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Huang et al.(10) **Pub. No.: US 2008/0303399 A1**(43) **Pub. Date: Dec. 11, 2008**(54) **FRONT INSTALLING DRAWER PULLING
FORCE ADJUSTING APPARATUS****Publication Classification**(75) Inventors: **Kuo-Sheng Huang**, Taipei County
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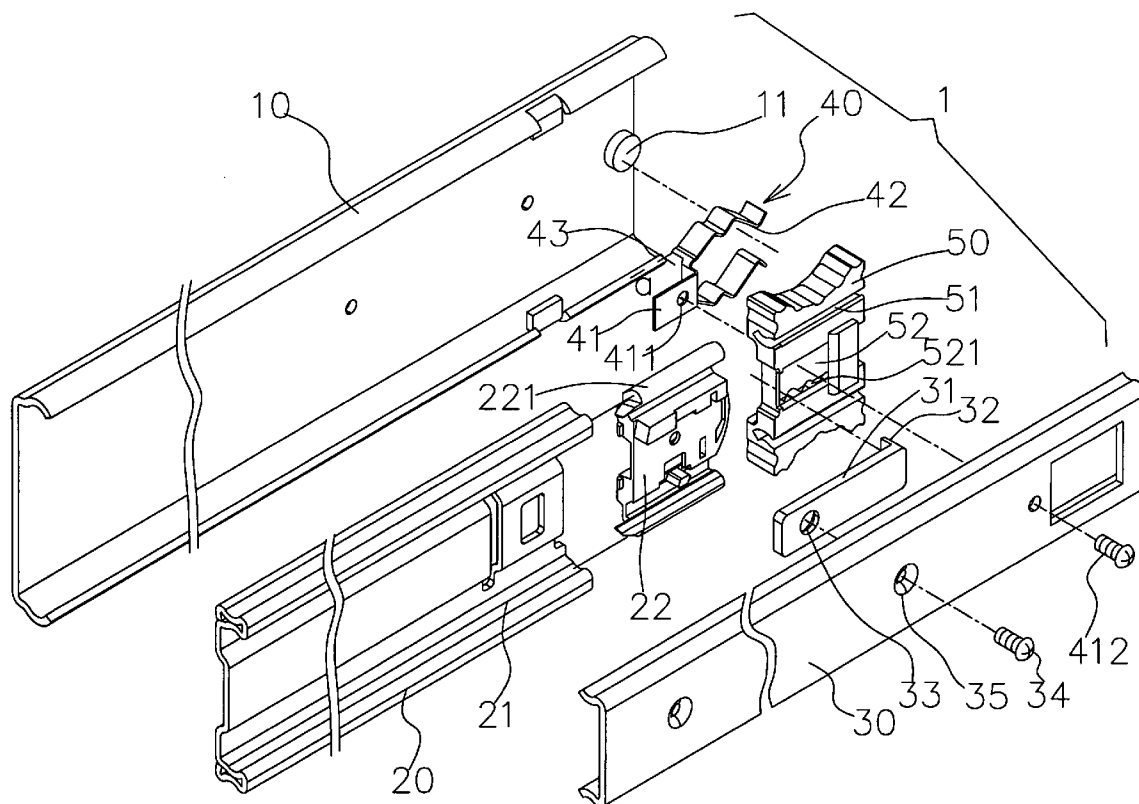
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(57) **ABSTRACT**

A front installing drawer pulling force adjusting apparatus is installed at a front end of a slide. The slide includes a bottom rail, a middle rail and an internal rail. The bottom rail has a latch element at the front end. The bottom rail has a slidable middle rail. The internal rail is embedded onto the middle rail and slid on the middle rail. The front end of the internal rail includes a limit element having a resilient element corresponding to the latch element. The internal rail is connected to an object that needs to be moved. During assembling, a portion intersecting the resilient element in the limit element with the limit element determines the level of retraction of the resilient element to adjust the tightness of clamping the resilient element onto the latch element of the bottom rail, so that users can open a drawer with an appropriate force.



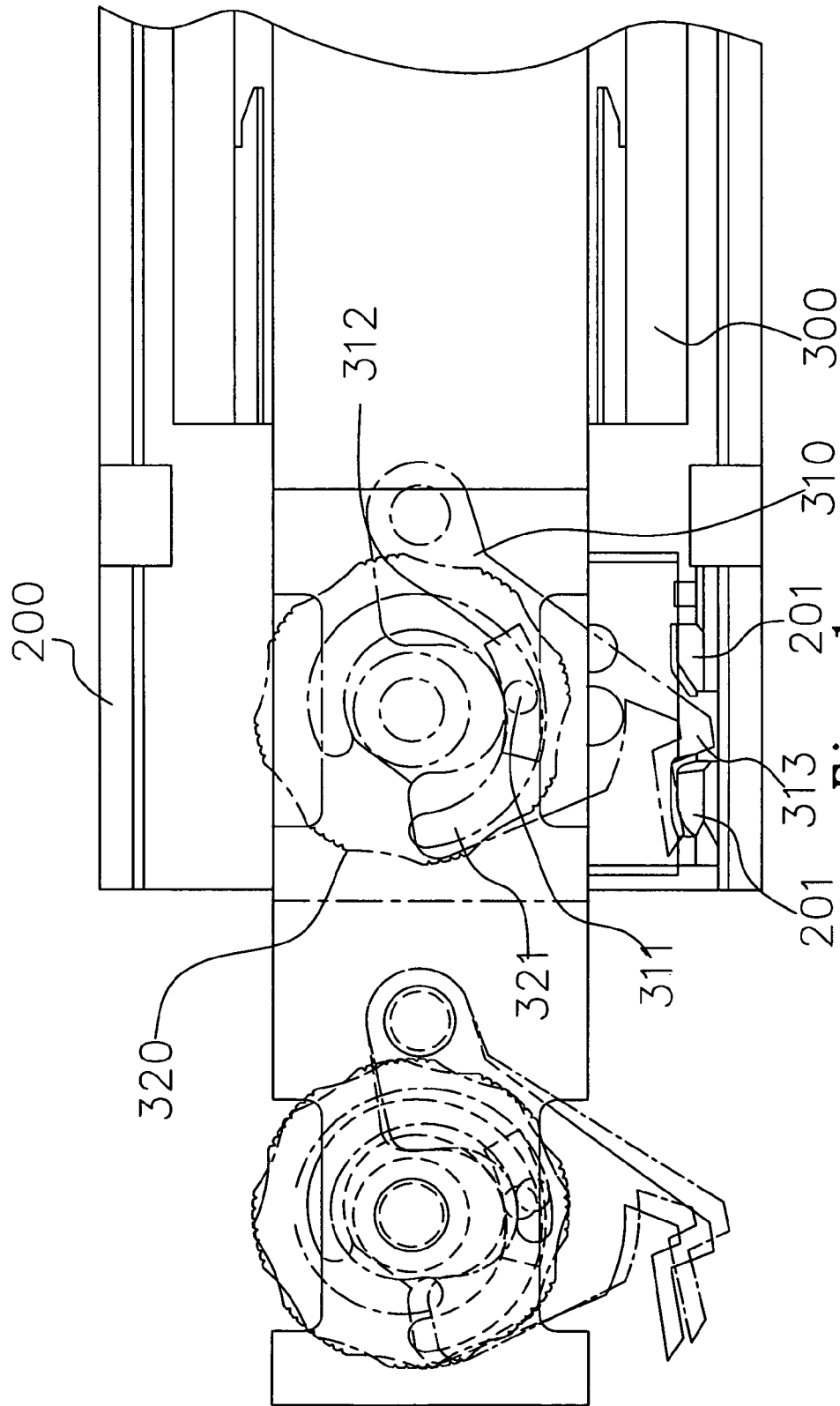


Fig. 1
(Prior Art)

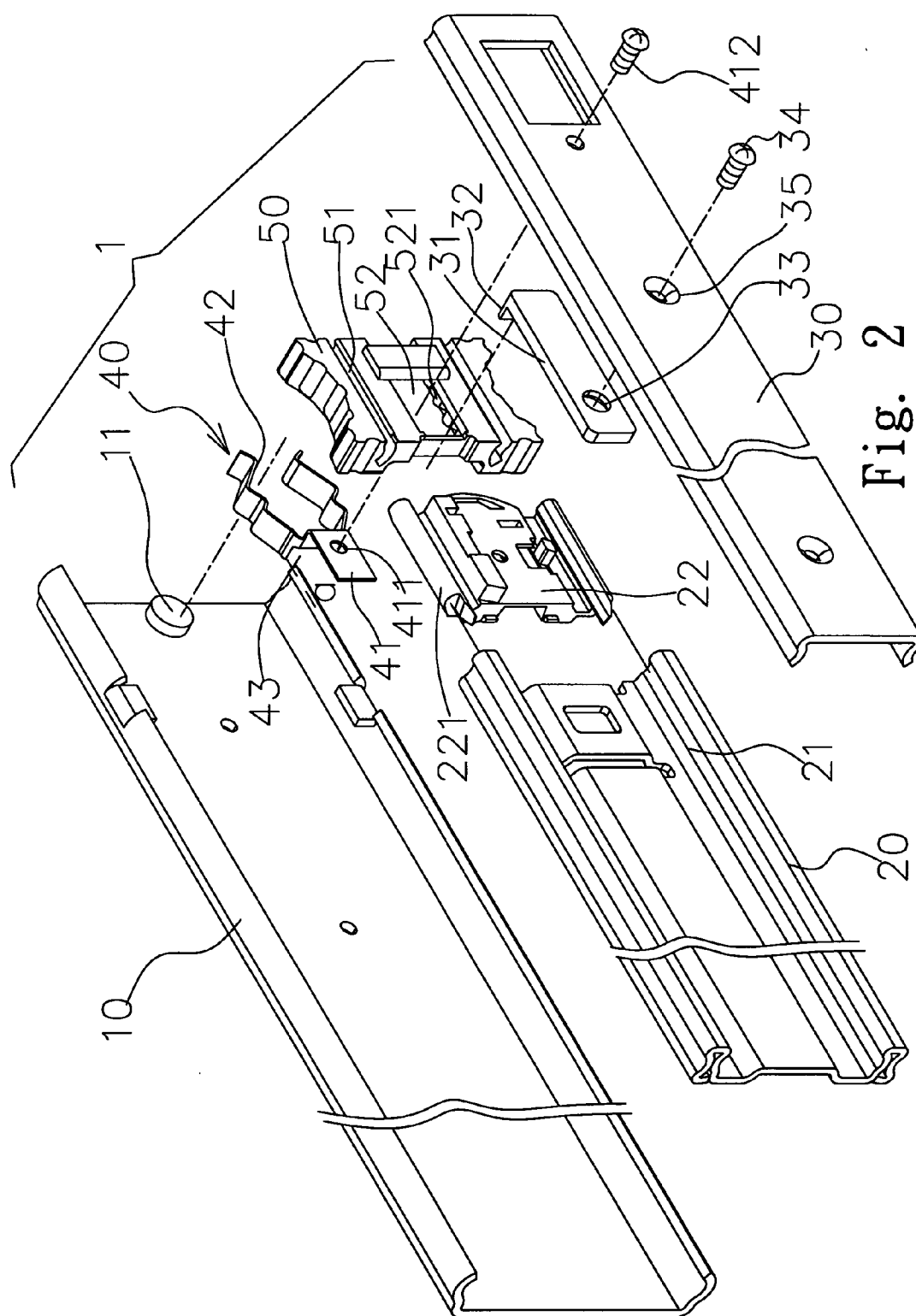
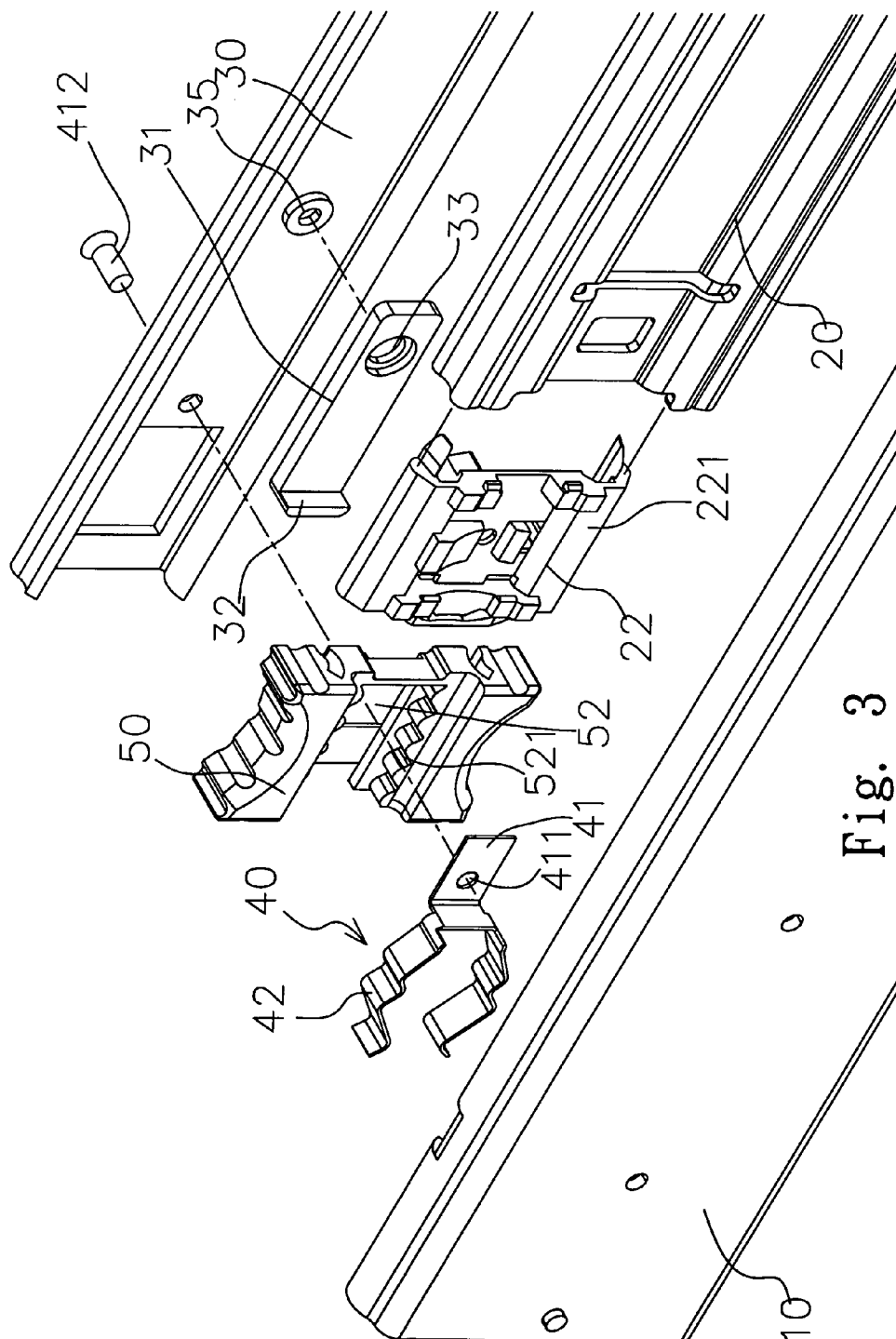


Fig. 2



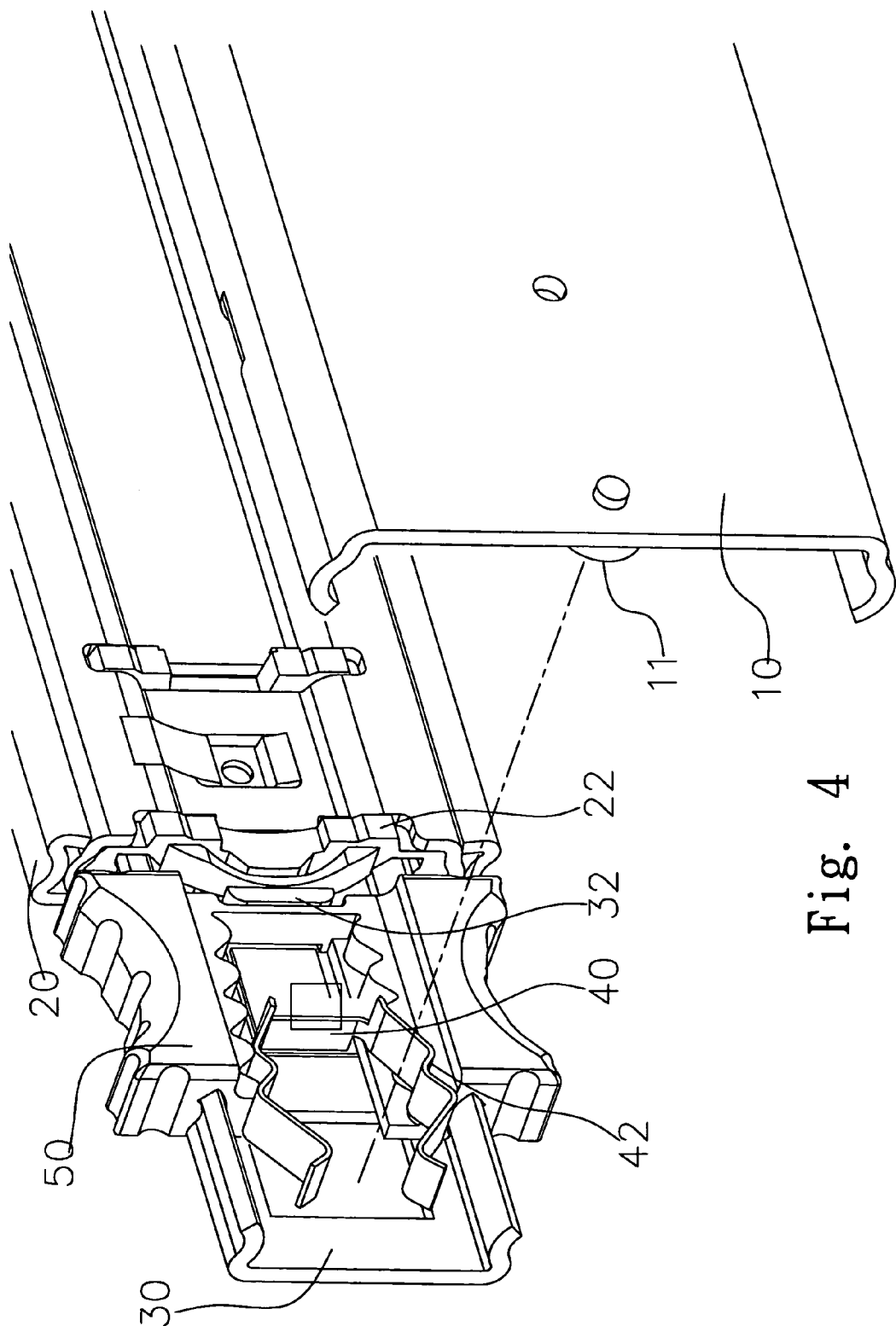


Fig. 4

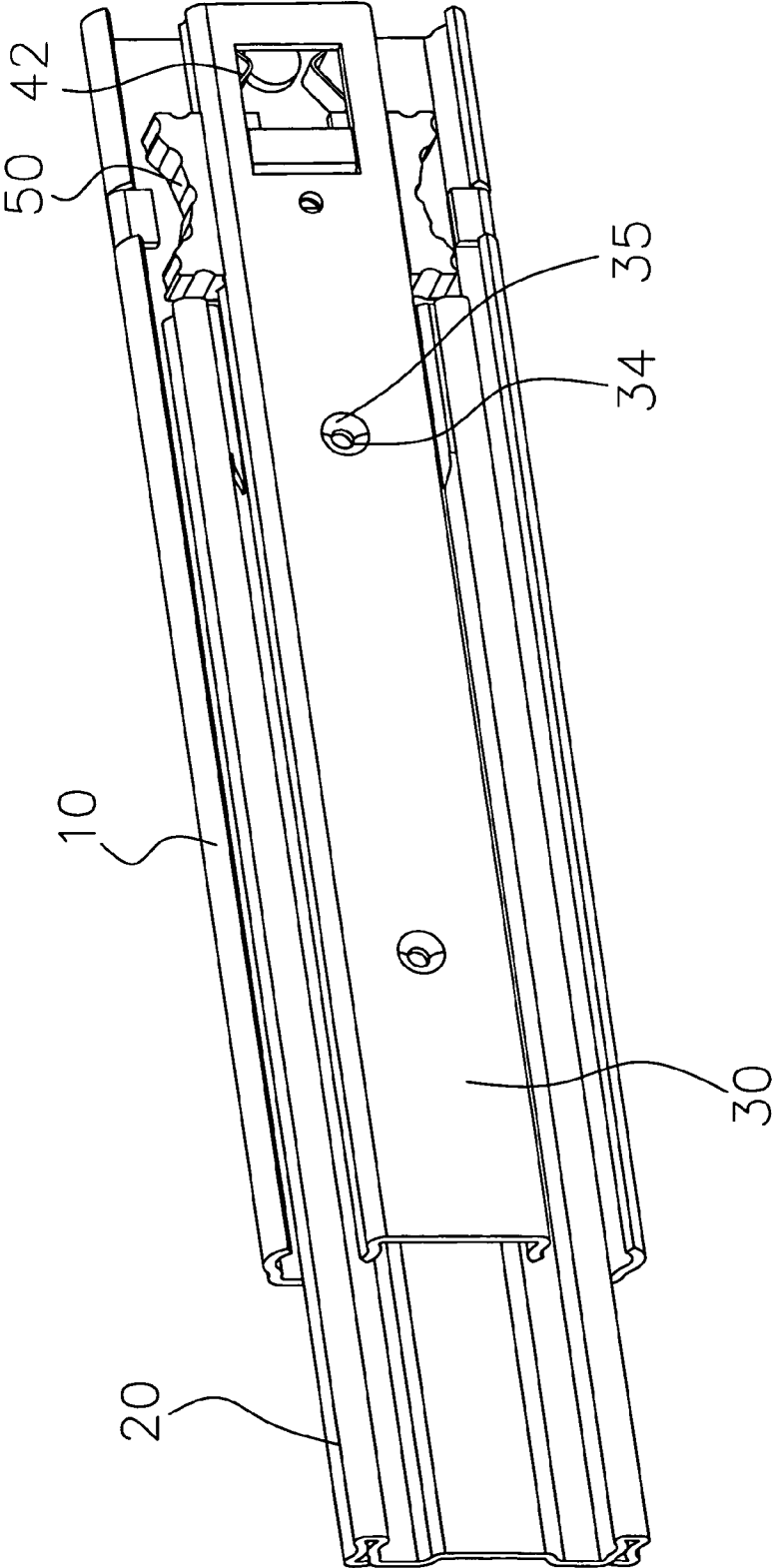


Fig. 5

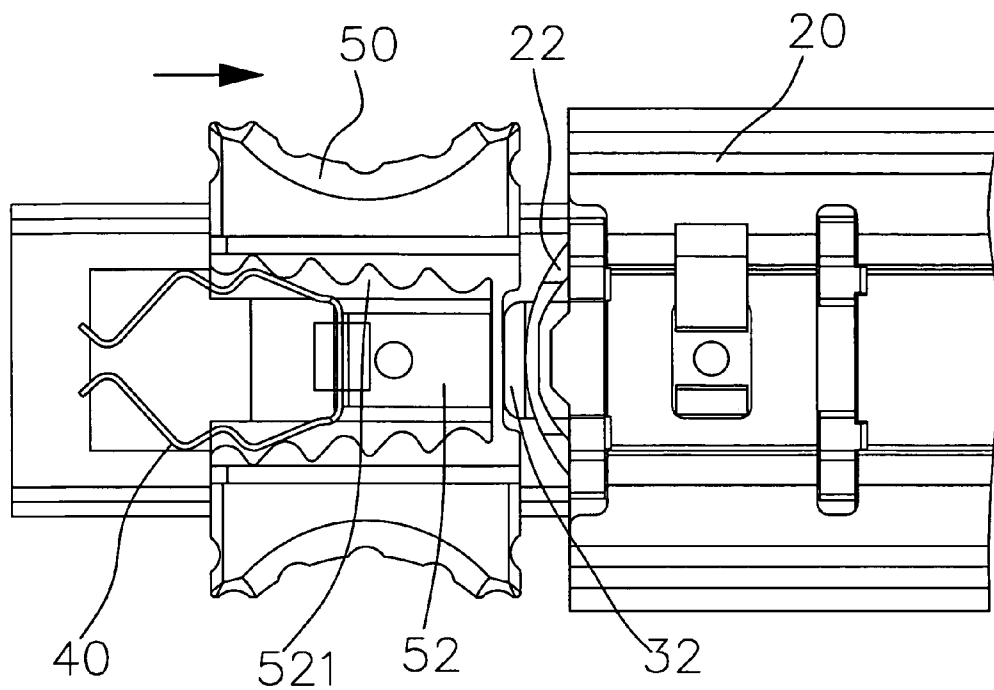


Fig. 6

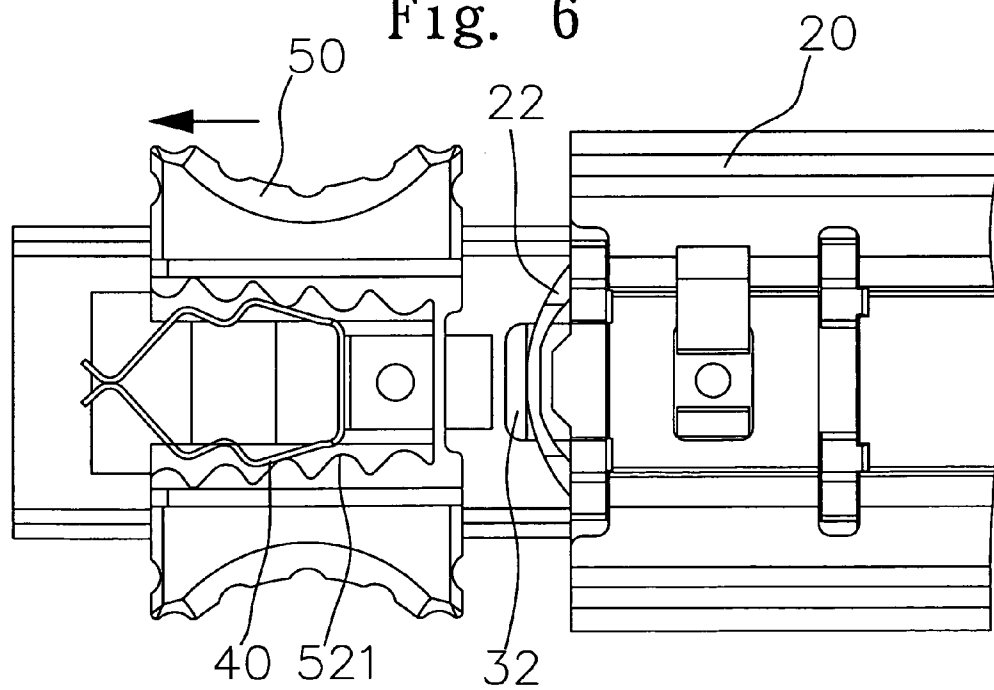
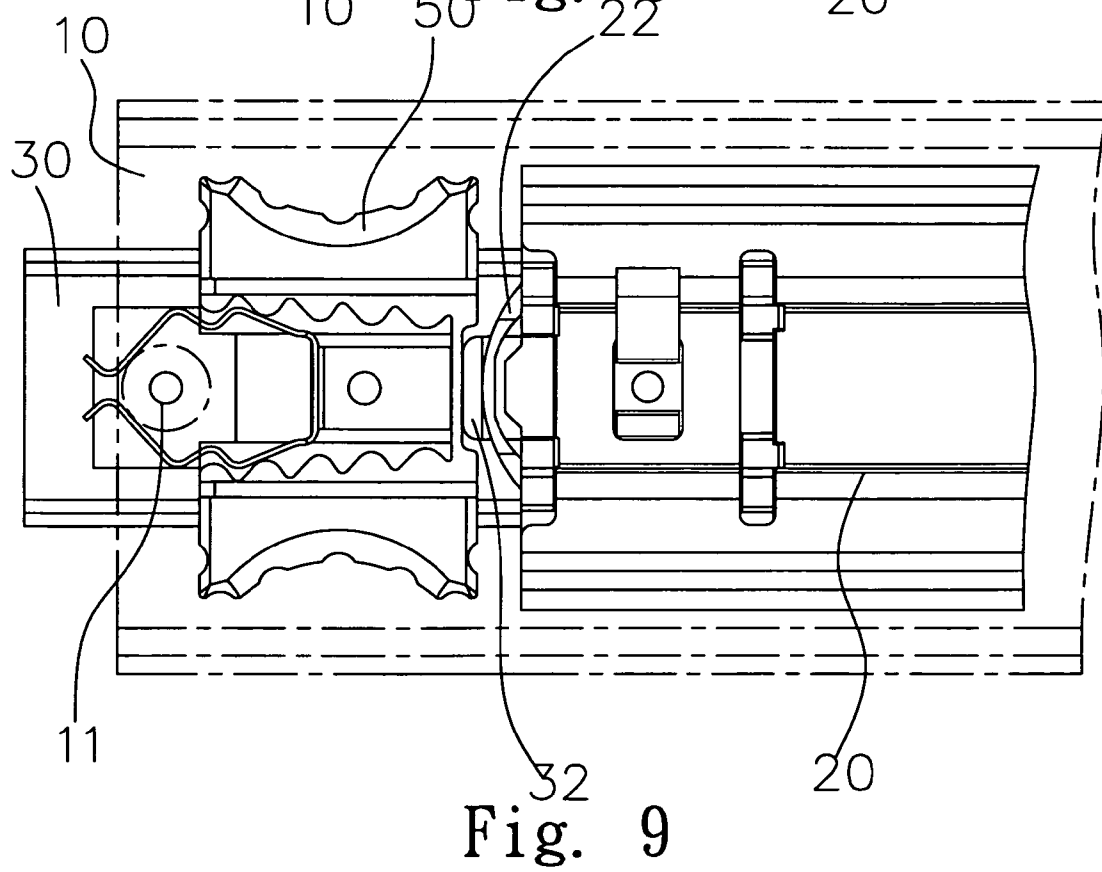
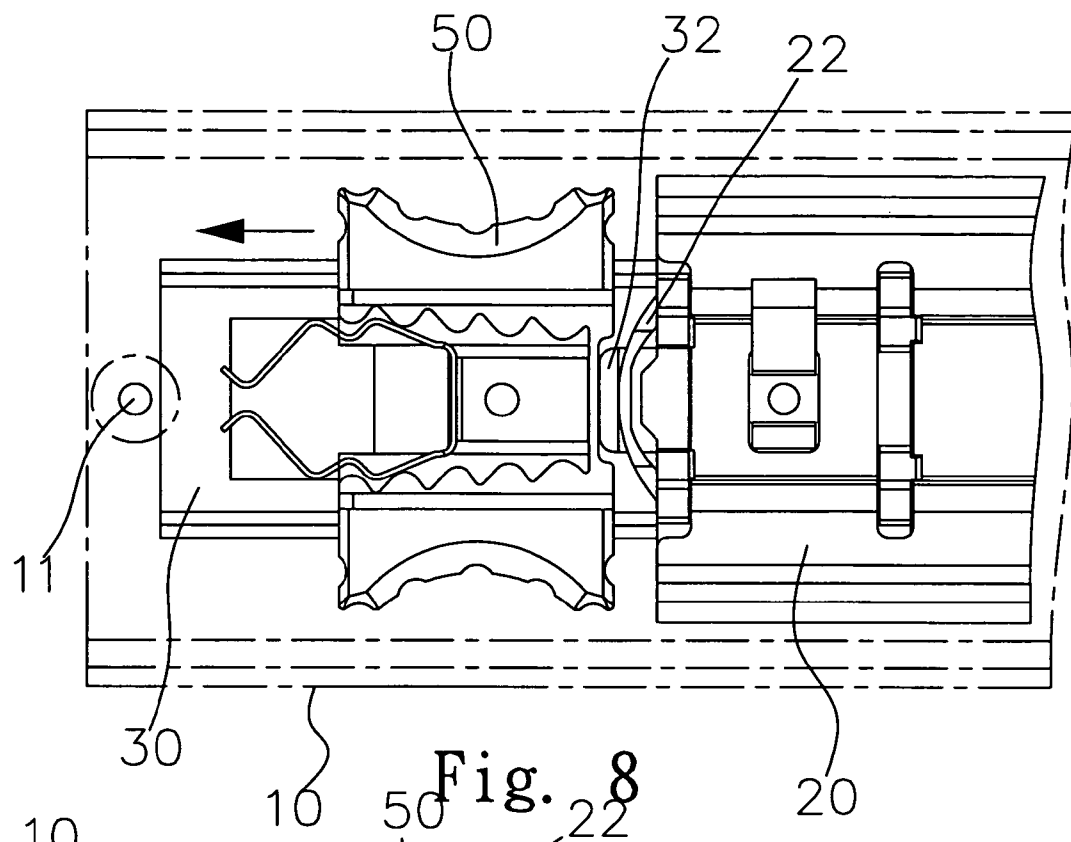


Fig. 7



FRONT INSTALLING DRAWER PULLING FORCE ADJUSTING APPARATUS

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a front installing drawer pulling force adjusting apparatus, and more particularly to an apparatus with a structure that uses a slide module for adjusting a force applied by a user to a drawer by means of the level of tightness of elastically clamping a resilient element to a latch element, so that the user can open the drawer with an appropriate force.

[0003] 2. Description of the Related Art

[0004] Referring to FIG. 1 for R.O.C. Pat. Application No. 93216385, the patent application discloses a bottom rail 200, and an end of the bottom rail 200 includes two corresponding flanges 201 with a predetermined interval between the flanges 201, and the bottom rail 200 has a pull slide 300 disposed thereon, and the pull slide 300 has an adjusting latch element 310 pivotally disposed on a surface facing towards the bottom rail 200, and the adjusting latch element 310 has a latch pillar 311 protruded towards the bottom rail 200 and a flange 312 fixed under the latch pillar 311 with a segment difference, and the adjusting latch element 310 has a set of elastically flexible latch 313, and the pull slide 300 has a rotating wheel 320 pivotally connected to an adjacent entering position of the adjusting latch element 310, and the rotating wheel 320 has a guide slot 321 disposed along the periphery of the rotating wheel 320 for precisely inserting the latch pillar 311. Though the device with this structure can drive the adjusting latch element 310 by the rotating wheel 320 to extend the latch 313 on the adjusting latch element 310 into the interval of the flanges 201 to a certain depth for adjusting the pulling force. The shallower the extension, the looser is the pulling force; and the deeper the extension, the tighter is the pulling force, and the lesser is the effort required for pulling a drawer. Since the prior art requires complicated components and incurs a high cost, and the device gets stuck easily during the rotating process, the prior art requires improvements.

SUMMARY OF THE INVENTION

[0005] In view of the shortcomings of the prior art, the inventor of the present invention based on years of experience in the related industry to conduct extensive researches and experiments, and finally developed a front installing drawer pulling force adjusting apparatus in accordance with the present invention to overcome the shortcomings of the prior art.

[0006] Therefore, it is a primary objective of the present invention to overcome the shortcomings of the prior art by providing a front installing drawer pulling force adjusting apparatus installed at a front end of a slide, and the slide is installed in a cabinet. The slide comprises a bottom rail, a middle rail and an internal rail, wherein a front end of the bottom rail has a latch element embedded thereon, and the bottom rail has a slidable middle rail, and the internal rail is embedded onto the middle rail and slid on the middle rail, and a front end of the internal rail has a limit element, and the limit element includes a resilient element corresponding to the latch element. Further, the internal rail is connected to an object such as a drawer that needs to be moved. During assembling, the portion that intersects the resilient element in the limit element with the limit element determines the extent

of retracting the resilient element to adjust the tightness of clamping the resilient element onto the latch element of the bottom rail, so that users can open a drawer with an appropriate force. The invention comes with simple components and provides a convenient application.

[0007] To make it easy for our examiner to understand the above and other objects, features and advantages of the present invention, we use preferred embodiments accompanied with the related drawings for the following detailed description of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1 is a schematic view of an apparatus of a prior art;

[0009] FIG. 2 is an exploded view of the present invention;

[0010] FIG. 3 is an exploded view of the present invention viewing from another angle;

[0011] FIG. 4 is a perspective view of a portion of an assembly of the present invention;

[0012] FIG. 5 is a schematic view of an assembly of the present invention;

[0013] FIG. 6 is a schematic view of a resilient element entering into a limit element in accordance with the present invention;

[0014] FIG. 7 is another schematic view of a resilient element entering into a limit element in accordance with the present invention;

[0015] FIG. 8 is a schematic view of a resilient element latch moving on a latch element in accordance with the present invention; and

[0016] FIG. 9 is another schematic view of a resilient element latch moving on a latch element in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] Referring to FIGS. 2 to 5, the invention relates to a front installing drawer pulling force adjusting apparatus installed at a front end of a slide 1, and the slide 1 comprises a bottom rail 10, a middle rail 20 and an internal rail 30.

[0018] The bottom rail 10 is a substantially U-shaped frame in this embodiment, and an external lateral surface of the bottom rail 10 is fixed onto two corresponding walls (not shown in the figure) on the internal sides of the cabinet or drawer, and the bottom rail 10 has a protruding latch element 11 at an end of an internal lateral surface. In this embodiment, the protruding latch element 11 is a circular lump installed at the front end of the bottom rail 10.

[0019] The middle rail 20 is embedded onto the bottom rail 10 and slid on the bottom rail 10, and the middle rail 20 is also a U-shaped frame. Further, the middle rail 20 has a curvedly concave rail 21 disposed separately on both internal lateral surface of the middle rail 20, and an end of middle rail 20 has a positioning base 22, and both sides of the positioning base 22 have a rail bar 221, and the rail bars 221 are embedded precisely into the rail 21, such that the positioning base 22 can be fixed onto the middle rail 20.

[0020] The internal rail 30 is embedded onto the middle rail 20 and slid on the middle rail 20. The internal rail 30 is a substantially U-shaped frame in this embodiment and connected to an object such as a drawer or retaining shelf (not shown in the figure) that needs to be moved. The internal rail 30 has a brake element 31 installed on a surface facing towards the bottom rail 10. In this embodiment, the internal rail 30 is a L-shaped lump, and an end of the brake element 31 has a stop member 32 protruded towards the middle rail 20, and the stop member 32 is pressed precisely against an edge of the positioning base 22, and another end of the brake element 31 has a through hole 33 for locking a screw rod 34 into a screw hole 35 of the internal rail 30 (as shown in FIG. 5) in order to fix the brake element 31 onto the internal rail 30, and pushing the middle rail 20. The internal rail 30 further includes a resilient element 40 which is a resilient bracket or a spring in this embodiment, and the resilient element 40 maintains a specific interval from the brake element 31, and an end of the resilient element 40 has a base portion 41, the base portion 41 has a hole 411 for passing a bolt 412 of the internal rail 30, such that the resilient element 40 can be fixed onto the internal rail 30, and the resilient element 40 has a wing bracket 42 extended separately outward from both sides of the base portion 41, and the wing brackets 42 are extended farther from the bottom rail 10 than the base portion 41, so that a predetermined height difference exists between the wing brackets 42 and the base portion 41 as shown in FIG. 2, and the wing brackets 42 are in a wavy shape, and a notch 43 is formed at the connecting position of the wing brackets 42 and the base portion 41, and a specific interval is maintained between the notch 43 and the latch element 11 on the bottom rail 10.

[0021] Further, the resilient element 40 can be accommodated by a limit element 50, and the limit element 50 has an embedding slot 51 disposed on a corresponding surface of the internal rail 30, and the embedding slot 51 can be embedded precisely onto an edge of the internal rail 30, and the limit element 50 has a containing space 52 concavely disposed on a surface facing towards the resilient element 40, and both sides of the containing space 52 have a plurality of continuous protruded teeth 521, and the interval between the protruded teeth 521 on both sides are tapered inward. In the meantime, the interval between the protruded teeth 521 is provided for embedding the wing brackets 42 of the resilient element 40.

[0022] Referring to FIGS. 6 to 9, the bottom rail 10, the middle rail 20 and the internal rail 30 are installed sequentially during the assembling, and the bottom rail 10 is fixed onto an internal surface of the cabinet (not shown in the figure), and the limit element 50 is moved to an appropriate position as required. In FIG. 7, if it is necessary to move the limit element 50 towards the resilient element 40, the wing brackets 42 of the resilient element 40 will be restricted by the protruded teeth 521 proximate to the internal side of the limit element 50 and retracted tightly inward. On the other hand, if it is necessary to move the limit element 50 in an opposite direction to the resilient element 40, then the wing brackets 42 of the resilient element 40 will be restricted by the limit element 50 on the protruded teeth 521 proximate to the opening of the containing space 52 and expanded slightly outward as shown in FIG. 6, so that the protruded teeth 521 having different intervals apart of the limit element 50 restrict the extent of retracting the wing brackets 42 of the resilient element 40 to determine the tightness of clamping the wing brackets 42 of the resilient element 40 to the latch element 11

as shown in FIGS. 8 and 9, so that users can open a drawer with an appropriate force. The present invention comes with simple components and provides a convenient application.

[0023] In summation of the above description, the present invention herein enhances the performance than the conventional structure and further complies with the patent application requirements and is duly filed for patent application.

[0024] While the invention is described in some detail hereinbelow with reference to certain illustrated embodiments, it is to be understood that there is no intent to limit it to those embodiments. On the contrary, the aim is to cover all modifications, alternatives and equivalents falling within the spirit and scope of the invention as defined by the appended claims.

What is claimed is:

1. A front installing drawer pulling force adjusting apparatus, comprising:

- a bottom rail, fixed on an object, and having a latch element protruded from an end of said bottom rail;
- a middle rail, embedded onto said bottom rail, and moved back and forth on said the bottom rail;
- an internal rail, embedded onto said middle rail, and moved back and forth on said middle rail, and coupled with said object that needs to be moved;
- a limit element, embedded and movably sliding on said internal rail, and having a containing space; and
- a resilient element, fixed onto said internal rail, and contained in said containing space of said limit element, and both sides of said resilient element separately having a swingable wing bracket;

thereby, said limit element is moved to a predetermined position on said internal rail to adjust the position intersected with said resilient element during an installation, determine the level of tightness of clamping said resilient element onto an embedding slot of said latch element, and allow a user to appropriately adjust said positioning base as required, so as to open a drawer within a range of appropriate applying forces.

2. The front installing drawer pulling force adjusting apparatus according to claim 1, wherein said bottom rail, said middle rail and said internal rail are U-shape frames.

3. The front installing drawer pulling force adjusting apparatus according to claim 1, wherein said middle rail includes a positioning base disposed at an end of said middle rail.

4. The front installing drawer pulling force adjusting apparatus according to claim 3, wherein said internal rail includes a brake element installed on a surface facing towards a surface of said bottom rail, and said brake element maintains a predetermined interval from said resilient element, and an end of said brake element has a stop member protruded towards said middle rail, and pressed against an edge of said positioning base.

5. The front installing drawer pulling force adjusting apparatus according to claim 1, wherein said resilient element further includes a base portion disposed at an end corresponding to said wing bracket, and fixed onto said internal rail by said base portion.

6. The front installing drawer pulling force adjusting apparatus according to claim 5, wherein said resilient element is fixed onto said internal rail by a slot.

7. The front installing drawer pulling force adjusting apparatus according to claim 5, wherein said wing bracket on said resilient element is protruded farther from said bottom rail than said base portion, such that said wing brackets have a predetermined height difference from said base portion, and a notch is formed at the connecting position of said wing brackets and said base portion, and a predetermined interval is maintained between said notch and said bottom rail.

8. The front installing drawer pulling force adjusting apparatus according to claim 1, wherein said resilient element is a resilient bracket.

9. The front installing drawer pulling force adjusting apparatus according to claim 1, wherein said containing space of said limit element includes a plurality of protruded teeth disposed on both sides of said containing space, and said wing bracket of said resilient element is substantially in a wavy shape corresponding to the shape of said protruded teeth.

10. The front installing drawer pulling force adjusting apparatus according to claim 9, wherein said protruded teeth on both sides of said containing space have a tapered interval from each other, when said protruded teeth are extended inward.

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