US 20090071186A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2009/0071186 A1**

(43) **Pub. Date: Mar. 19, 2009**

Laible

(54) **TELESCOPIC SLIDE FOR A REFRIGERATION DEVICE**

(75) Inventor: **Karl-Friedrich Laible**, Langenau (DE)

Correspondence Address:
BSH HOME APPLIANCES CORPORATION
INTELLECTUAL PROPERTY DEPARTMENT
100 BOSCH BOULEVARD
NEW BERN, NC 28562 (US)

(73) Assignee: **BSH Bosch und Siemens Hausgerate GmbH**, Munchen (DE)

(21) Appl. No.: **12/226,363**

(22) PCT Filed: **Apr. 2, 2007**

(86) PCT No.: **PCT/EP2007/053194**

§ 371 (c)(1),
(2), (4) Date: **Oct. 16, 2008**

(30) **Foreign Application Priority Data**

Apr. 20, 2006 (DE) 10 2006 018 425.4

Publication Classification

(51) **Int. Cl.**
F25D 23/00 (2006.01)

(52) **U.S. Cl.** **62/448**

(57) **ABSTRACT**

A telescopic slide for a refrigeration device is provided that includes at least two rails that can be displaced towards each other in the longitudinal direction while being guided one on the other. A support having a tolerance is mounted on the first rail. The contact surfaces between the support and the first rail have a large coefficient of friction in order to prevent the support from sliding to and fro on the rail.

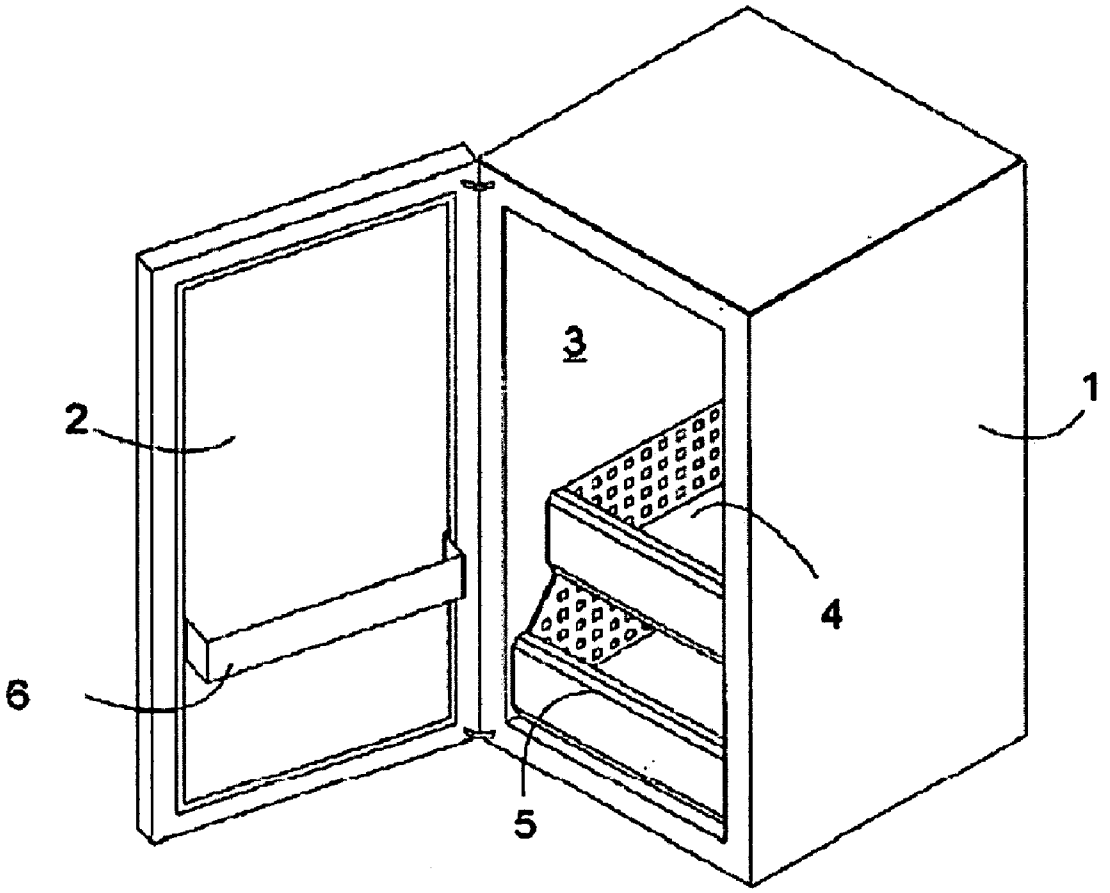


Fig. 1

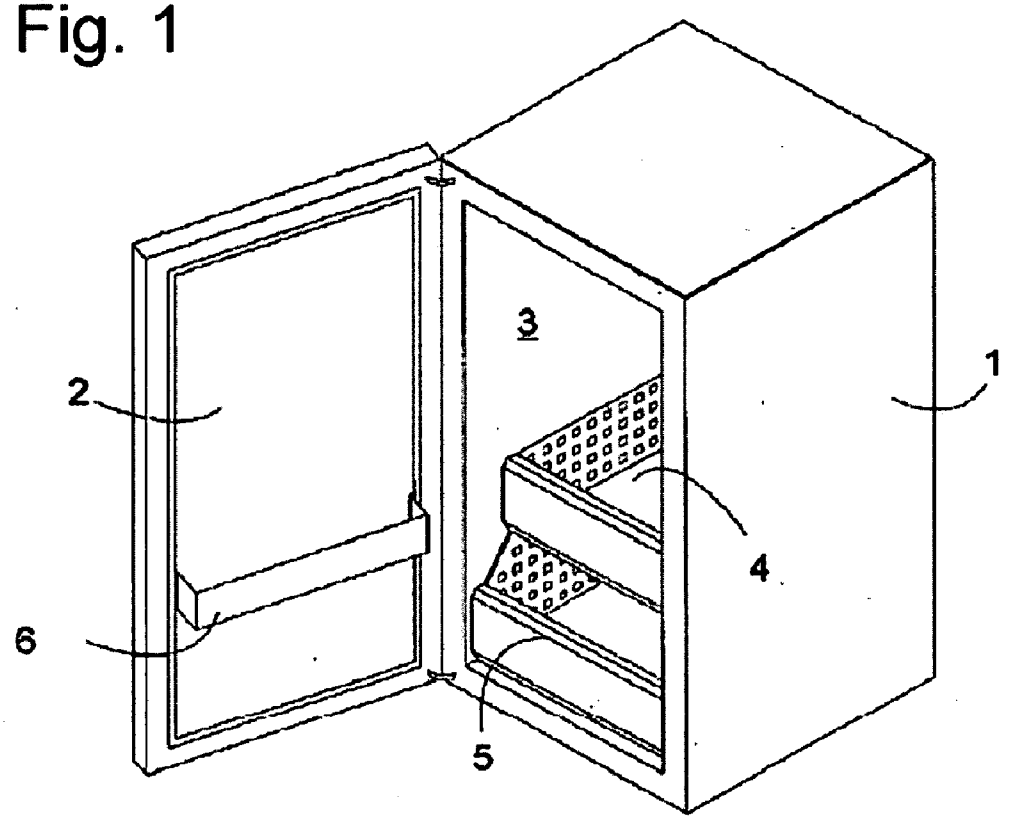


Fig. 2

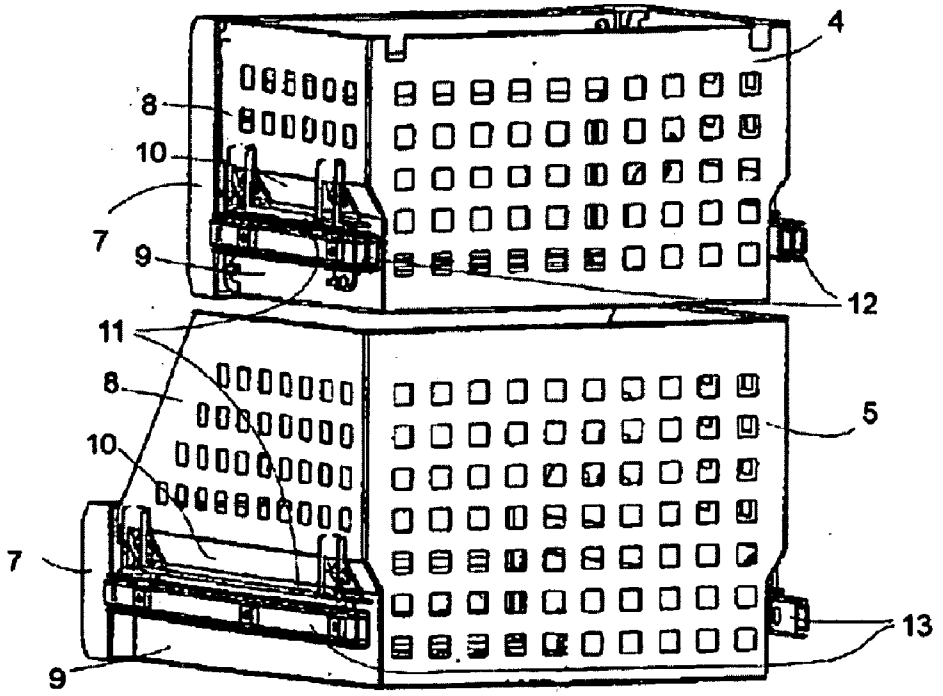


Fig. 3

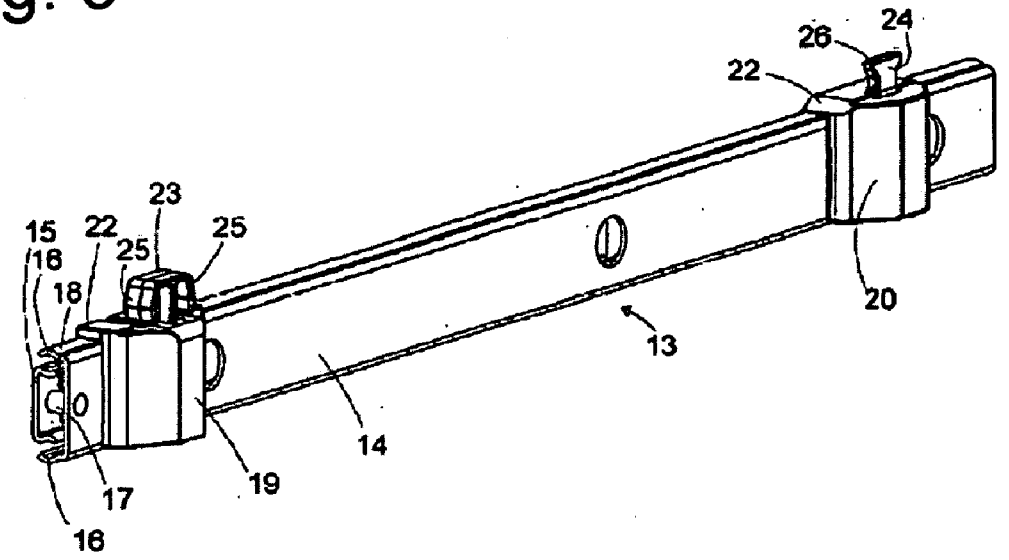

26
24
22
23
15
22
25
25
16
18
20
13
14
19
17
16

Fig. 4

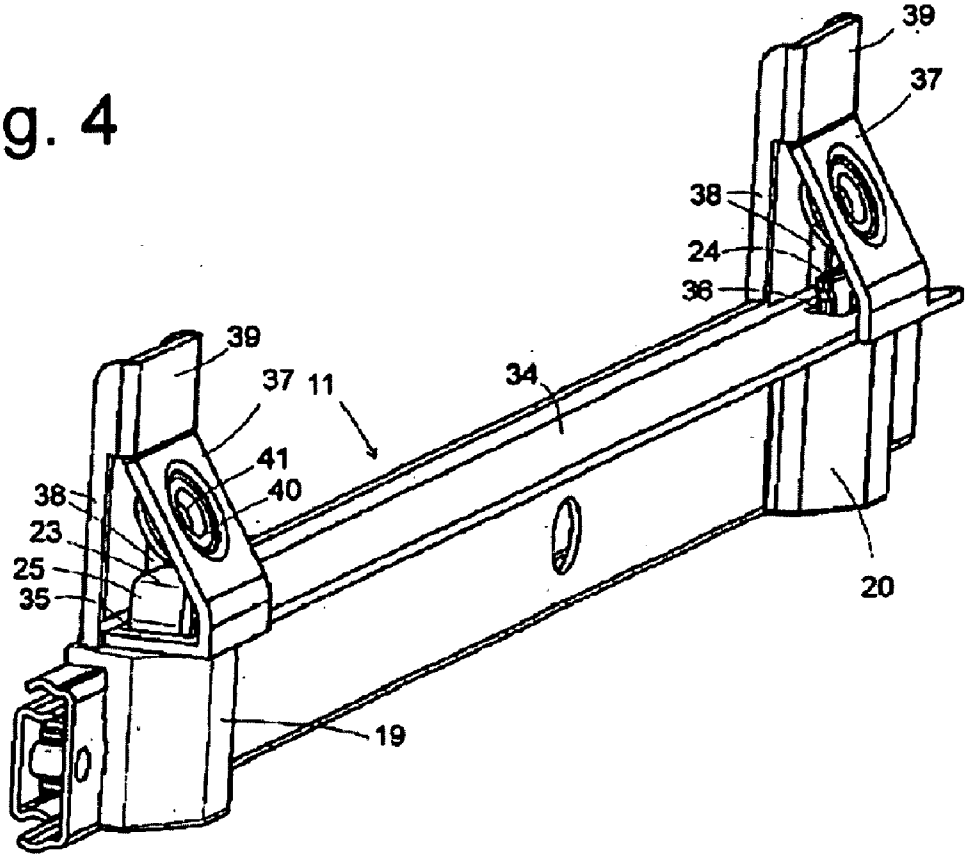
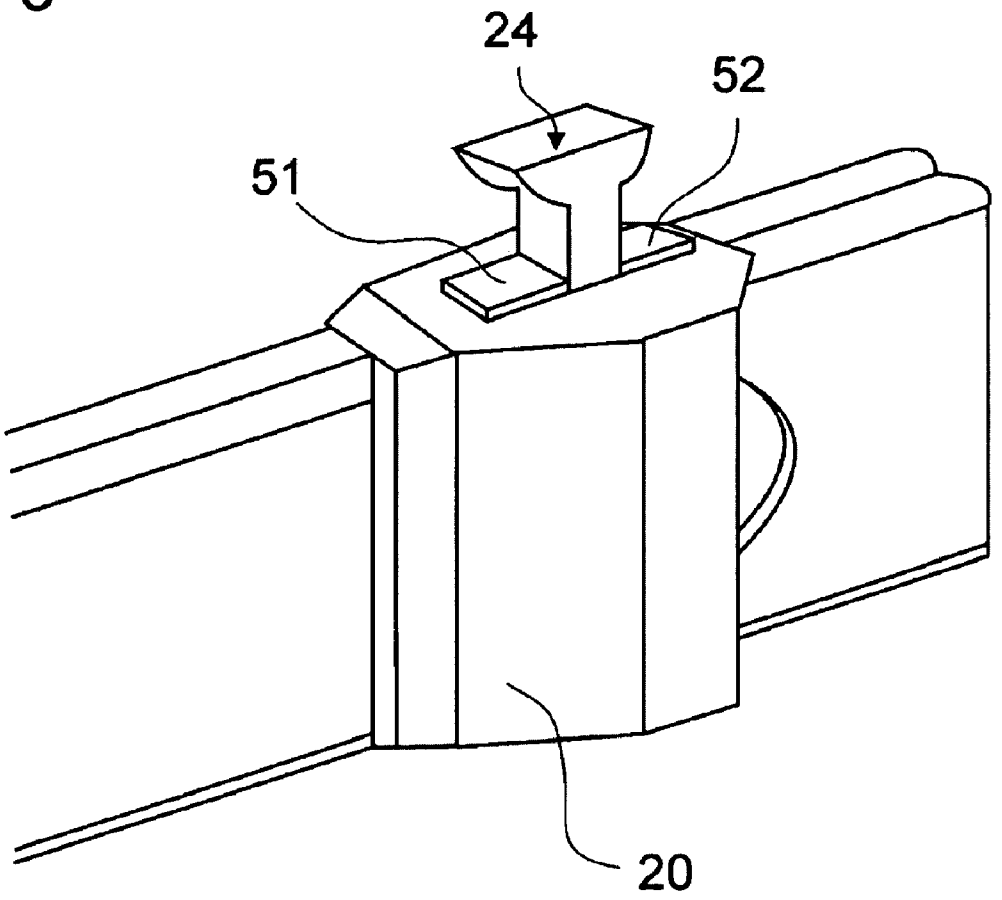

39
37
38
24
36
39
37
11
34
41
40
38
23
25
35
20
19

Fig. 5



TELESCOPIC SLIDE FOR A REFRIGERATION DEVICE

[0001] The invention relates to a telescopic slide for a refrigeration device as claimed in the preamble of claim **1** and claim **8**

[0002] Rails of such a telescopic slide, with which the refrigerated goods carrier are to be moved out of the refrigeration device, are to be smooth-running, so that the support can be removed from the refrigeration device with little effort, even when it is heavily laden. Slides of this type generally have stops, which restrict the freedom of movement of the rails in respect of one another so that the rails are not completely pulled apart by accident. During operation, stops of this type are exposed to significant loads in the case of heavily laden supports and careless use can result in damage to the support or stops.

[0003] To prevent this, DE 10 2005 021 589.0 already proposed fastening the support to the rails in the direction of motion of the rails in an elastic fashion. As a result, the supports have a certain play in respect of the rails.

[0004] The internal widths of refrigeration devices are also subject to large tolerances due to the foamed housing and the different expansions of the materials which results from the large temperature loads. To balance out these tolerances, the supports are fastened to the rails with a lateral play, in other words a play which is perpendicular to the direction of motion of the rails. This loose acceptance of the refrigerated goods carriers on the slide essentially allows damage to the refrigerated goods carriers resulting from use to be avoided. As a result of the play between the support and the slide, it nevertheless ensues that the refrigerated goods carriers wobble from side to side during movement. This results in a reduction in the tangible quality and thus in a decrease in the value of the refrigeration device.

[0005] The object underlying the invention is to design a telescopic slide for a refrigeration device such that the refrigerated goods carriers can be moveable in a smooth-running fashion, damage to the refrigerated goods carriers is avoided during normal use, the necessary large tolerances are allowed for by the refrigeration devices, while at the same time the impression of a high-quality system is retained.

[0006] The object is achieved in accordance with the invention by a telescopic slide for a refrigeration device with the features of claim **1** and claim **8**.

[0007] In accordance with the invention, contact surfaces between the supports and the rails are embodied such that large frictional forces prevail between them. Friction surfaces of this type prevent the frame from wobbling about and thus also prevent a possible twisting of the refrigerated goods carriers, which is brought about in the previous design as a result of the play of the refrigerated goods carriers, which is determined by the large tolerances, in respect of the rails. As a result, the lateral displacement of the refrigerated goods carriers during normal use can be completely prevented, as a result of which the tangible quality is significantly improved.

[0008] A further advantage is that the friction surfaces produce an attenuation effect, which results in quieter movement noises when removing the refrigerated goods carrier. As a result, a rattling of cheap refrigerated goods carriers made of plastic on the slides can also be prevented, which likewise effects an impression of high quality, although further favorable materials are used.

[0009] In accordance with the invention, large frictional forces are understood to mean frictional forces which are greater than the forces developing during the movement of the support, so that a relative movement on the contact surfaces between the supports and the rails is at least largely avoided during a reverse movement of the carrier for instance.

[0010] The static friction of the contact surfaces involving friction preferably lies between 0.3 and 1. Through this, a lateral wobbling of the refrigerated goods carrier can be prevented without at the same time significantly restricting the moveability of the slides in the direction of movement. The value for the coefficient of friction ideally lies at 0.7.

[0011] In a preferred embodiment of the invention, the rail, on which the support is fastened, is provided with a surface which effects a high adhesive force. As a result of the fact that the friction surface is effected by way of a surface treatment of the rails, the previously proven design and the previously used materials can be retained and only a surface treatment of the rails is necessary. The rails could be provided with a non-slip coating. The surface of the rails could however also be provided with a structure which effects a higher friction. This solution is then particularly advantageous if the refrigerated goods carrier rests directly on the rails of the telescopic slide.

[0012] In a further advantageous embodiment, a support retainer, which is used here to fasten the support to the first rail with a measure of tolerance, is produced in at least the contact area with the support made in part of a material with high frictional values, like for instance a soft thermoplastic elastomer, or is provided with a bearing made of such a material. Through this, the embodiment of rails and supports can be retained, attention need only be paid to a large coefficient of friction when selecting the material for the support retainer. This presents a particularly advantageous solution, which requires few structural modifications to the previous design and is simple to guarantee. If only the support surface of the support retainer is manufactured from a soft thermoplastic elastomer, it is advantageous to manufacture the support retainer itself from polyoxymethylene or another high-quality plastic for instance. As a result, the stability of the support retainer and the high non-slip quality of the contact surface is ensured for the support.

[0013] In a further advantageous embodiment of the invention, the friction surface is realized on the support itself. In the region of the support, in which the contact to the rail or a support retainer fastened thereto is established, the support is equipped for this purpose with a material with a high frictional value, like for instance a soft thermoplastic elastomer. This can prevent modifications having to be made to the relatively complex rail system of the telescopic slide. The material with a large coefficient of friction is attached to the refrigerated goods carrier itself, which in some circumstances may be a more cost-effective solution.

[0014] Further details and advantages of the invention result from the subclaims in conjunction with the description of an exemplary embodiment, which is explained in detail on the basis of the drawings, in which;

[0015] FIG. **1** shows a perspective view of a refrigeration device on which the present invention is realized,

[0016] FIG. **2** shows a perspective view of two refrigerated goods carriers of the refrigeration device in FIG. **1**,

[0017] FIG. **3** shows a perspective view of a left telescopic slide of the lower refrigerated goods carrier,

[0018] FIG. **4** shows the telescopic slide in FIG. **3** with a support part mounted thereto and

[0019] FIG. **5** shows a cutout from the telescopic slide with a friction surface according to the invention.

[0020] FIG. **1** shows a perspective view of a refrigeration device having a carcass **1** and a door **2**. In a refrigerating zone **3** inside the device, two refrigerated goods carriers **4** and **5** are shown by way of example in the form of pull-out boxes. The pull-out boxes **4** and **5** are mounted on telescopic slides (not visible in this illustration) which are suspended on the side walls of the carcass **1**.

[0021] FIG. **2** shows the two pull-out boxes **4** and **5** in a perspective view from their rear. The pull-out boxes **4** and **5** each include a basket made from perforated sheet metal, the front side of which, which faces the door, being covered with a plastic plate **7**. The side walls of the basket each have vertical upper and lower wall sections **8** and/or **9** and slanted shoulders **10** herebetween, which converge towards the bottom. A support part **11** formed from injection-molded plastic or metal is fastened to the shoulders **10** in each instance, this being clearer in FIG. **4**. The support parts **11** are in turn supported on telescopic slides **12** and/or **13** by way of adapters **19**, **20**, with the adapters **19**, **20** together with the support parts **11** creating conditions whereby various widths of telescopic slides, namely partial and complete slides, can be mountable on differently shaped refrigerated goods carriers.

[0022] The telescopic slides **13**, on which the lower pull-out box **5** is supported, each have a pair of interlocking rails. The freedom of movement of these rails in respect of each other amounts to between 50 and 80% of their length; here it is identical to the depth of the pull-out box **4** disposed thereabove, so that when in its position extended as far as the stop, the pull-out box **5** is fully accessible below the box **4** disposed thereabove and over its entire upper surface **2**.

[0023] FIG. **3** shows a perspective view of one of the telescopic slides **13** of the lower pull-out box **5**, namely of the left slide **13** from the perspective of an observer looking into the refrigerating zone **3**. The slide includes two arched rails made from sheet steel; an outer rail **14** with an approximately C-shaped cross-section and an inner rail **15** engaging into the cavity of the outer rail **14**. Brackets of the rails **14** and **15** which lie opposite one another delimit two cylindrical channels **16** in which several balls (not visible in this representation) are accommodated, which easily guide the rails **14** and **15** in a moveable fashion and with little backlash. A bolt **17** protrudes from the front end of the outer rail **14** into the intermediate space between the rails **14** and **15**. Its contact with a rubber cushion which is still just visible in the Figure and is fastened to the inner rail **15** defines a limit in the freedom of movement of the rails **14** and **15** in respect of each other.

[0024] A front adapter **19** and a rear adapter **20** made of plastic are fastened to the outer rail **14**. The adapters **19** and **20** each have a truncated prism-shaped base body **21**, on which a horizontal web **22** resting on the upper bracket of the rail **14** is molded on its upper side. A locking element **23** and/or **24** protrudes in each instance from the upper side of the base body **21**.

[0025] FIG. **4** again shows a perspective view of the telescopic slide **13** from FIG. **3**, this time with a support part **11** locked thereto. The support part **11** includes an elongated base plate **34**, which is supported on the upper side of the adapters **19** and **20**. A receiving recess **35** embodied as a rectangular aperture is formed on a front end of the base plate **34**, through which receiving recess the locking element **23** of the adapter **19** is pushed. The pin **24** of the rear adapter **20** engages in a downward opening slot **36** in the base plate **34**. A counter bearing for fastening the basket of the pull-out box is formed on both ends of the base plate **34**, above the hole **35** and/or the slots **36**. The counter bearing includes an inclined plate **37** in each instance, which is connected on its lower edge to an edge of the base plate **34** which faces toward the basket and which, with its upper edge, joins two vertical struts **38** coming from the base plate **34** to form a U-shaped profile section **39**. The center of the plate **37** has a flat depression **40** and in the center thereof in turn a drilled hole **41**, these being extended at the rear of the plate **37** to form a hexagonal cross-section.

[0026] Whenever the rails **14** and/or **15** come up against a path limitation stop and as a result the pull-out box **4** and thus the support **11** is abruptly halted, the base plate **24** exerts a force on one of the elastic brackets **25** of the locking element **23**, which drives this in the direction of the opposite bracket **25**. The pull-out box **4** can thus slip on the rail **14** in the direction of movement thereof to the extent that contact with the bracket prevents further deformation. The inertia forces which occur when the rail **14** come up against a stop and the pull-out box **4** is abruptly halted, are thus significantly smaller than with a rigid connection between the pull-out box and rails, so that a light, thin-walled and correspondingly more cost-effective adapter is sufficient to ensure secure mounting of the pull-out box **4** on the telescopic slide **13**.

[0027] As can be seen on the hole **35** and/or the slots **36** in FIG. **4**, both the pins **24** and also the locking element **23** of the adapter **19** and **20** at right angles to the direction of movement of the rails **14** have play in respect of the base plate **34** of the support, which allows a large lateral tolerance of the support **11** by vis à vis the telescopic slide **13**. Allowance is made here, as a manufacturing condition, for slightly different widths of refrigeration devices, to which the telescopic slides **13** are fastened, as well as different expansions of the materials fastened to one another. The support can thus be moved to and fro across from the rails **14** within the play which is made visible in the adapter **20** with the aid of the slots **36**. This causes the box **4** and/or **5** to wobble when the support is moved on the rails **14**.

[0028] To prevent this and/or to restrict this as far as possible, areas **51** and **52** equipped with a soft thermoplastic elastomer are provided on the contact surfaces **50** of the adapter **19** and **20** with the support part **11**, as is shown representationally on the basis of the extract shown in FIG. **5** from the FIG. **3** in the example of the adapter **20**. Friction surfaces **51** and **52** of this type can be arranged on any surface of the adapter **19** and **20** which is in contact with the support part **11**, it is however generally also possible to equip the adapters **19** and **20** with a surface with a high coefficient of friction.

LIST OF REFERENCE CHARACTERS

[0029] **1**. Carcass
[0030] **2**. Door
[0031] **3**. Refrigerating zone
[0032] **4**. Refrigerated goods carrier/pull-out box above
[0033] **5**. Refrigerated goods carrier/pull-out box below
[0034] **7**. Plastic plate
[0035] **8**. Wall section
[0036] **9**. Wall section
[0037] **10**. Brackets

[0038] **11**. Support parts
[0039] **12**. Telescopic slide
[0040] **13**. Telescopic slide left
[0041] **14**. Rails outside
[0042] **15**. Rails inside
[0043] **16**. Cylindrical channels
[0044] **17**. Bolts
[0045] **18**. Rubber cushion
[0046] **19**. Adapter
[0047] **20**. Adapter
[0048] **21**. Truncated prism-shaped base body
[0049] **22**. Web
[0050] **23**. Locking element
[0051] **24**. Locking element
[0052] **34**. Base plate
[0053] **35**. Receiving recess embodied as a rectangular aperture
[0054] **36**. Downward opening slot
[0055] **37**. Inclined plate
[0056] **38**. Vertical struts
[0057] **39**. U-profile section
[0058] **40**. Flat depression
[0059] **41**. Drilled hole
[0060] **51**. Friction surface
[0061] **52**. Friction surface

1-8. (canceled)

9. A telescopic slide for a refrigeration device comprising:

a first rail;

a second rail, the first and second rails being displaceable towards each other in the longitudinal direction with one of the rails being guided on the other rail; and

a support secured to the first rail in a securement arrangement permitting limited free play between the support and the first rail, the support and the first rail each having a contact surface in contact with a contact surface of the other and these contact surfaces having a high coefficient of friction.

10. The telescopic slide for a refrigeration device as claimed in claim **9**, wherein contact surfaces between the support and rails have a coefficient of friction of at least 0.3.

11. The telescopic slide for a refrigeration device as claimed in claim **10**, wherein contact surfaces between the support and rails have a coefficient of friction of 0.7.

12. The telescopic slide for a refrigeration device as claimed in claim **9**, wherein the first rail or a support retainer fastened thereto has a friction surface.

13. The telescopic slide for a refrigeration device as claimed in claim **12**, wherein the first rail has a non-slip surface.

14. The telescopic slide for a refrigeration device as claimed in claim **12**, wherein the support retainer has a material with a high coefficient of friction.

15. The telescopic slide for a refrigeration device as claimed in claim **9**, wherein the contact area of the support with the rails or a support retainer fastened thereto has a material with a high coefficient of friction.

16. A refrigeration device comprising:

a refrigerating zone body forming a refrigerating zone in which items to be kept cooled are stored;

a refrigerated goods carrier;

a telescopic slide, the telescopic slide being coupled to the refrigerated goods carrier for extending the refrigerated goods carrier out of the refrigerating zone and for retracting the refrigerated goods carrier into the refrigerating zone, the telescopic slide including:

(a) a first rail,

(b) a second rail, the first and second rails being displaceable towards each other in the longitudinal direction with one of the rails being guided on the other rail, and

(c) a support secured to the first rail in a securement arrangement permitting limited free play between the support and the first rail, the support and the first rail each having a contact surface in contact with a contact surface of the other and these contact surfaces having a high coefficient of friction.

* * * * *