United States Patent [19]

Tazaki

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[54] **DRAWER SUSPENSION APPARATUS**

[75] Inventor: **Michiharu Tazaki**, Yokohama, Japan

[73] Assignee: **Kyoeikogyo Kabushiki Kaisha**, Tokyo, Japan

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[52] **U.S. Cl.** **308/3.8**, 312/339

[51] **Int. Cl.** **F16c 21/00**

[58] **Field of Search** ..... 308/3.8, 6 R; 312/348, 337, 338, 339

[56] **References Cited**

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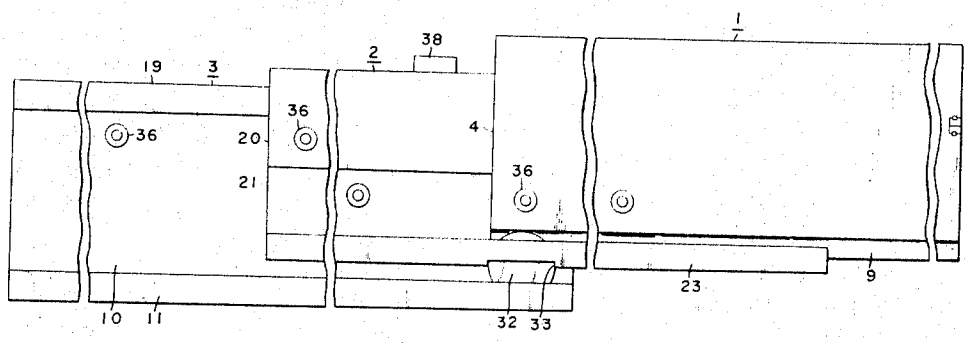
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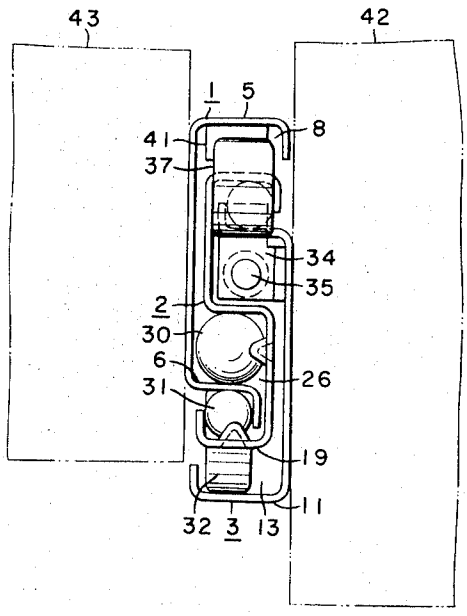
Primary Examiner—Charles J. Myhre
Assistant Examiner—R. H. Lazarus
Attorney—Lawrence B. Biebel et al.

[57] **ABSTRACT**

An extensible drawer support utilizing balls as bearing members can be assembled by a relatively simple procedure by means of retainers mounted at the final stage of assembly on the top of intermediate rail to fit slidably within a groove formed on the outside panel of drawer rail. The retainers can also be used as stopper means for limiting movements of drawer rail relative to intermediate rail.

6 Claims, 8 Drawing Figures





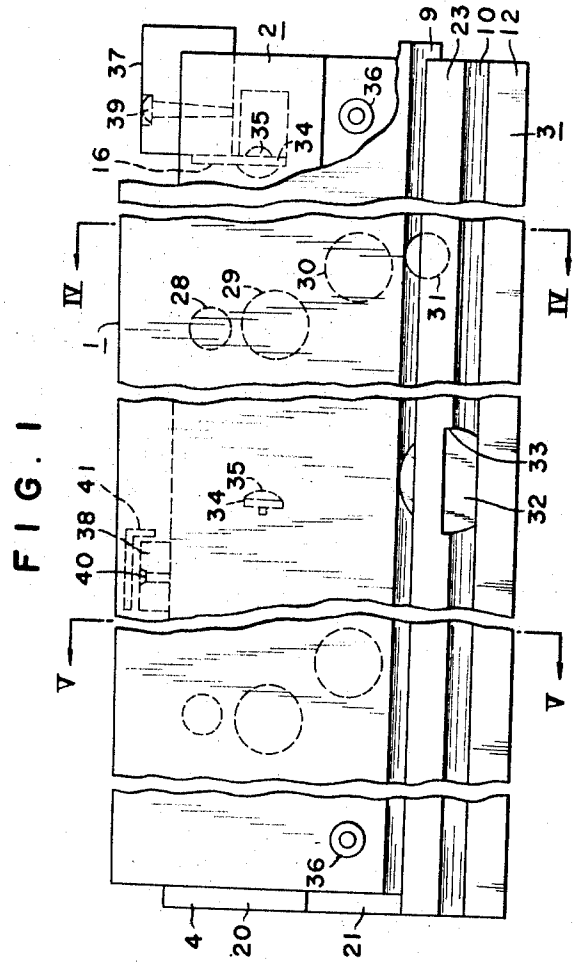

2
9
23
10
12
37
39
16
35
34
36
3
IV
28
29
30
31
IV
1
41
38
40
34
35
33
32
V
V
36
4
20
21

FIG. 1

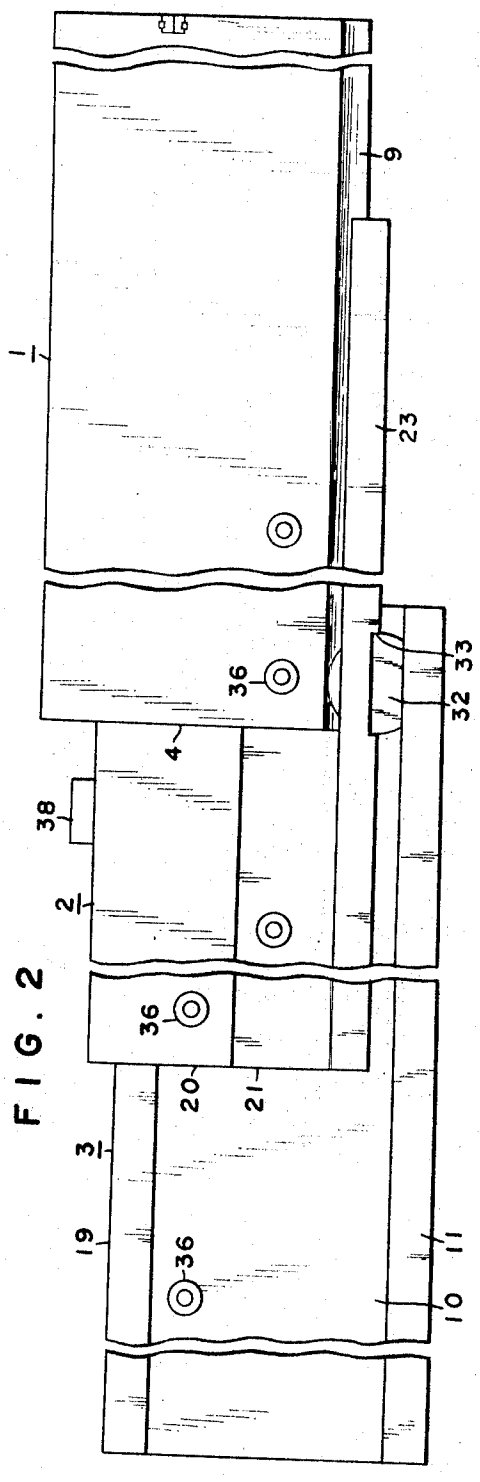

9
1
23
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2
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20
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11
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FIG. 2

FIG. 3

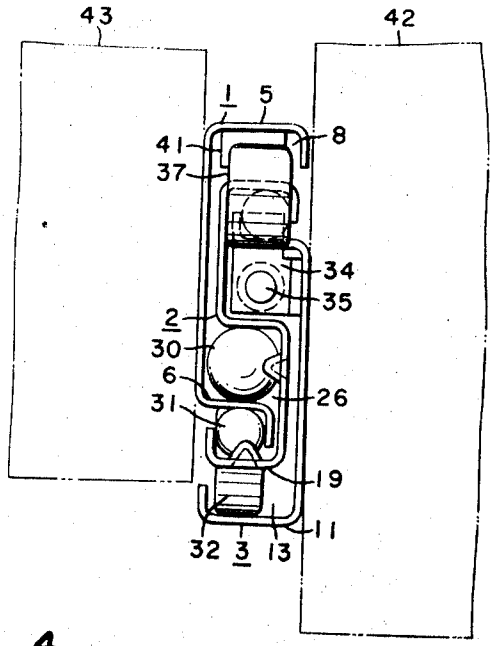


FIG. 4

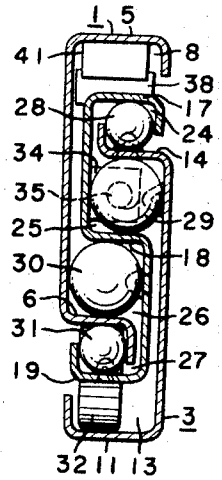


FIG. 5

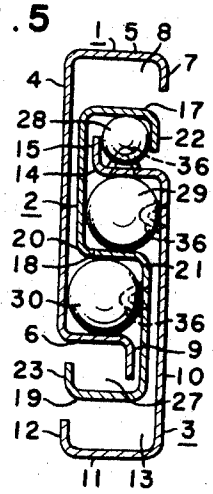


FIG. 6

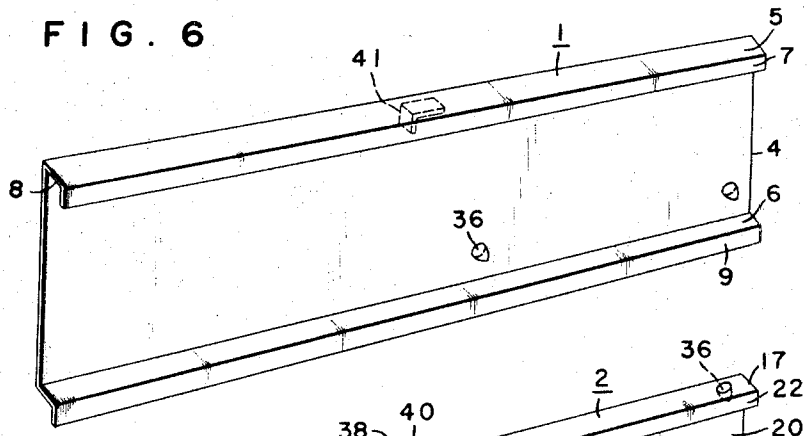


FIG. 7

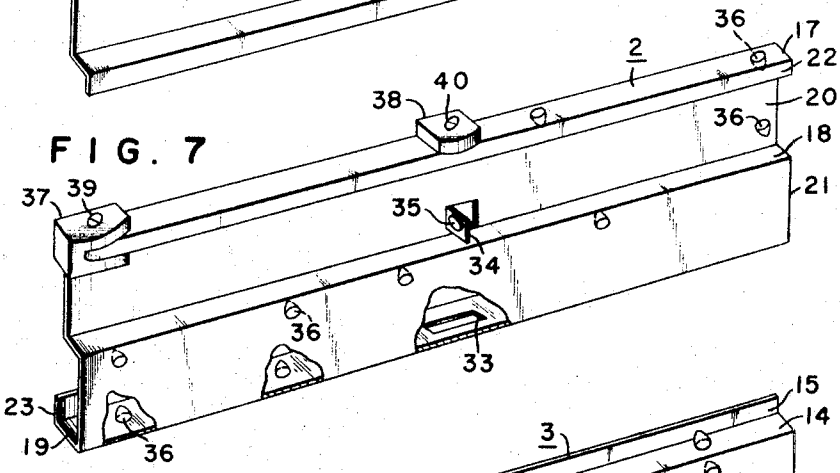
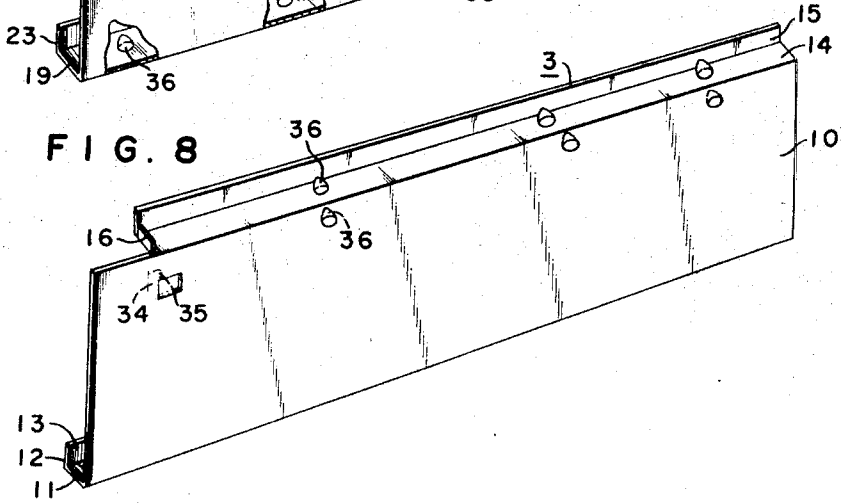


FIG. 8



DRAWER SUSPENSION APPARATUS

BACKGROUND OF THE INVENTION

It is desirable to use bearing balls in extensible drawer supports for smooth and stable drawer movements, however, there have been some problems which have made the manufacture unduly expensive. Balls must be retained between telescopically fitted supporting elements in each optimum position, and that may complicate the assembling procedures. In some cases, ball stops must be formed as by bending cut portions of panels after insertion of balls. Further, the shape of supporting elements is generally intricate that may also prevent the economical manufacture.

SUMMARY OF THE INVENTION

This invention relates to improvements in extensible drawer supports.

Accordingly, an object of this invention is to provide an extensible drawer supports utilizing balls as bearing members, which can be compactly assembled by a relatively simple procedure.

Another object of this invention is to provide an extensible drawer support in which relatively simple supporting elements are used for economical manufacture.

The foregoing and related objects may be readily attained in an extensible drawer support, wherein a drawer rail and a case rail, each formed in channel section having a groove formed on one of its parallel spaced panels are incorporated together extensibly with intermediate rail disposed therebetween, in such a way as to dispose each of said groove opposite the top and the bottom of said intermediate rail respectively, and a roller retained in said bottom of intermediate rail is fitted rotatably within said groove of case rail, and at least one retainer is mounted on said top of intermediate rail to fit slidably within said groove of drawer rail.

In this manner, said retaining and roller means retain said drawer and case rails respectively and prevent disintegration, thus a compact extensible drawer support can be obtained by a simple assembling procedure.

Retaining means can also be used as stopper means for limiting movements of drawer rail relative to intermediate rail.

An embodiment of this invention will be described below in more detail with reference to the accompanying drawings, wherein:

FIG. 1 is a fragmental inside elevational view of the extensible drawer support in a retracted condition.

FIG. 2 is a fragmental inside elevational view illustrating the extensible drawer support of FIG. 1 in an extended condition.

FIG. 3 is an end view of FIG. 1.

FIG. 4 is a sectional view taken along the line IV—IV of FIG. 1.

FIG. 5 is a sectional view taken along the line V—V of FIG. 1.

FIG. 6 is an outside perspective view of a drawer rail.

FIG. 7 is an outside perspective view of an intermediate rail.

FIG. 8 is an outside perspective view of a case rail.

DESCRIPTION OF PREFERRED EMBODIMENT

Referring now to the drawing, the extensible drawer support illustrated comprises a drawer rail **1**, an intermediate rail **2** and a case rail **3** incorporated together extensibly. Drawer rail **1** is formed in channel section

and includes a side wall **4** having parallel spaced panels **5** and **6** provided along its upper and lower edges. Inturned flange **7** is formed on the outer edge of panel **5** providing a groove **8** thereon. Panel **6** is narrower than panel **5** and outturned flange **9** is formed on its outer edge. Case rail **3** is similar to drawer rail **1** in cross section, however disposed inversely, and includes a side wall **10**, a lower panel **11** with inturned flange **12** which provides a groove **13** thereon, and an upper panel **14** with outturned flange **15**. Upper panel **14** is narrower than lower panel **11** and a part of its front end is cut to receive stopper of intermediate rail **2**, and a stop **16** is formed by bending.

The intermediate rail **2** is substantially S-shaped in cross section having parallel spaced upper, middle and lower panels **17, 18** and **19** connected alternately by upper and lower walls **20** and **21**. Inturned flanges **22** and **23** are provided on outer edges of upper and lower panels **17** and **19** respectively. Upper wall portion **20** of intermediate rail **2** is fitted between panels **5, 6** of drawer rail **1**, and lower wall portion **21** of intermediate rail **2** is fitted between panels **14** and **11** of case rail **3**, thus four raceways for balls **24, 25, 26** and **27** are formed by panels **17, 18, 19** of intermediate rail **2** and case and drawer rail panels **14, 6**, and grooves **8** and **13** are positioned outside of intermediate rail **2**, opposite with each other.

Two each balls **28, 29, 30** are positioned in raceways **24, 25, 26** respectively and a ball **31** is positioned in the front part of raceway **27**, each rotatably.

A roller **32** which is extending through and retained within an opening **33** formed in the center part of panel **19** of intermediate rail **2**, is positioned rotatably between panel **6** of drawer rail **1** and panel **11** of case rail **3**. Edges of the opening **33** may be rounded for smooth rotation of roller **32**. Suitably arranged ball stops are formed in each rails for limiting ball movements. Stops **34** are formed by cutting and bending walls, and bumper **35** is mounted on each stop **34**. Stops **36** are formed by depressing.

Retainers **37, 38** are secured on the top surface of intermediate rail **2** by screws **39** and **40** respectively so as to fit within groove **8** of drawer rail **1** and slidably retain the drawer rail **1**. Retainer **37** is substantially C-shaped and fitted into the front end of panel **17**, while retainer **38** is blockform and secured on the center part of panel **17**. These retainers **37, 38** are made of plastics or other good sliding material and contact surfaces are slightly curved for sliding engagement with flange **7**. These retainers **37, 38** are also used for limiting the movement of drawer rail **1** relative to intermediate rail **2** in cooperation with a stop **41** provided on panel **5**.

The extensible drawer support may be assembled as follows:

The case rail **3** is fitted to lower wall portion of intermediate rail **2** which is placed on a bench or the like with upper wall portion down, and balls **28, 29** are inserted in each raceway **24, 25** within ranges of respective ball stops. It is preferred that the lower part of case rail **3** is slightly raised, while balls being inserted, and pressed down after insertion.

This assembly is then reversed and roller **32** is inserted into opening **33**. Drawer rail **2** is fitted to upper wall portion of intermediate rail **2** and balls **30, 31** are inserted in each raceway **26, 27** within ranges of respective ball stops. It is also preferred that the upper part of drawer rail **1** is slightly raised while balls being

inserted, and pressed down after insertion. Thus the balls and roller are interfitted in each raceway and the assembly is accomplished by securing retainers **37** and **38** on the top surface of intermediate rail **2.** This may be performed first by securing retainer **37** after the intermediate rail **2** being slightly moved forward, then securing retainer **38** after assembly being fully extended.

As shown in FIG. **3,** the extensible drawer support is mounted within drawer case **42** by securing case rail **3** thereto, and drawer **43** is secured to the drawer rail **1,** thus the drawer can be withdrawn from and retracted in drawer case in a smooth manner, and when fully withdrawn, the drawer is stopped as intermediate rail **2** is stopped by engagement of ball **30** with stops **34,** and drawer rail **1** is stopped by engagement of stop **41** and retainer **37.** And when retracted, the drawer is stopped as intermediate rail **2** is stopped by engagement of retainer **37** and stop **16,** and drawer rail **1** is stopped by engagement of stop **41** and retainer **38.**

As drawer rail **1** and case rail **3** are retained by retainers **37, 38,** and roller **32** respectively, the extensible drawer support is assembled in a compact and facile form for handling, and assembling procedure is made very simple by these retainers.

Further, the shape of these three rails is relatively simple, and drawer and case rails are similar in cross section, so that the fabrication is made more economically.

Although the description and illustration have been made on a preferred embodiment of the invention, it is to be understood that the present invention will not be limited thereto and changes and modifications may be made by those skilled in the art without departing from the spirit and scope of the invention.

I claim:

1. A drawer suspension apparatus comprising:

a. a substantially C-shaped drawer rail formed in channel section and comprising a side wall, an upper panel joined to said side wall along the upper marginal edge thereof, an inturned flange marginally joined to said upper panel opposide said side wall for formation of a drawer rail groove, and a lower panel joined to said side wall opposite said upper panel,

b. a substantially C-shaped case rail formed in channel section and comprising a side wall, an upper panel joined to said side wall along the upper marginal edge thereof, a lower panel joined to said side wall opposite said upper panel, and an inturned flange marginally joined to said lower panel opposite said side wall for formation of a case rail groove; said case rail being interfitted with said drawer rail such that the upper panel of said case rail faces said drawer rail intermediate the upper panel and lower panel of said drawer rail and the lower panel of said drawer rail faces said case rail intermediate the upper panel and the lower panel of said case rail,

c. a substantially S-shaped intermediate rail formed in channel section and comprising an upper wall portion, an upper panel joined on said upper wall portion along the upper marginal edge thereof, a middle panel joined to said upper wall portion opposite said upper panel, a lower wall portion joined to said middle panel opposite said upper wall portion, and a lower panel provided with a medial opening and joining said lower wall portion opposite said middle panel; said intermediate rail being interfitted between said drawer rail and said case rail with its upper panel coextending with the upper panel of said drawer rail and intermediate the upper panel of said drawer rail and the upper panel of said case rail, and the lower panel of said intermediate rail coextending with the lower panel of said case rail and positioned intermediate the lower panel of said case rail and the lower panel of said drawer rail,

d. a roller rotatably disposed within said medial opening in the lower panel of said intermediate rail to ride within said case rail groove and support the lower panel of said drawer rail, and

e. a retainer fitted within said drawer rail groove for limiting the movement of said drawer rail relative to said intermediate rail.

2. Apparatus according to claim **1,** the upper panel of said case rail and the lower panel of said drawer rail cooperating with the upper, middle, and lower panels of said intermediate rail to define four ball raceways, and said apparatus further comprising at least one ball bearing within each of said raceways.

3. A drawer suspension apparatus comprising a drawer rail, a case rail and a intermediate rail each formed in channel section; said drawer rail and said case rail each being substantially C-shaped in cross section, each comprising two parallel panels joined by a wall, with a groove formed on one panel of said two parallel panels, said groove facing the non-grooved panel of said two parallel panels; said intermediate rail being of substantially S-shape in cross section having three parallel spaced panels connected by two parallel walls, each end panel having a groove facing the intermediate panel of said three panels; said drawer rail and said case rail being incorporated together adjacently, and extensibly along their longitudinal axes, and inversely disposed in cross section such that the said grooved panels are at two ends and face each other and between the said grooved panels lie the said non-grooved panels with the said drawer rail non-grooved panel being adjacent to the said case rail grooved panel and vice versa; said intermediate rail disposed between said drawer rail and case rail in such a way that one said intermediate rail grooved panel lies parallel between said drawer rail grooved panel and said case rail non-grooved panel and the other said intermediate rail grooved panel lies parallel between said case rail grooved panel and said drawer rail non-grooved panel; wherein each said intermediate rail grooved panel cooperates with each of said adjacent non-grooved panels respectively to form a raceway for ball bearings; and wherein said non-grooved intermediate panel of which rail cooperates with each of said non-grooved panels of said case rail and said drawer rail respectively to form raceways for ball bearings, each of said raceways being provided with at least one ball bearing; and wherein a roller is fitted rotatably within the groove of either one of said case rail panel groove or of said drawer rail panel groove, said roller being retained by the said intermediate rail panel w hich is adjacent to said either one panel; and wherein at least one retainer is fitted slidably within the groove of the other one of said either case rail panel groove or drawer rail panel groove said retainer being removably mounted on the said intermediate rail panel which is adjacent to said other one panel.

4. A drawer suspension apparatus as claimed in claim 3, wherein said retainer is adapted to limit the movement of said drawer rail relative to said intermediate rail.

5. A drawer suspension apparatus as claimed in claim 3, wherein said either one panel groove is the case panel groove, and is lower in relationship to the said rail panel groove.

6. A drawer suspension apparatus as claimed in claim 4, wherein said either one panel groove is the case panel groove, and is lower in relationship to the said rail panel groove.

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