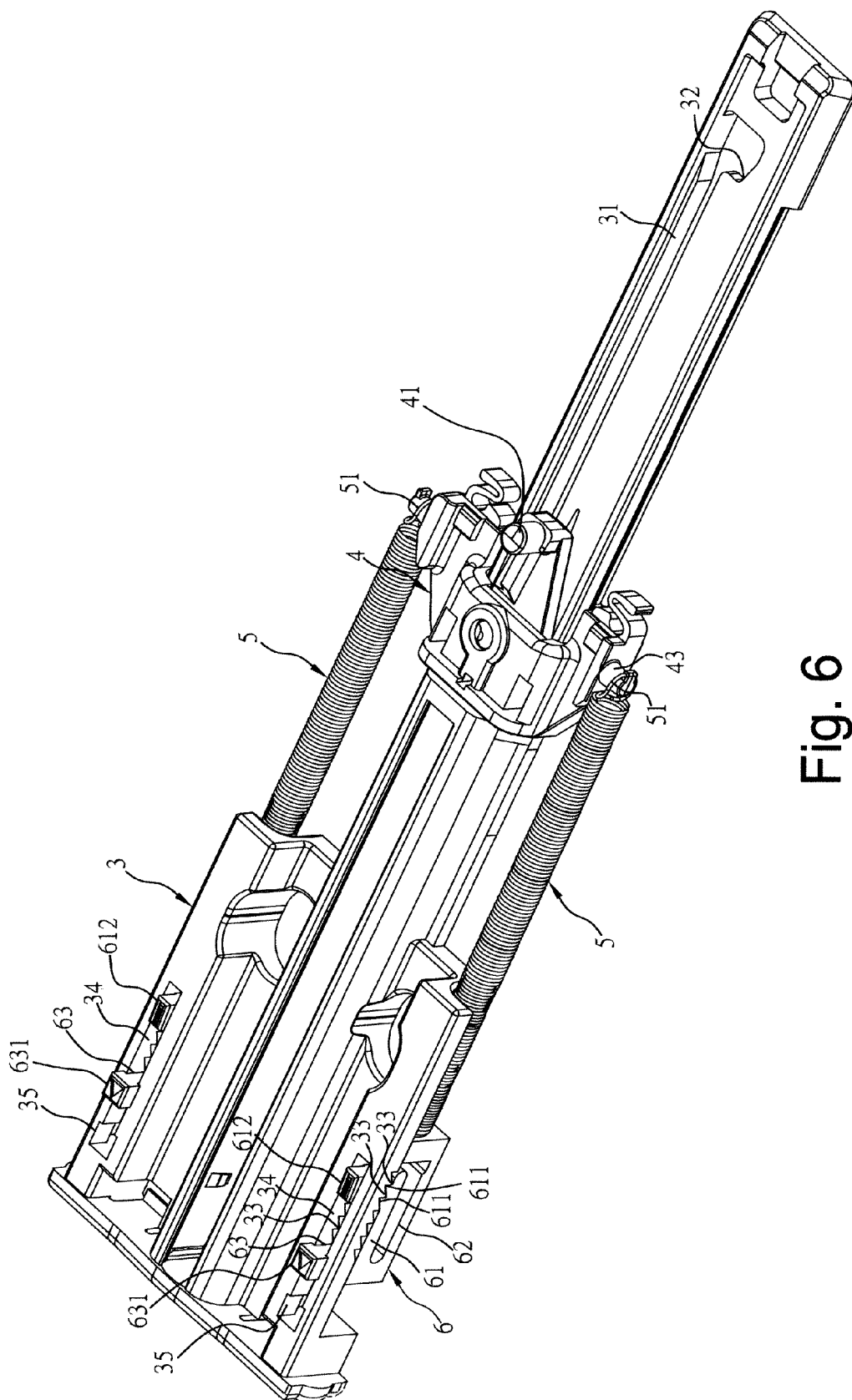


Fig. 6

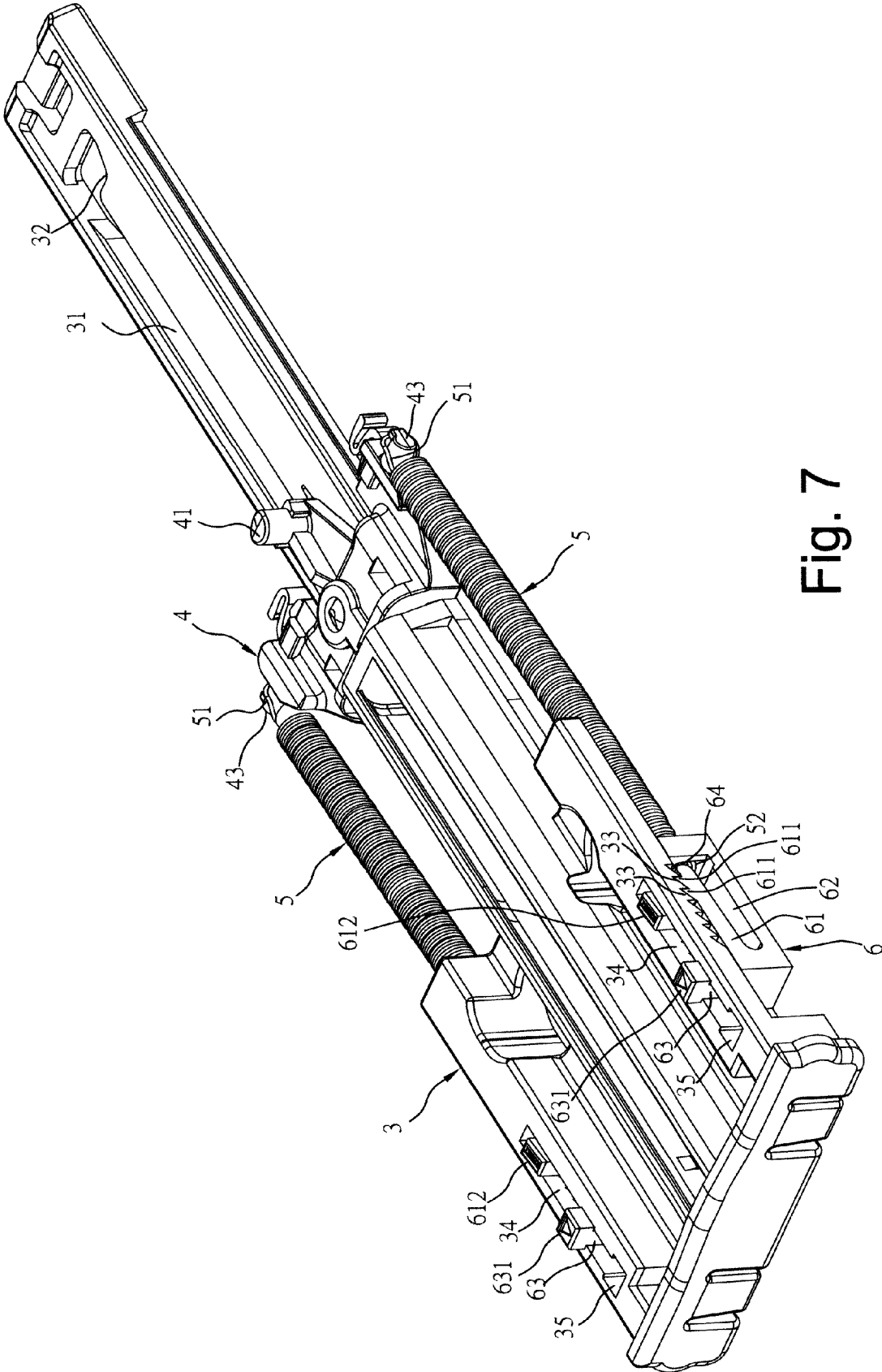


Fig. 7

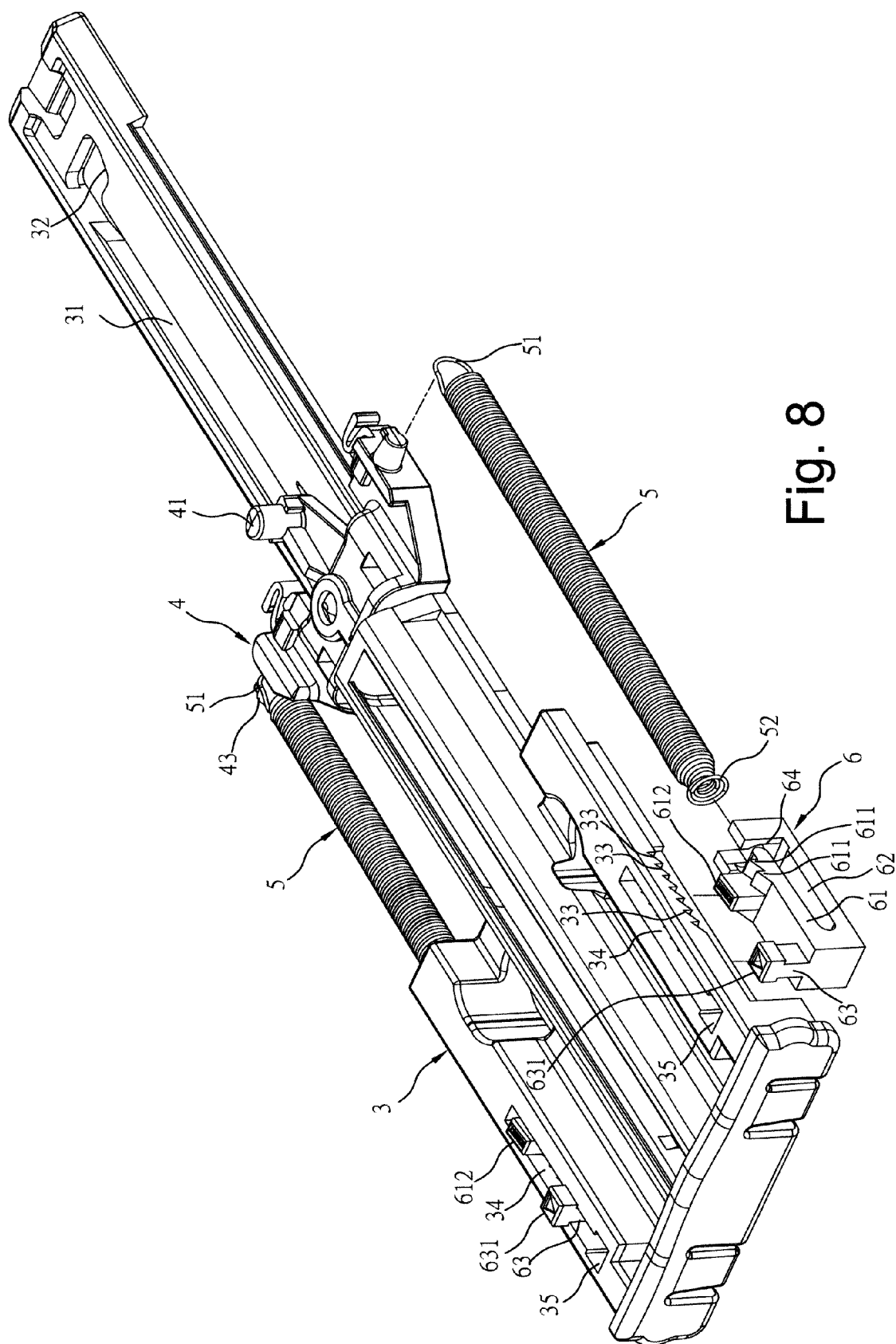
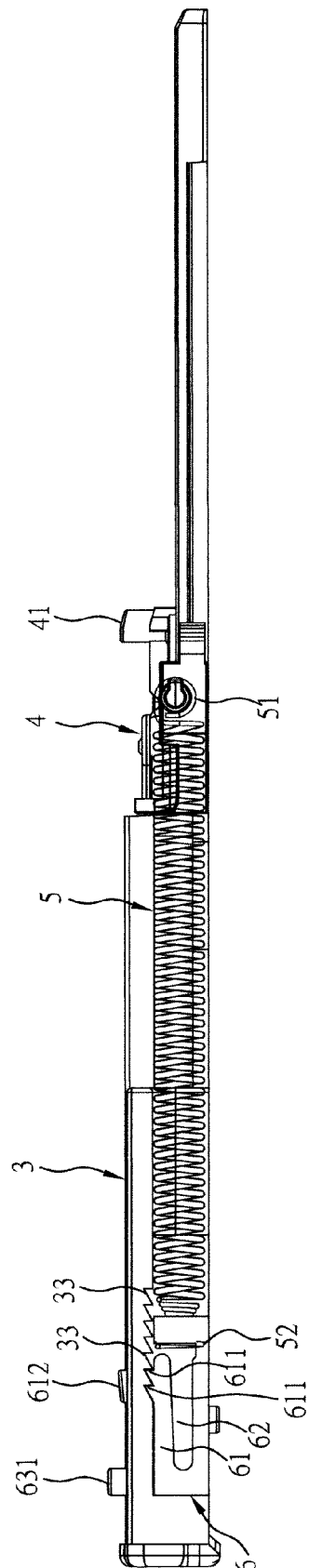
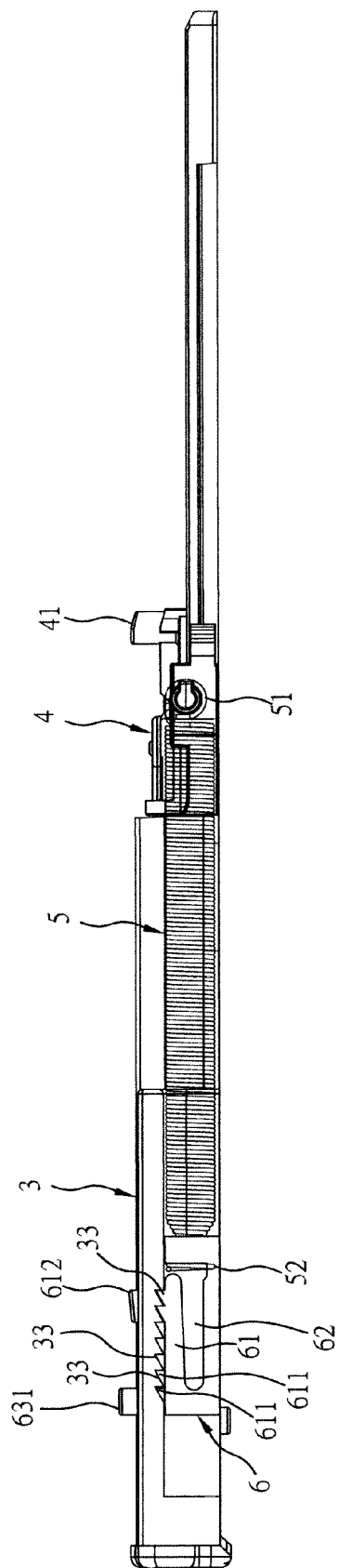


Fig. 8



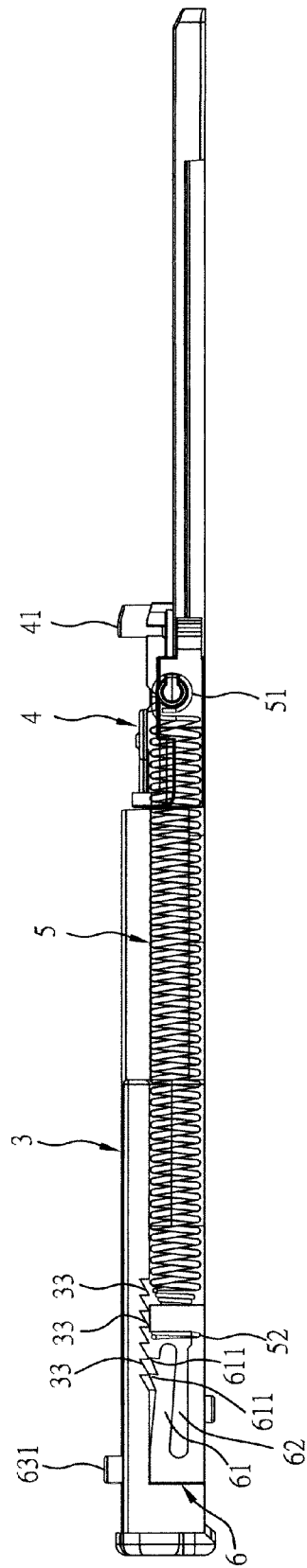


Fig. 11

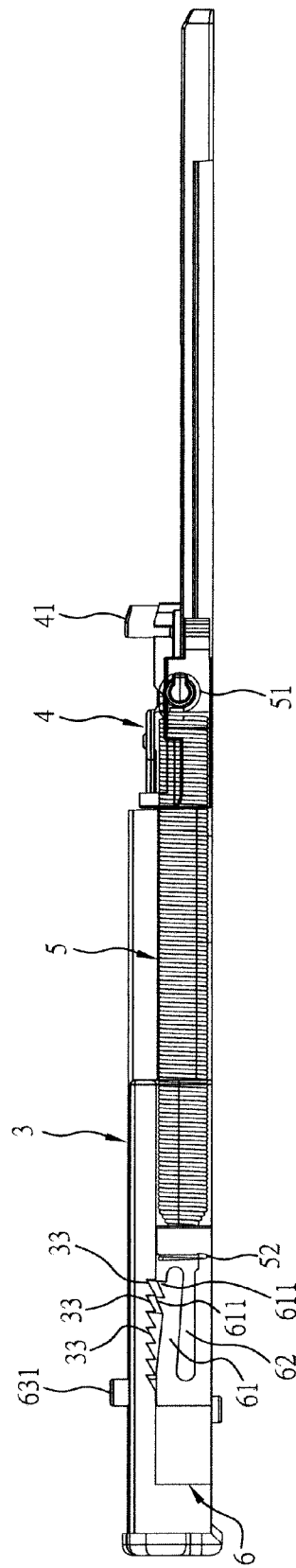


Fig. 12



EUROPEAN SEARCH REPORT

Application Number
EP 14 25 0096

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 202 112 640 U (GUANGDONG TAIMING METAL PRODUCTS CO LTD) 18 January 2012 (2012-01-18) * figures 1,2,10-12 *	1-9	INV. A47B88/04
X	EP 1 557 113 A1 (GRASS GMBH) 27 July 2005 (2005-07-27) * paragraph [0019] - paragraph [0033]; figures 7-12 *	1-6,9	
X	CN 202 009 845 U (SHAOHAN LI) 19 October 2011 (2011-10-19) * figures 1-5 *	1-3,9	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47B E05F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 20 January 2015	Examiner Jacquemin, Martin
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ON EUROPEAN PATENT APPLICATION NO.**

EP 14 25 0096

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The members are as contained in the European Patent Office EDP file on
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20-01-2015

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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