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ITO

(54) CORNER CANVAS AND CORNER AWNING DEVICE

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(52) **U.S. Cl.** **160/22**; 160/66; 160/72

(57) **ABSTRACT**

A corner canvas is formed such that when seen in a development, it has a right-angled trapezoidal form consisting of a rectangular canvas main body and a right-angled triangular canvas extension. A canvas take-up shaft is formed by an outer roller slidably and rotatably fitted on an inner shaft. When the canvas is to be developed, a folded swing arm is parallel-rotated obliquely forward and a front bar is pushed out to an obliquely forward corner space, thereby the corner space is covered. When the canvas is to be taken up, the swing arm is rotated obliquely rearward and the front bar is parallel-moved obliquely rearward, whereupon the outer roller is moved rearward while rotating to take up the corner canvas, and thereby the canvas extension is taken up by the exposed inner shaft. Thus, an epoch-making novel product is provided to the industry, which dramatically enhances ornamentality and external appearance in the corners of various buildings and which abounds in technical interests and utility as a corner awning device.

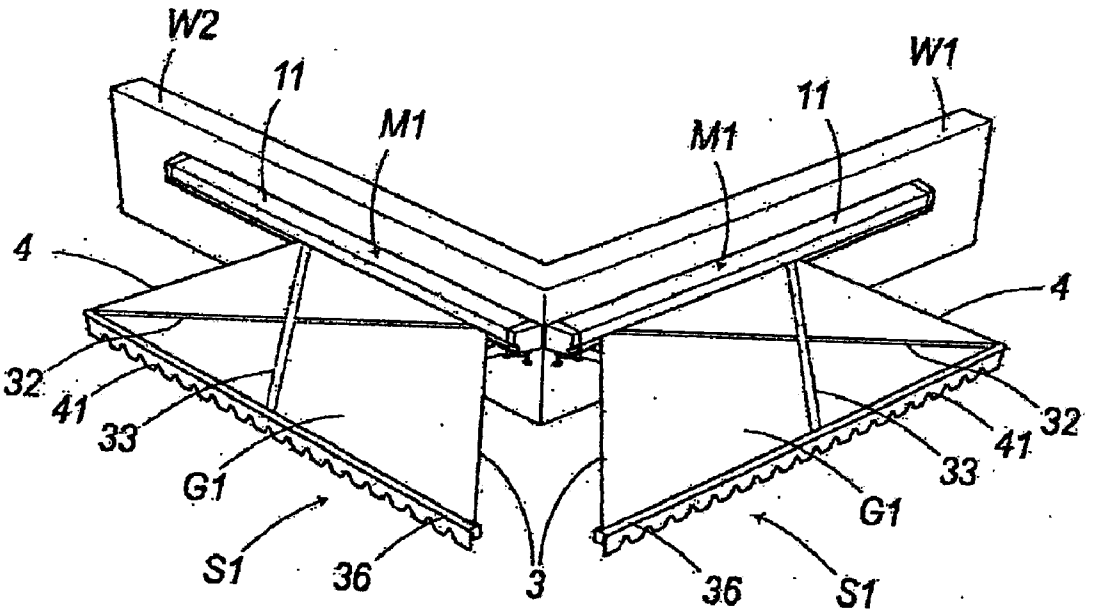

Fig. 1

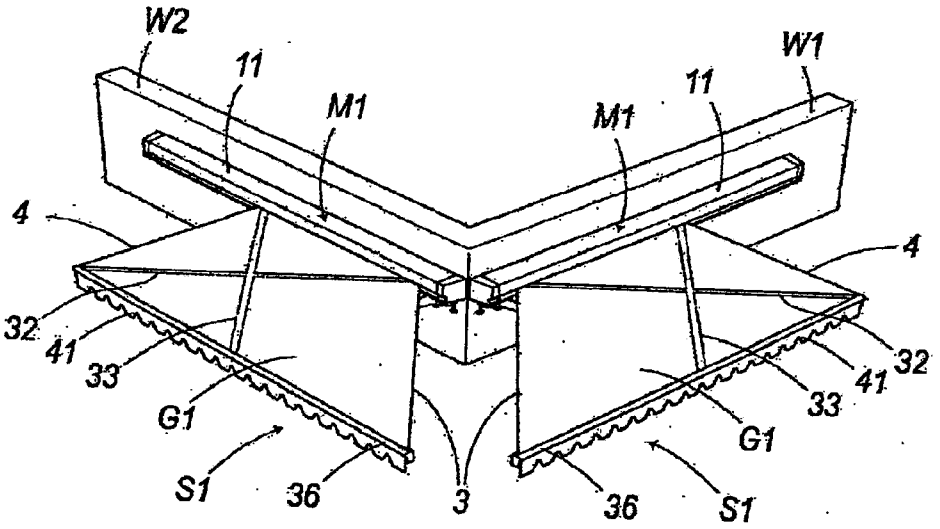
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Fig. 2

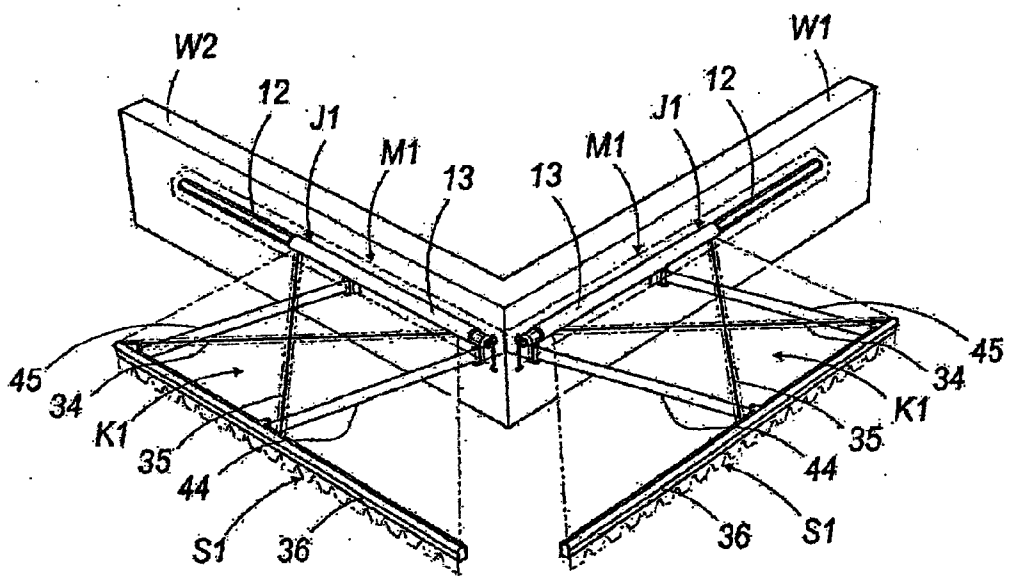
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Fig. 3

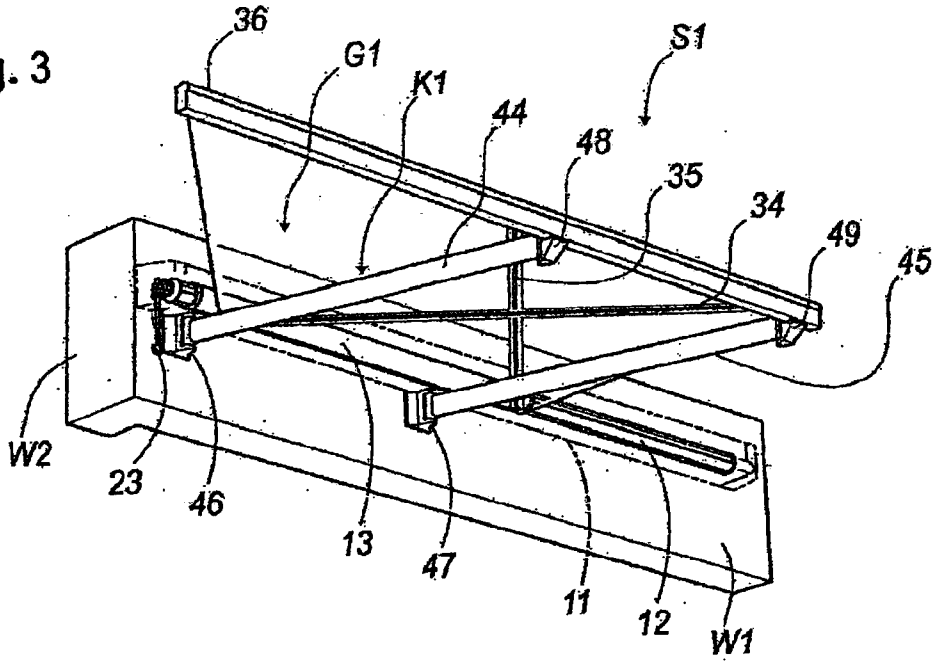
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Fig. 4

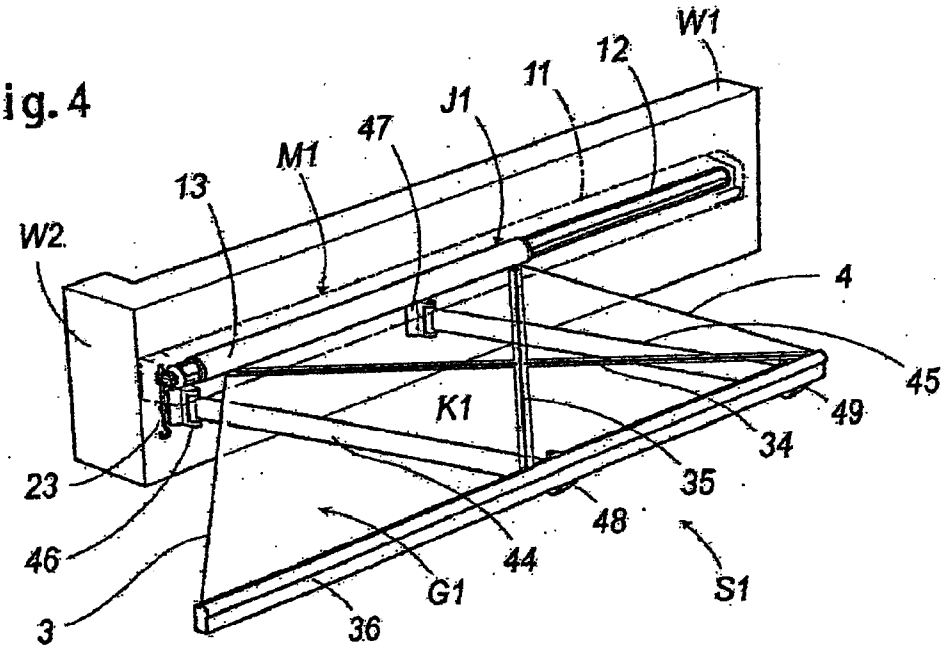
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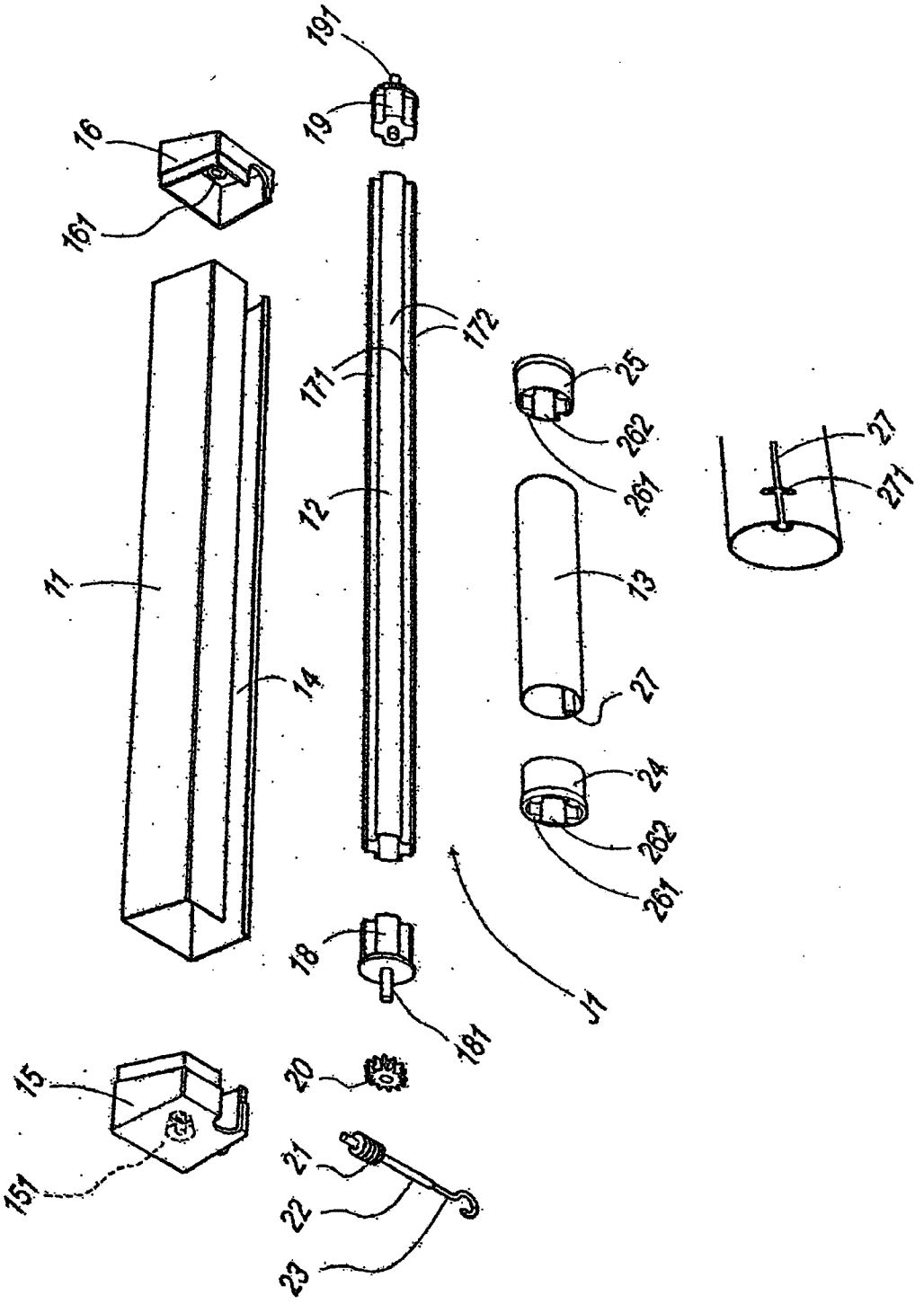
Fig.5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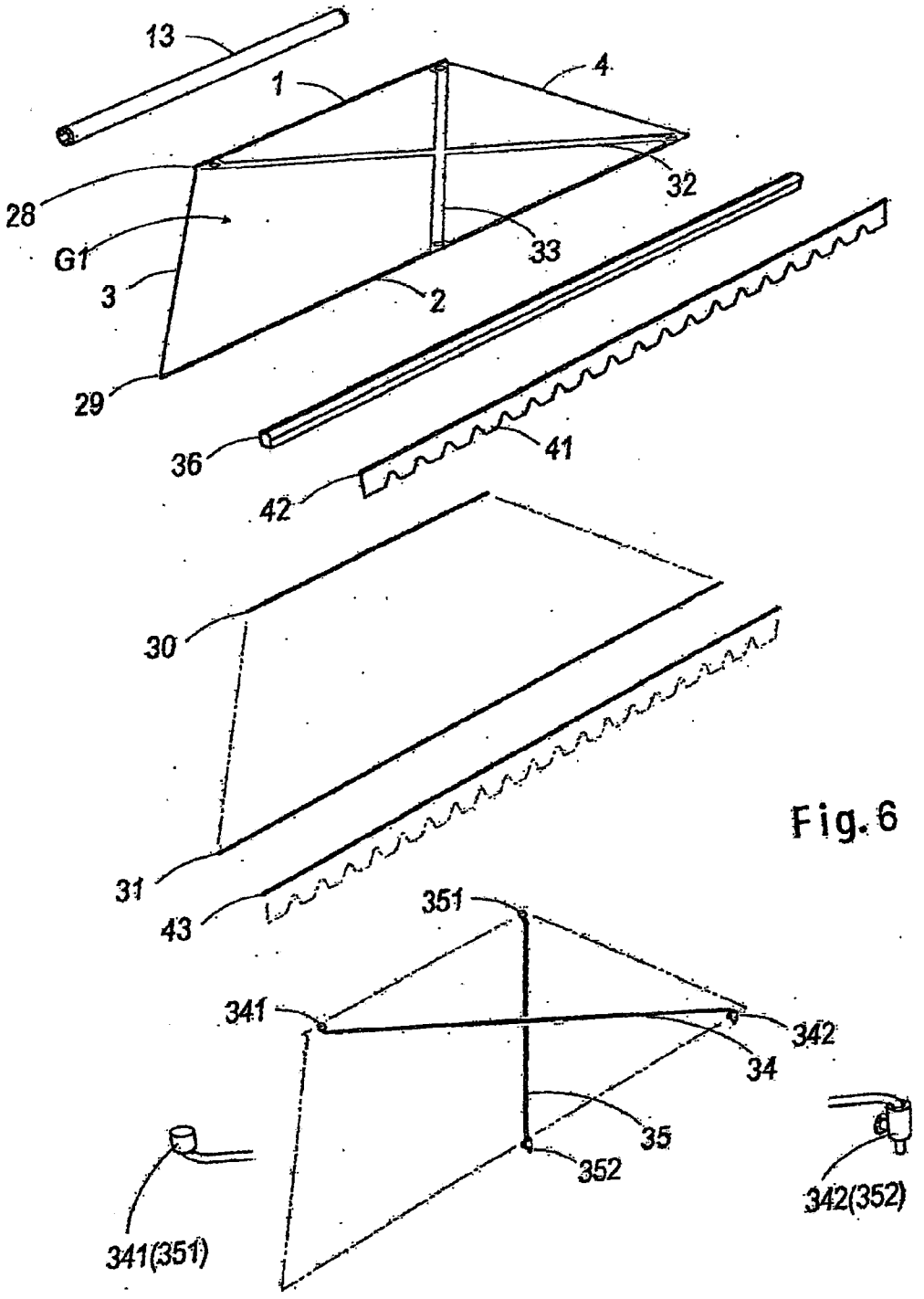
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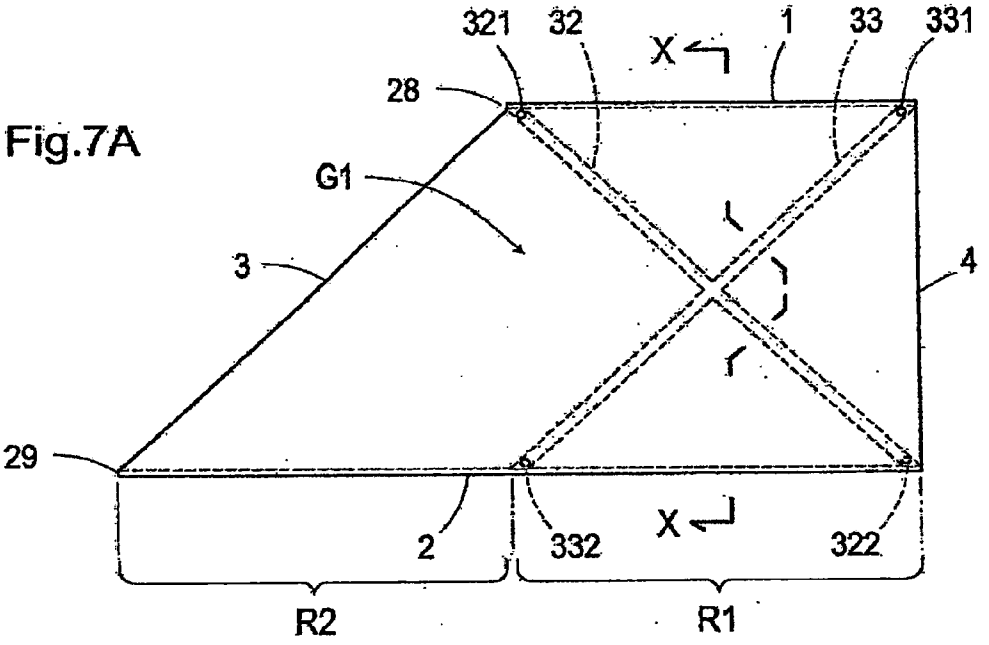
Fig. 6

Fig.7A



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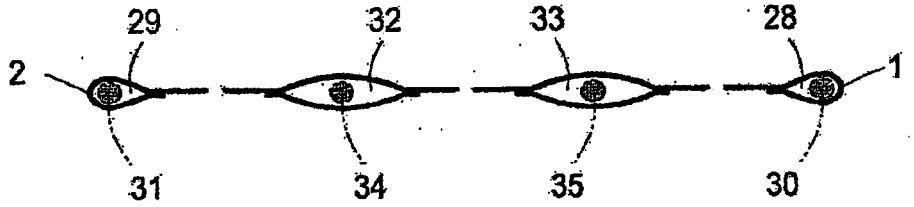
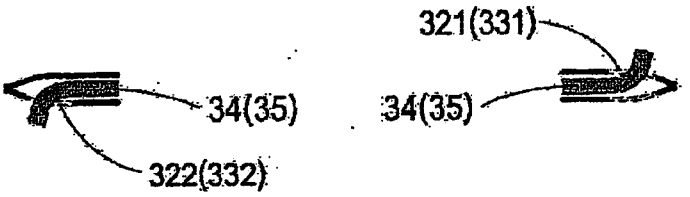


Fig.7C



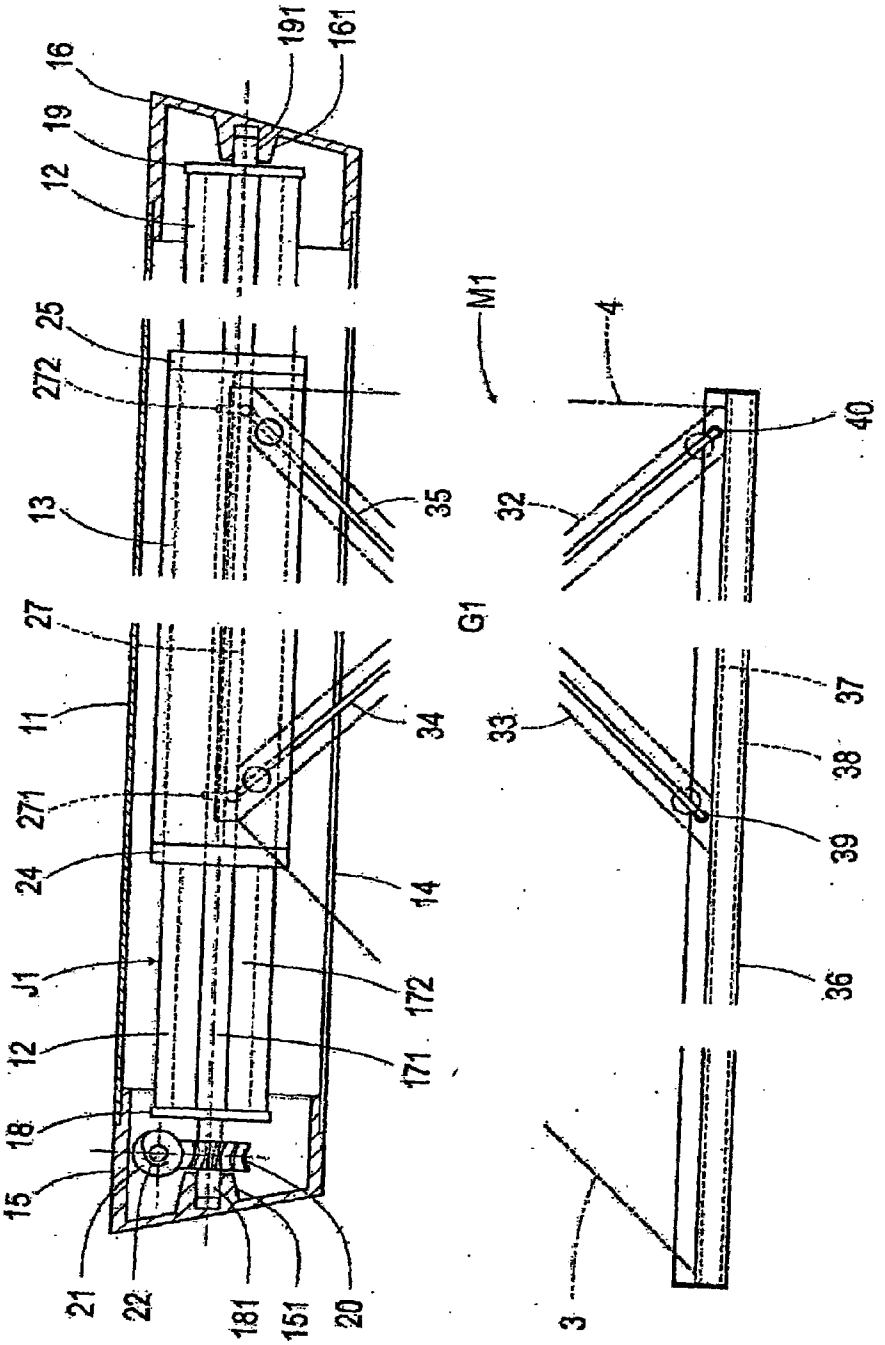

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Fig. 8

Fig. 9A

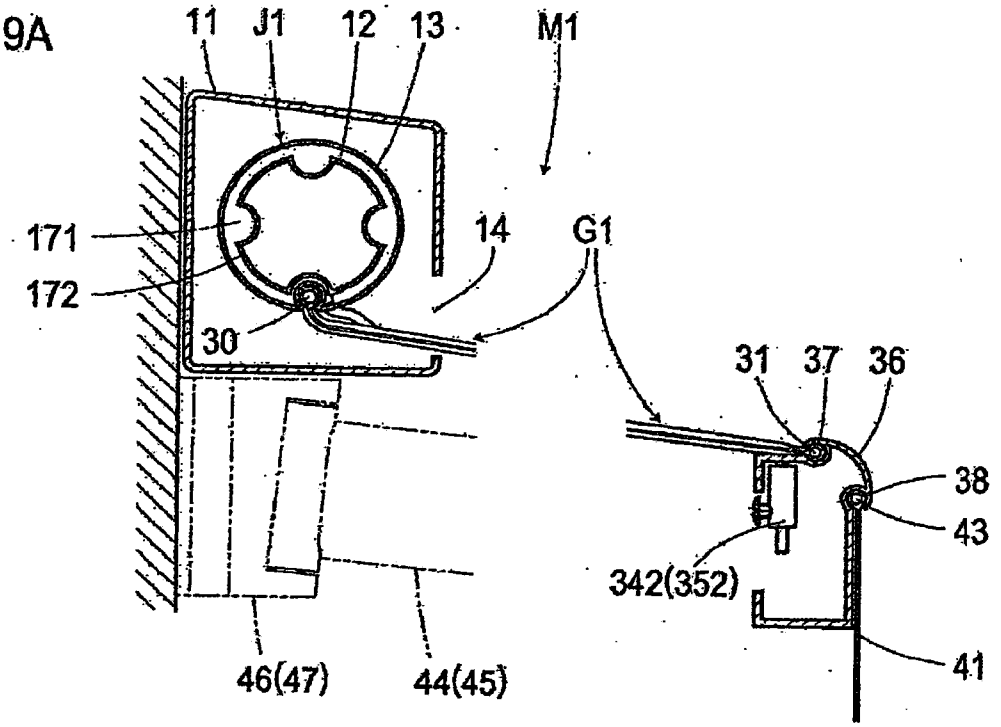
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Fig. 9B

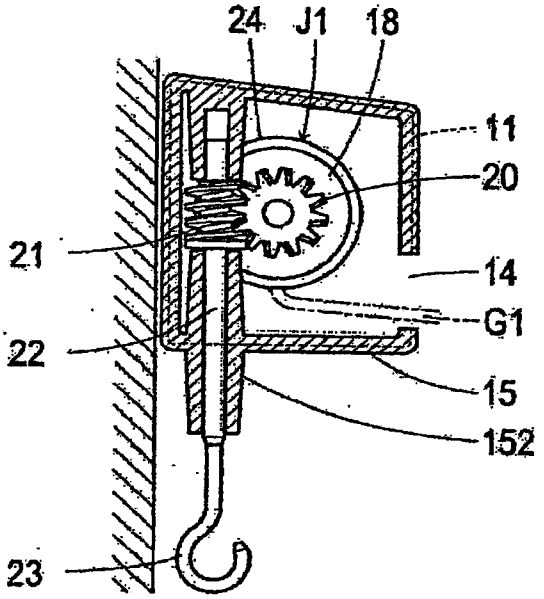
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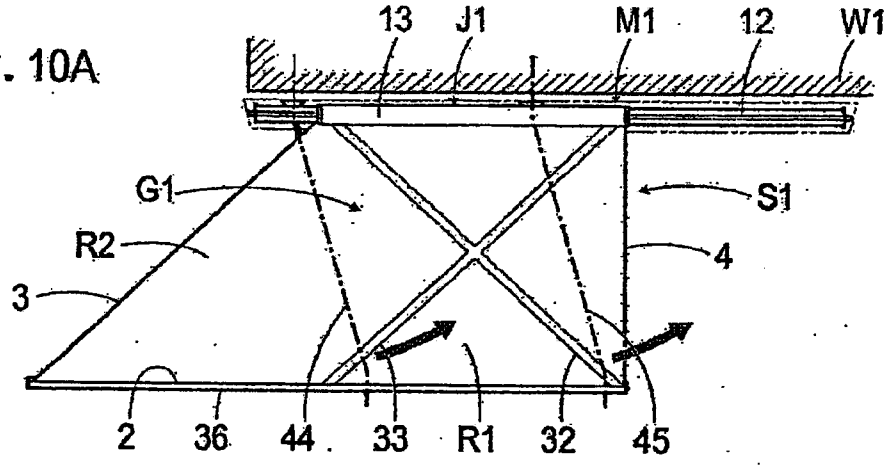
Fig. 10A



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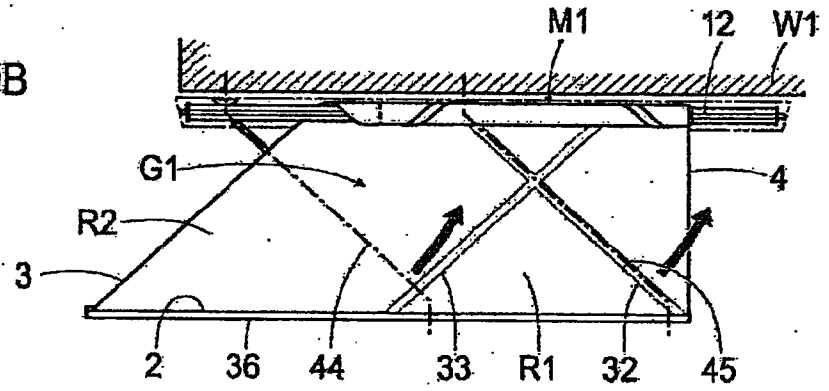

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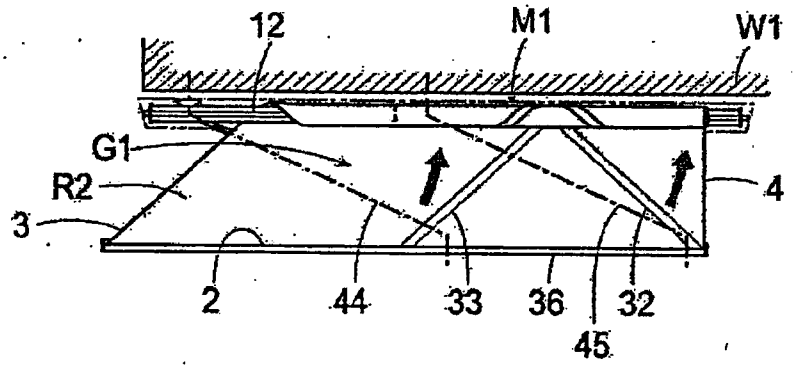

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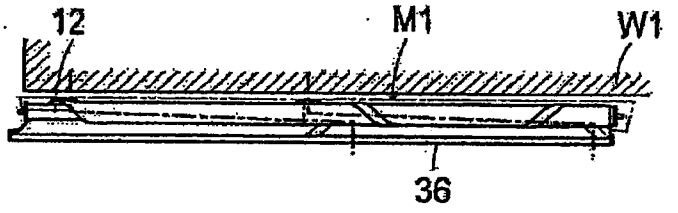

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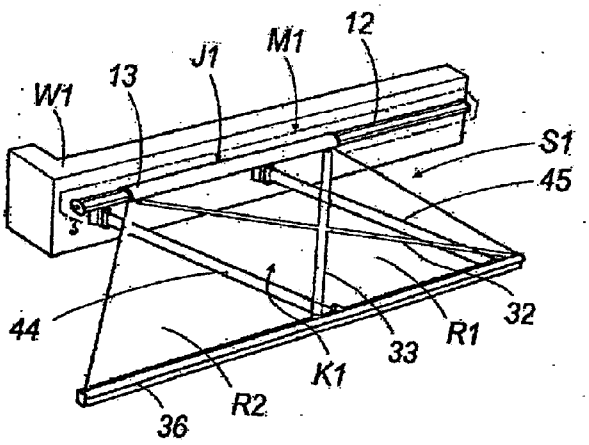

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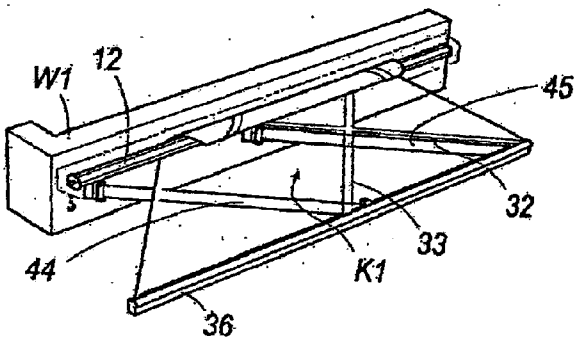

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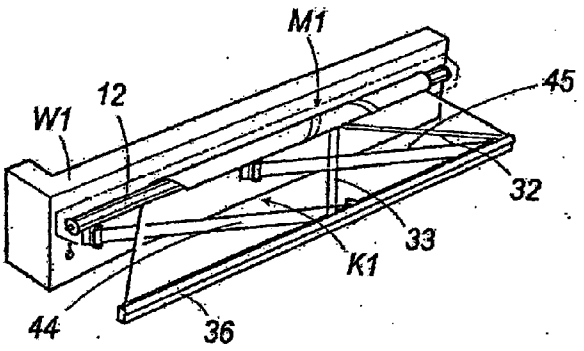

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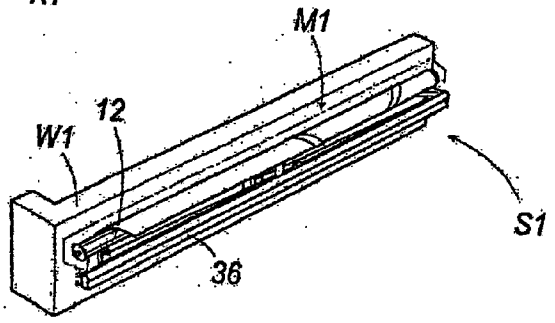

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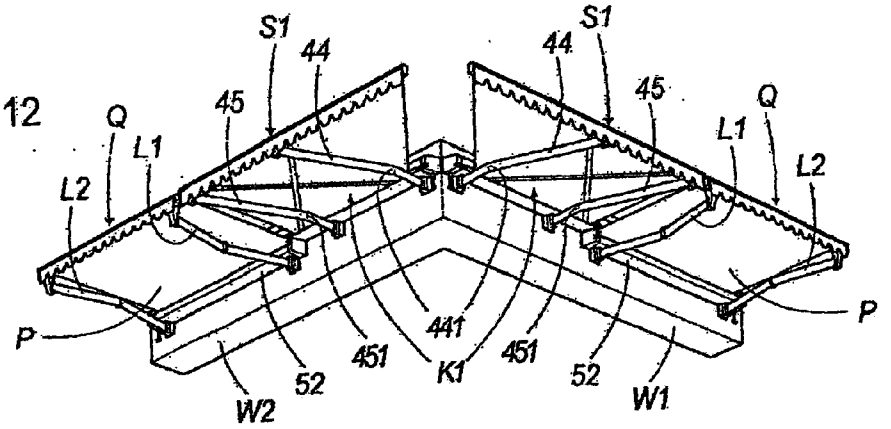

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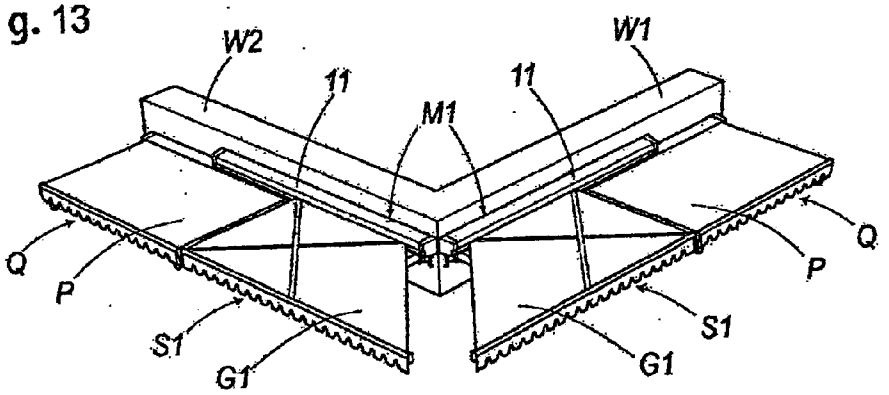

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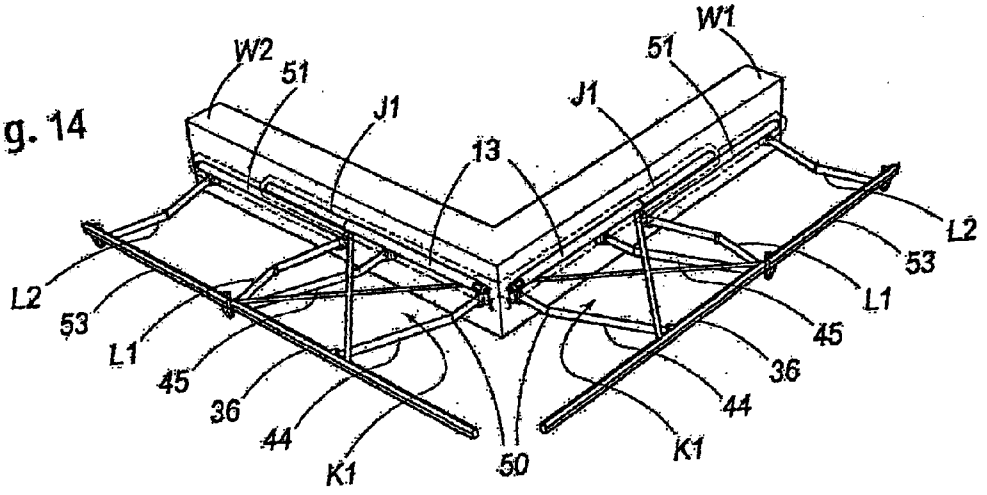

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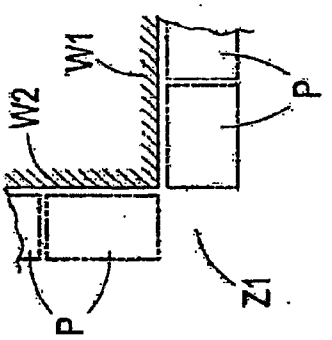

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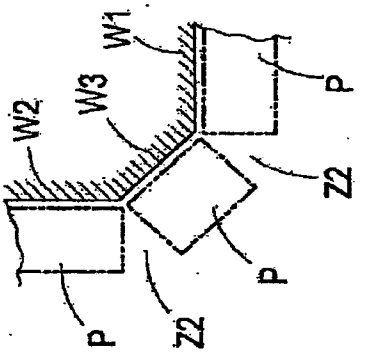

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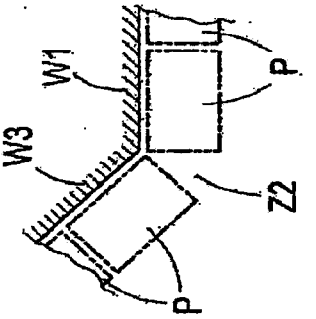

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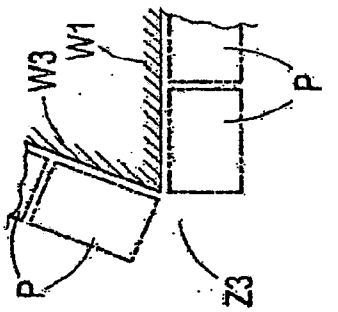

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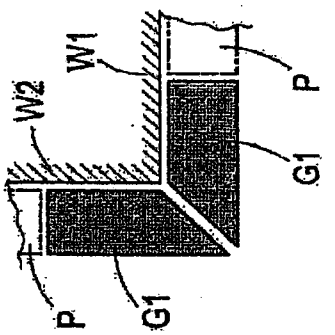
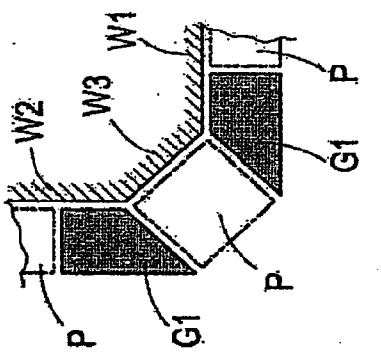


Fig. 16B



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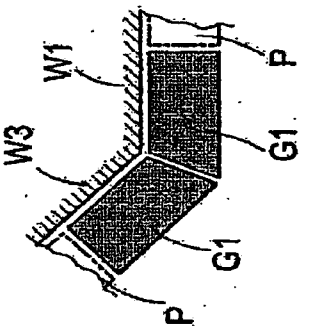

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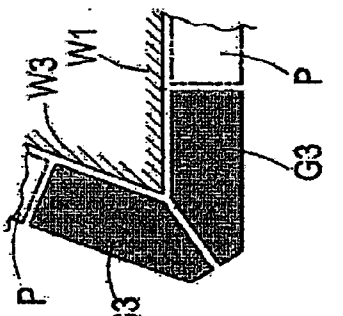

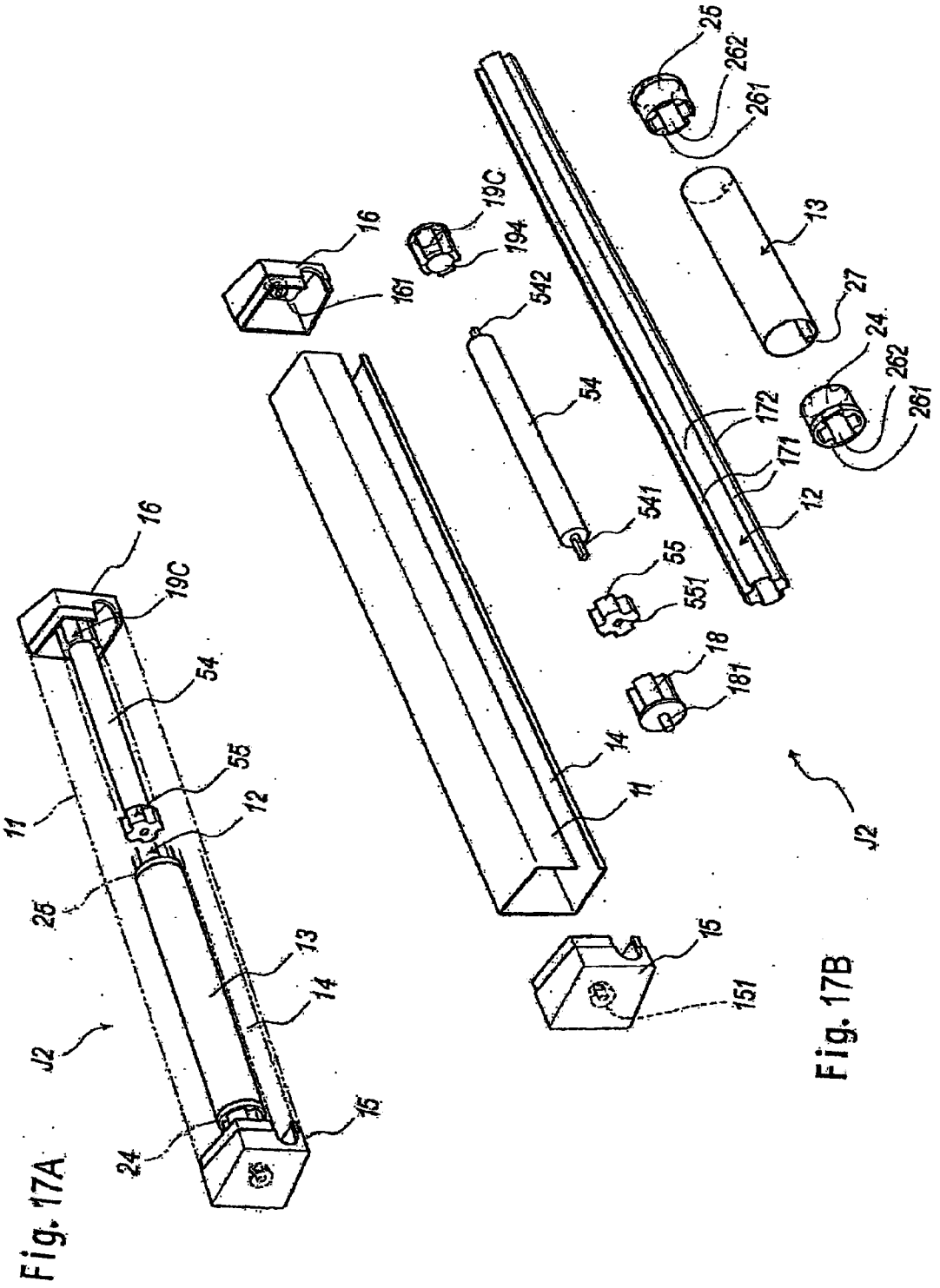
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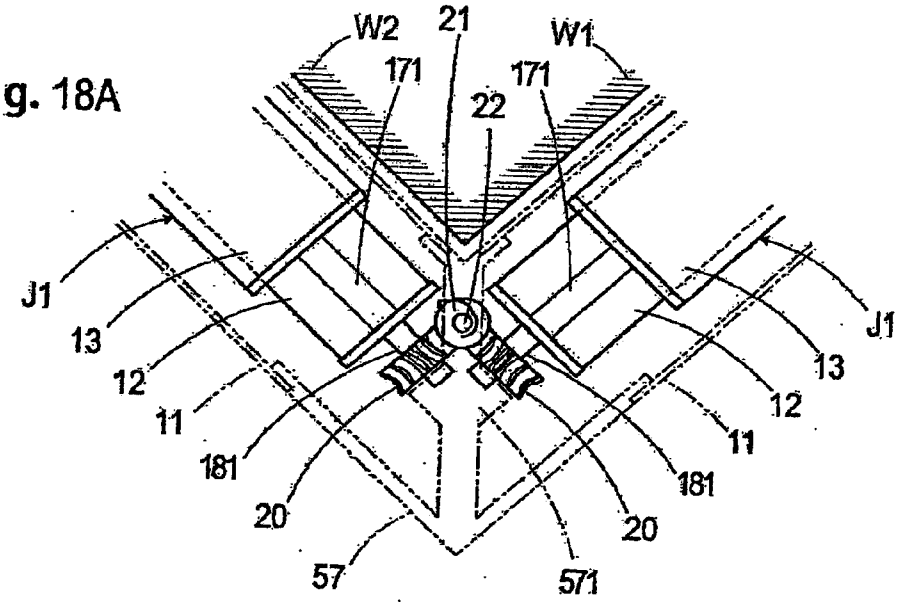
Fig. 17B

Fig. 18A



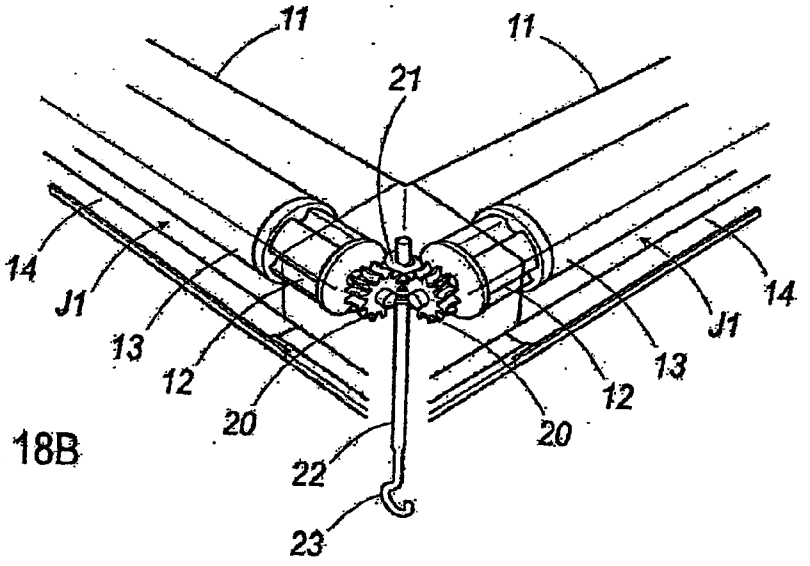
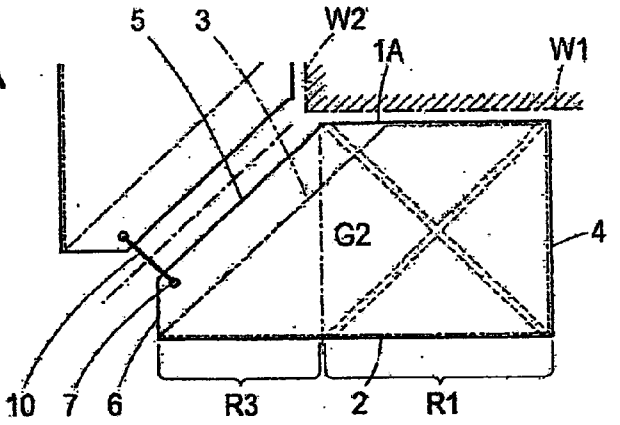


Fig. 18B

Fig. 19A



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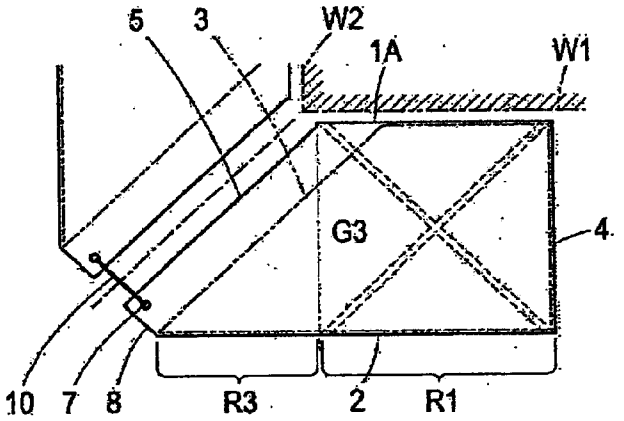

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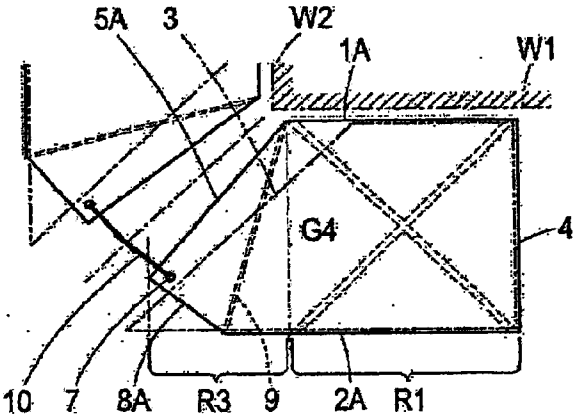

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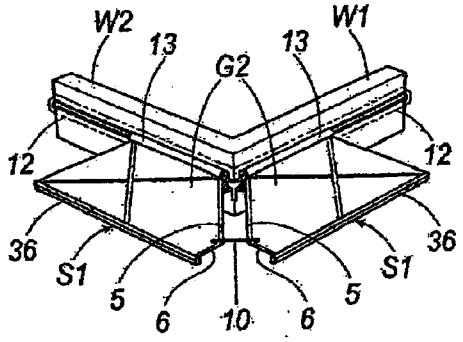

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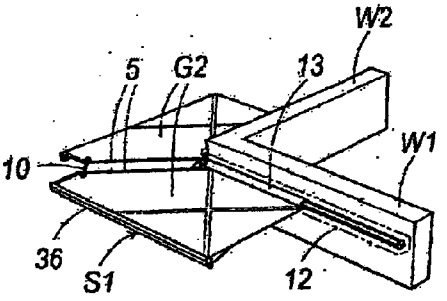

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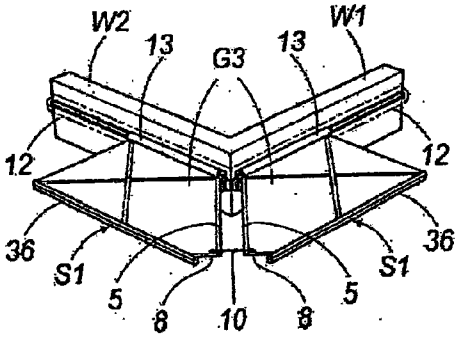

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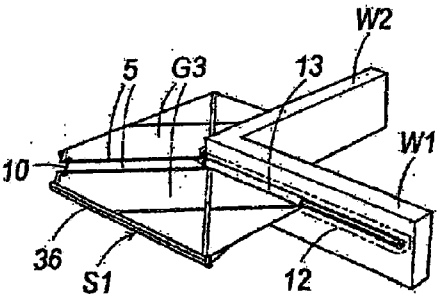

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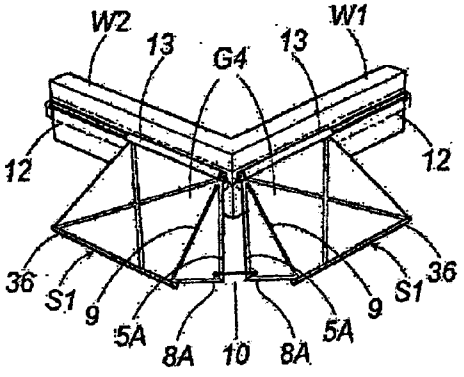

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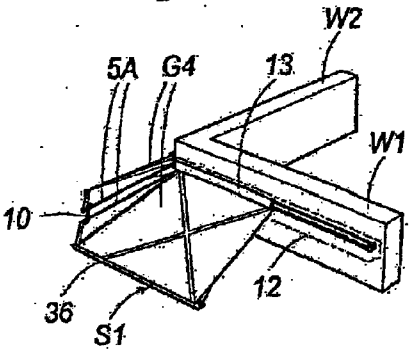

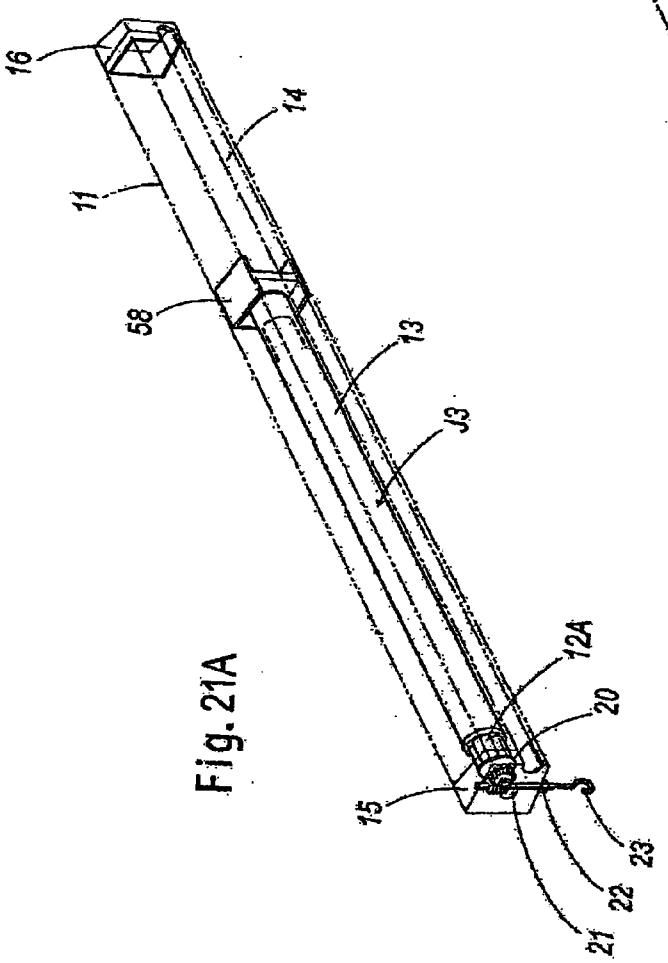

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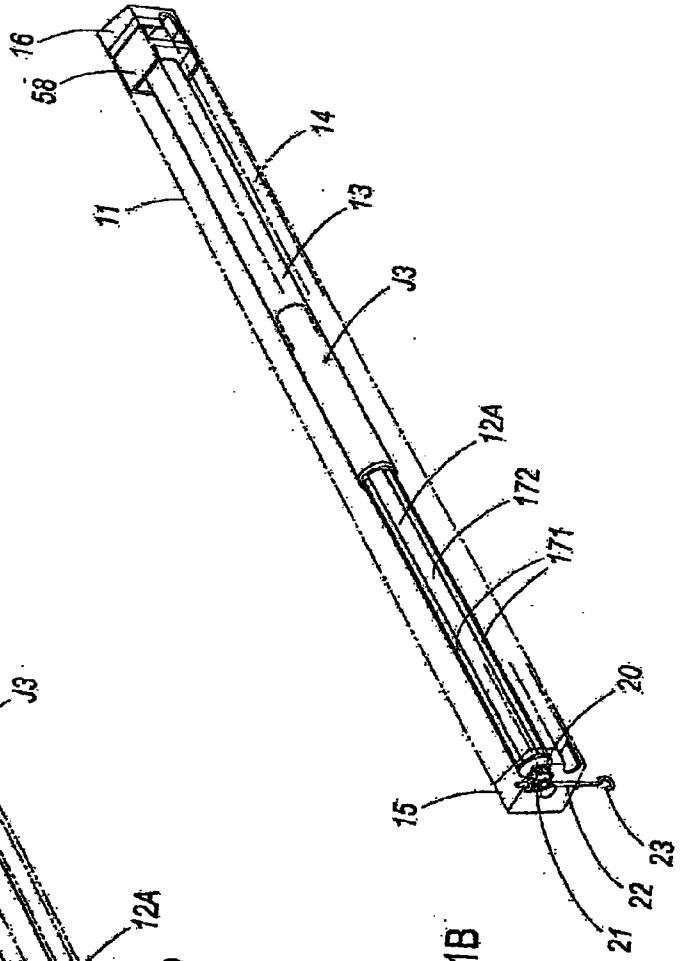
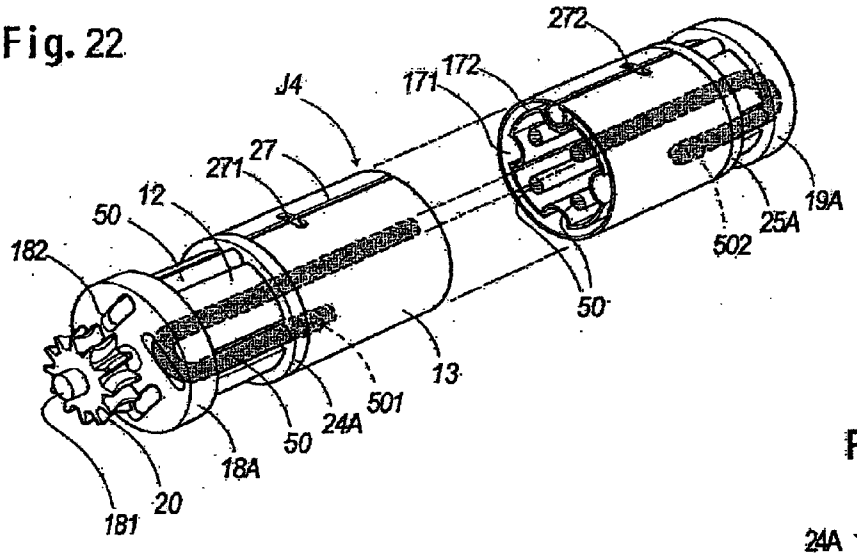


Fig. 21B

Fig. 22



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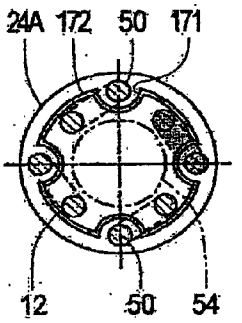

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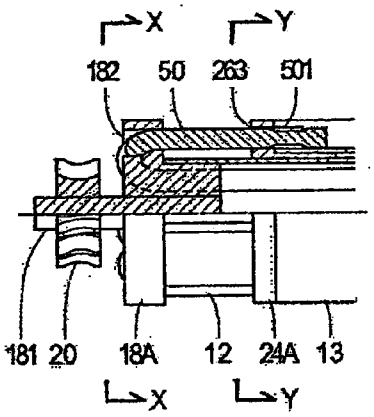

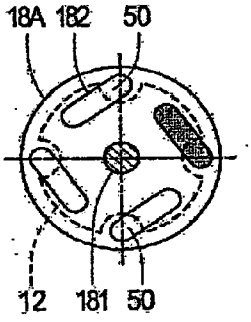

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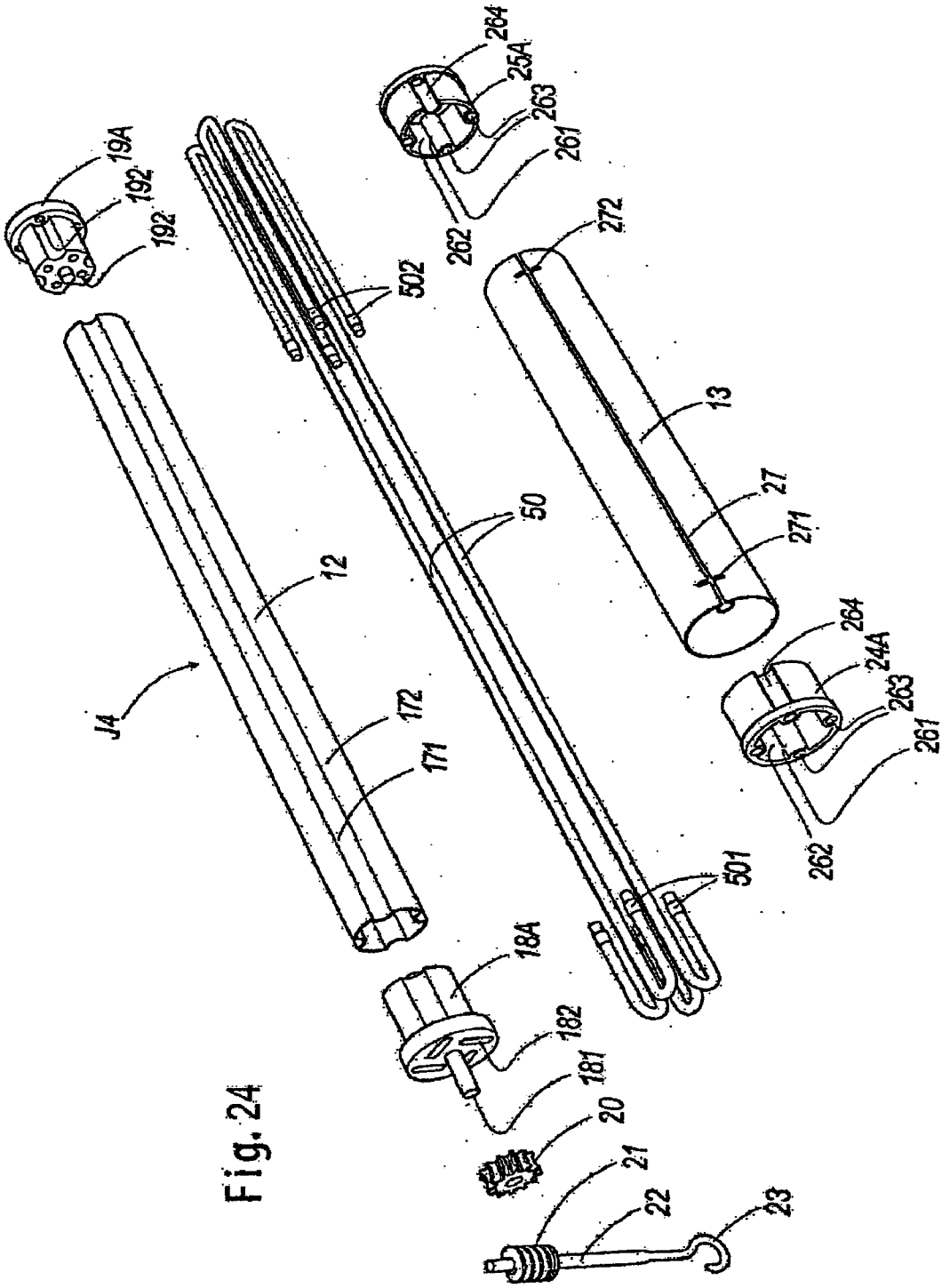
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192
502
264
25A
263
261
262
272
13
27
271
264
24A
263
261
262
50
12
J4
172
171
501
184
182
181
20
21
22
23

Fig. 24

Fig. 25

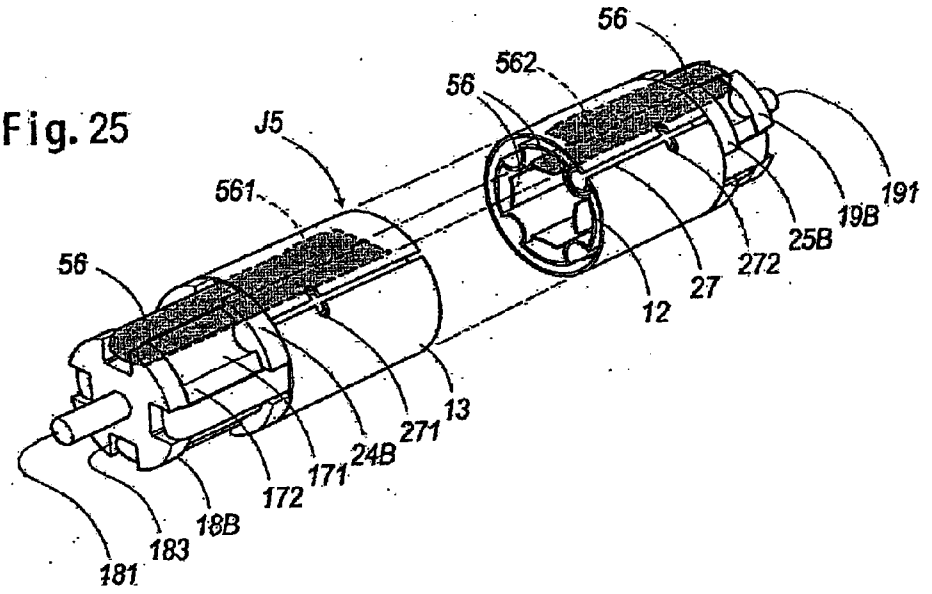
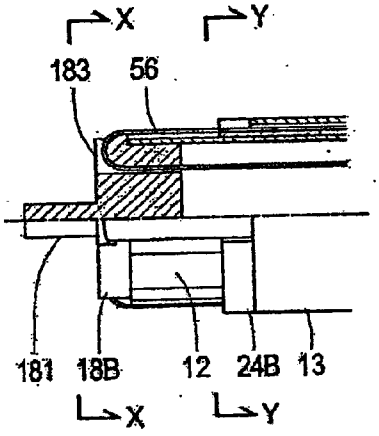


Fig. 26A



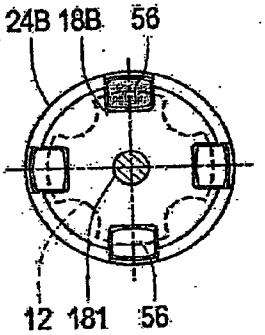
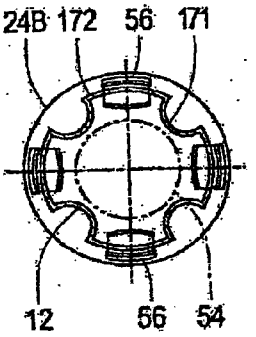


Fig. 26B

Fig. 26C



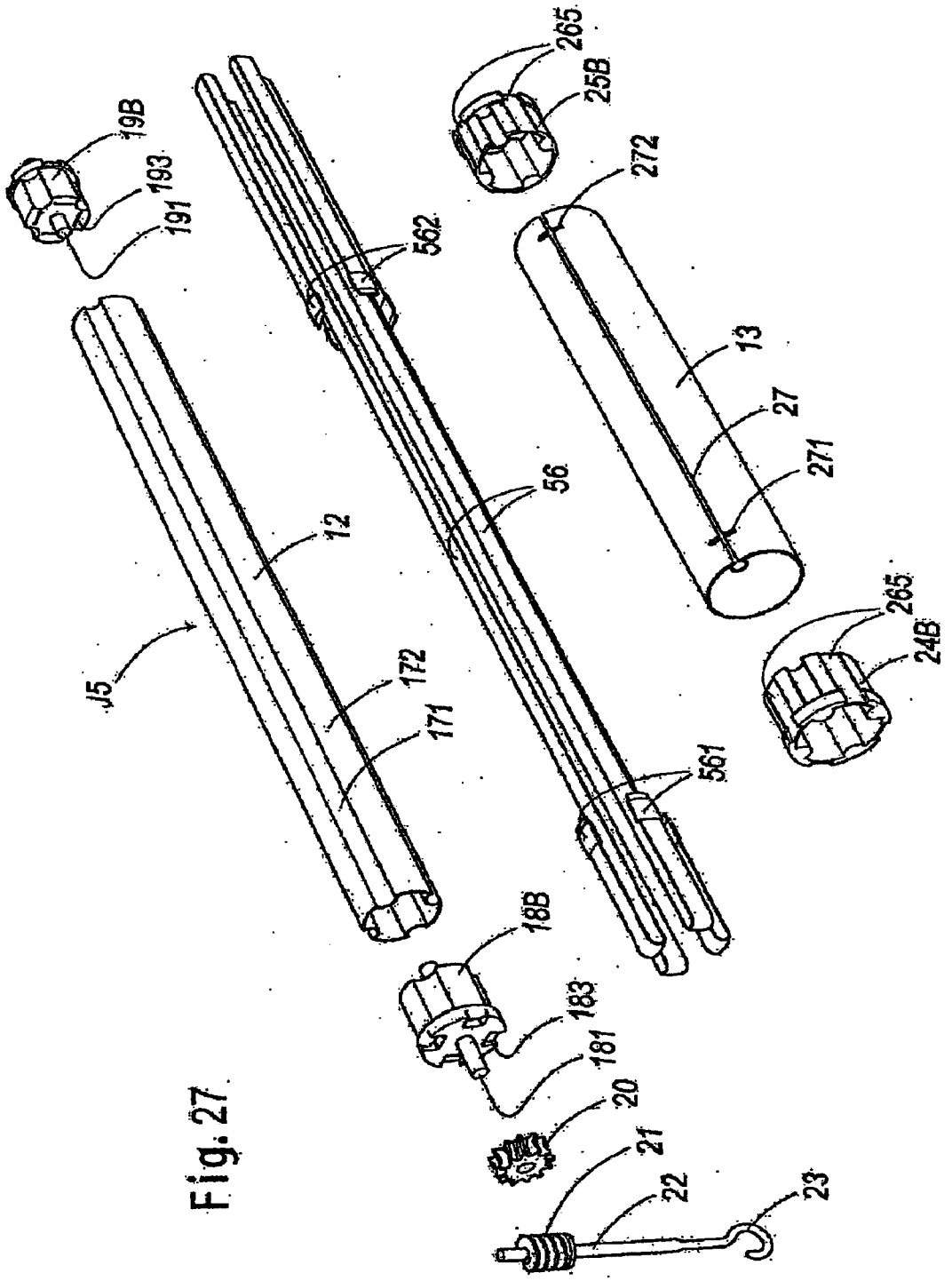

19B
193
191
562
265
25B
272
13
27
271
56
12
J5
172
171
561
265
24B
18B
183
181
20
21
22
23

Fig. 27

Fig. 28A

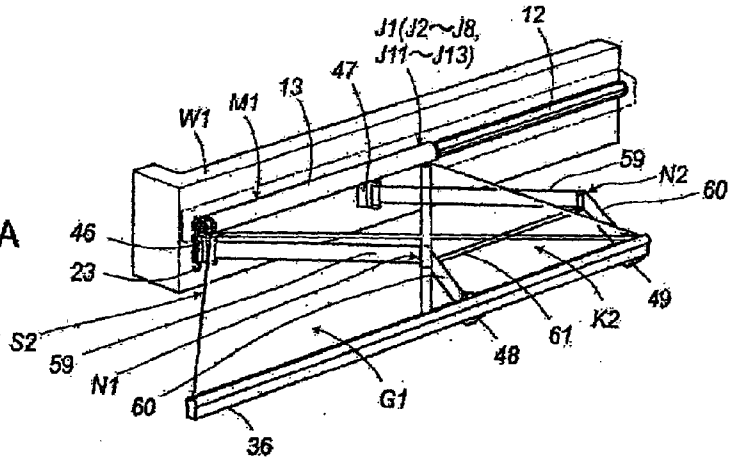


Fig. 28B

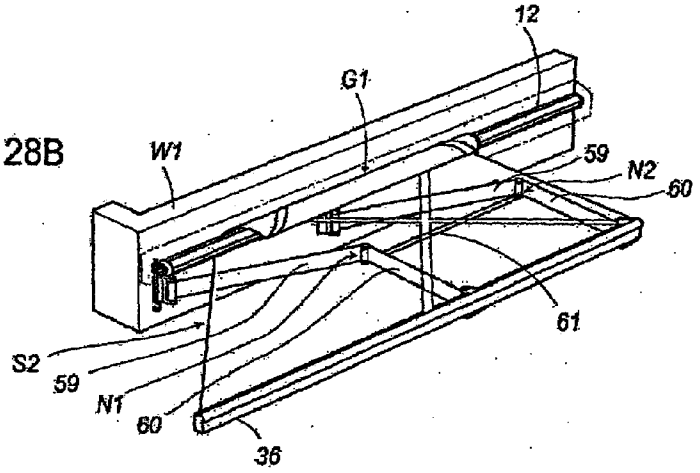


Fig. 28C

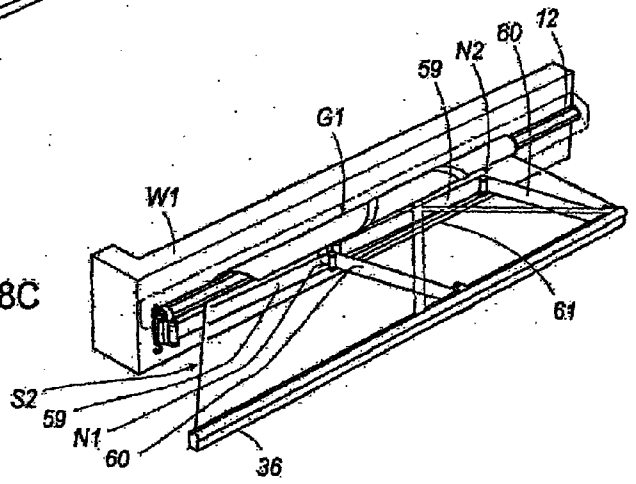


Fig. 29D

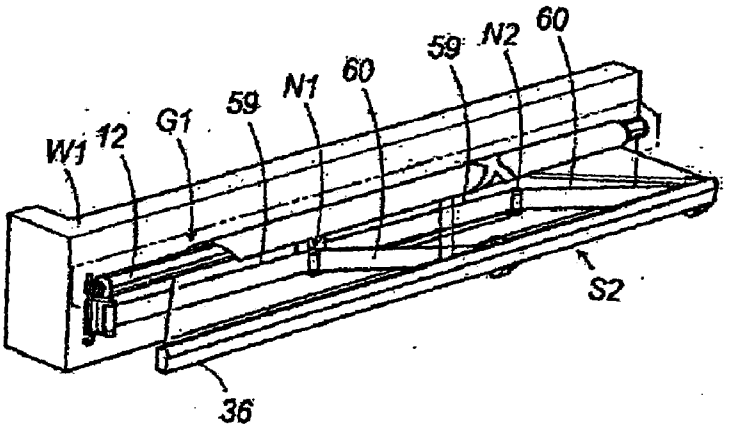


Fig. 29E

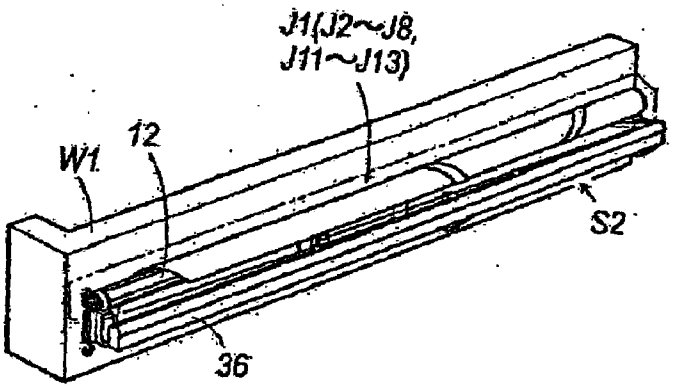


Fig. 30A

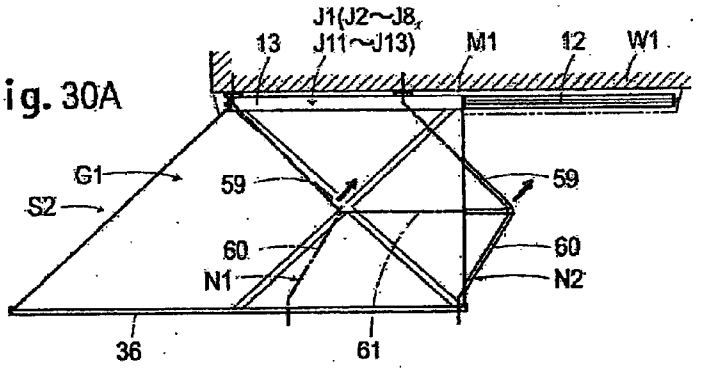


Fig. 30B

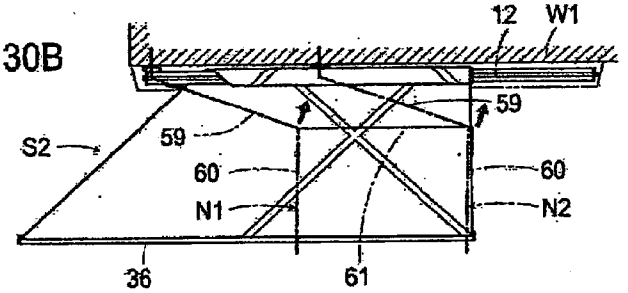


Fig. 30C

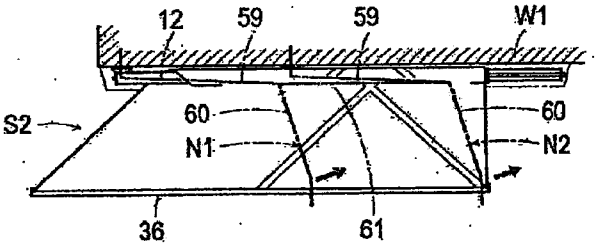


Fig. 30D

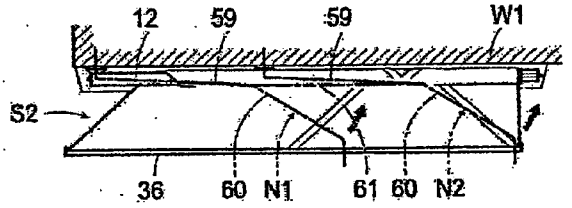


Fig. 30E

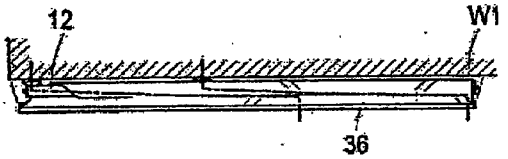
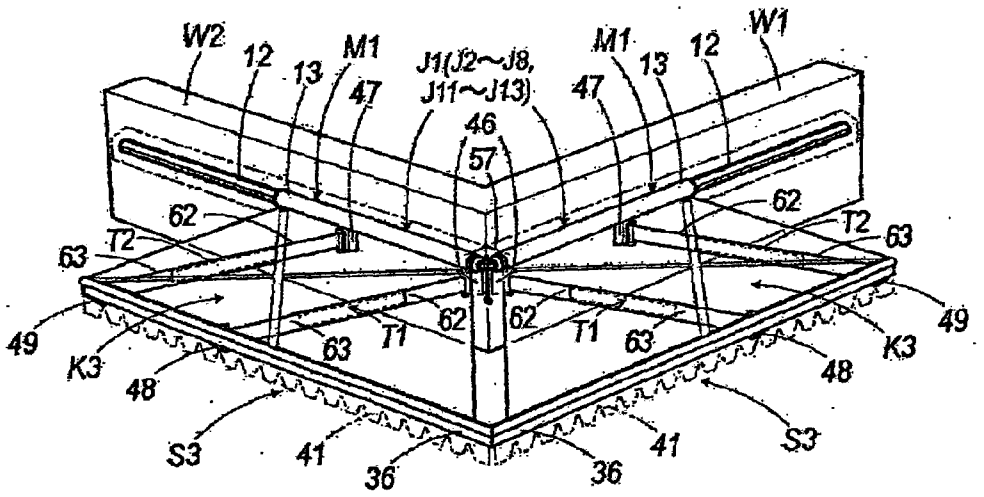


Fig. 31A



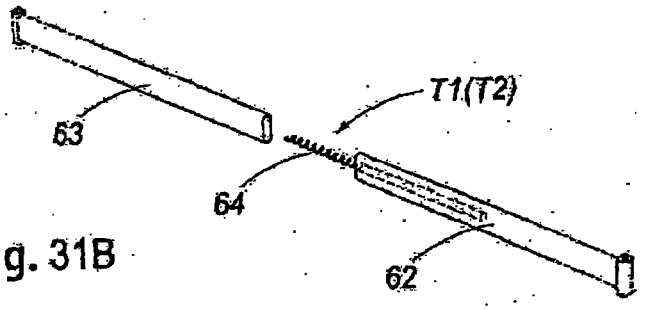


Fig. 31B

Fig. 32A

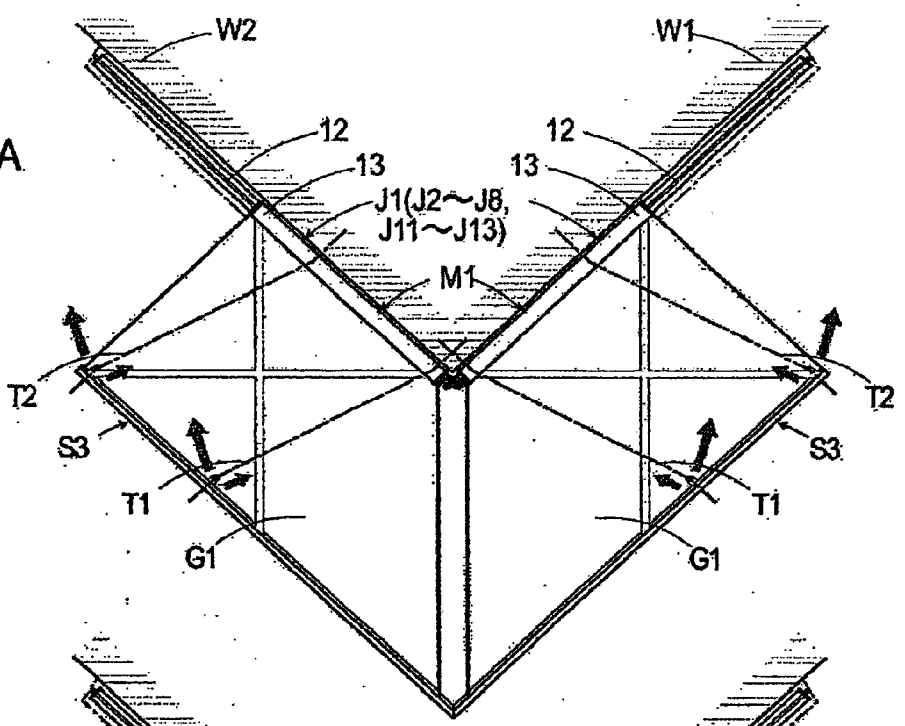


Fig. 32B

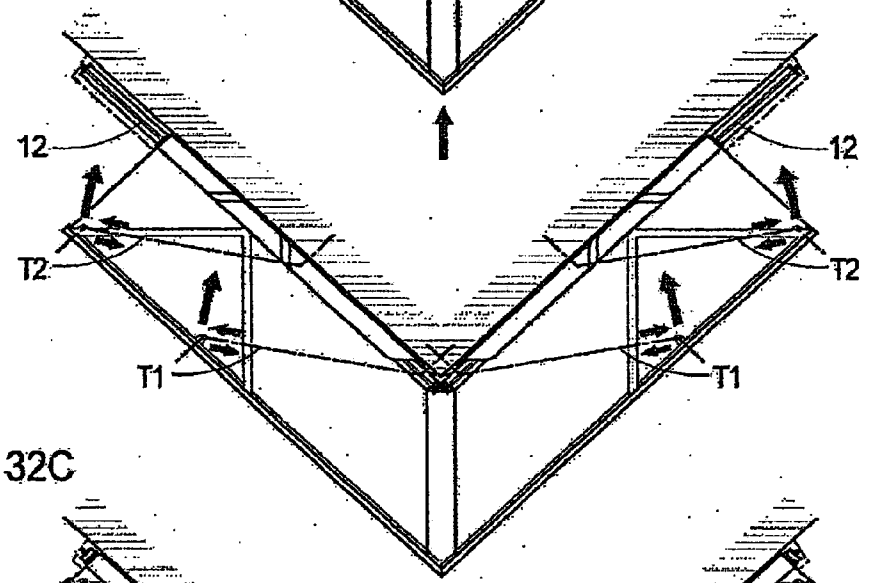


Fig. 32C

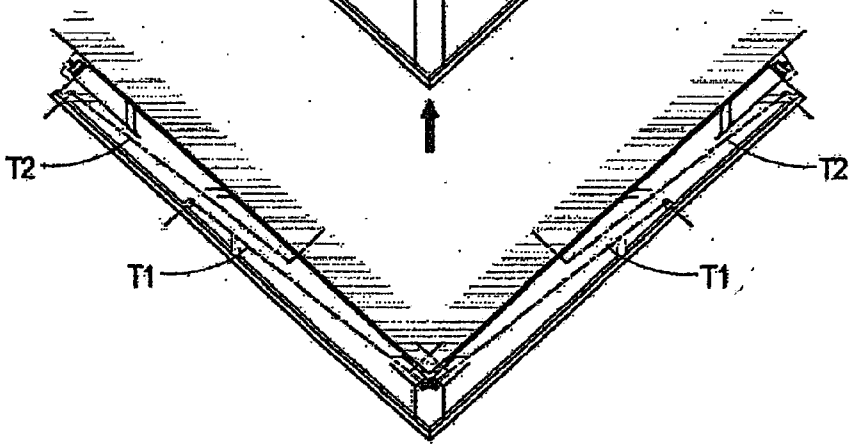


Fig. 33

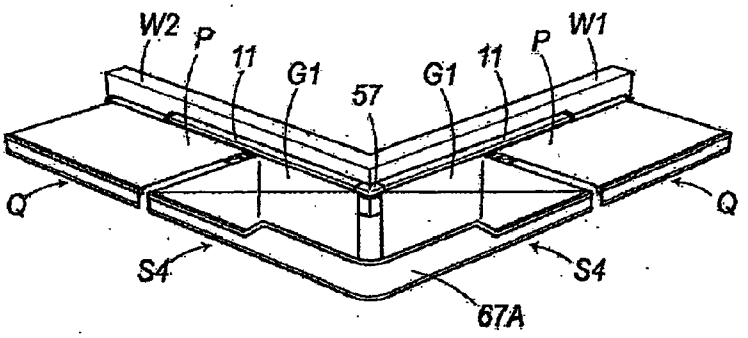


Fig. 34

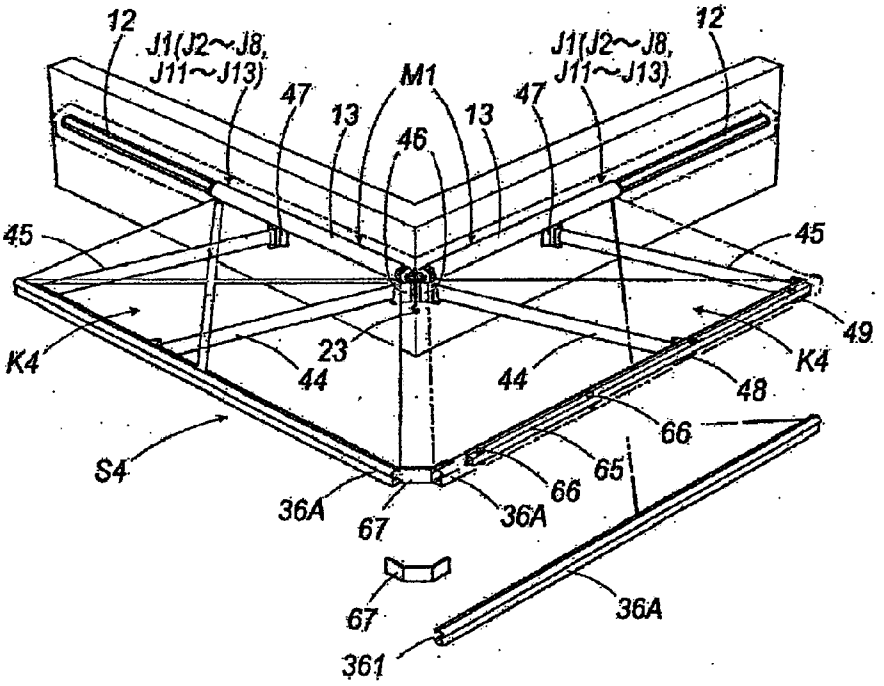


Fig. 35

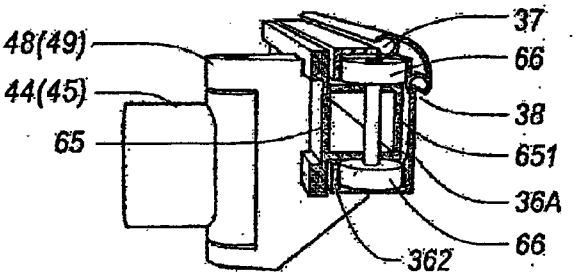


Fig. 36

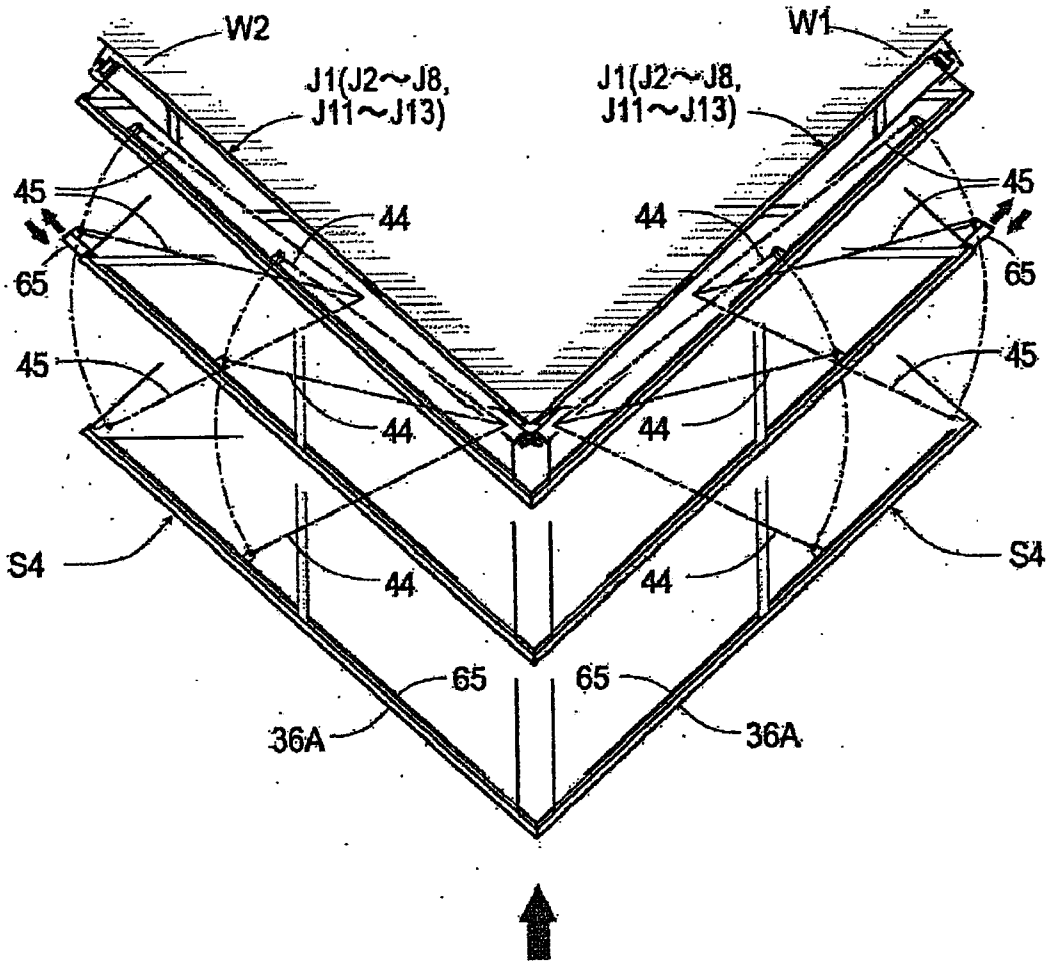
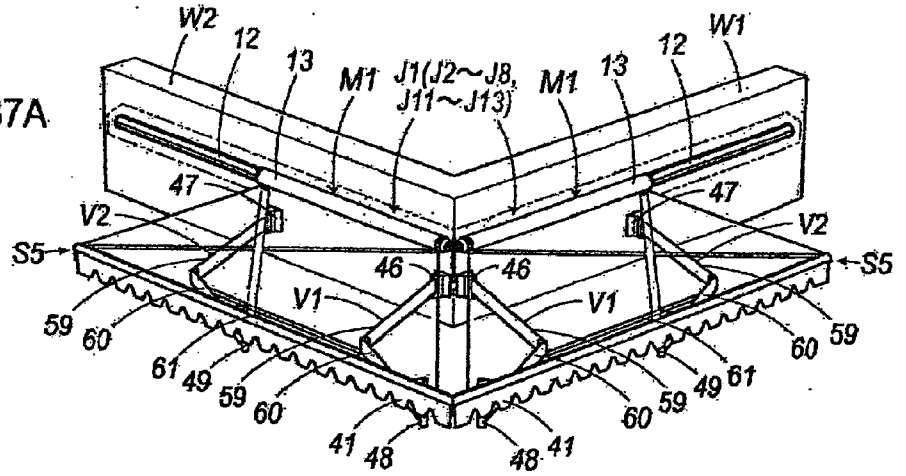

W2
W1
J1(J2~J8, J11~J13)
J1(J2~J8, J11~J13)
45
45
44
44
65
65
45
45
44
44
S4
S4
44
44
65
65
36A
36A

Fig. 37A



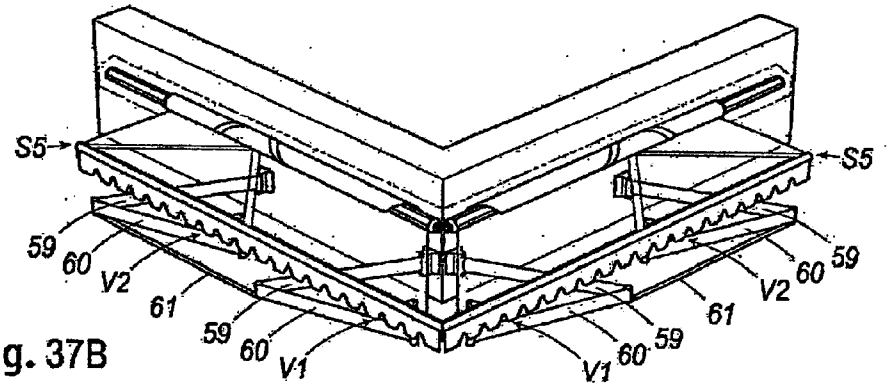


Fig. 37B

Fig. 37C

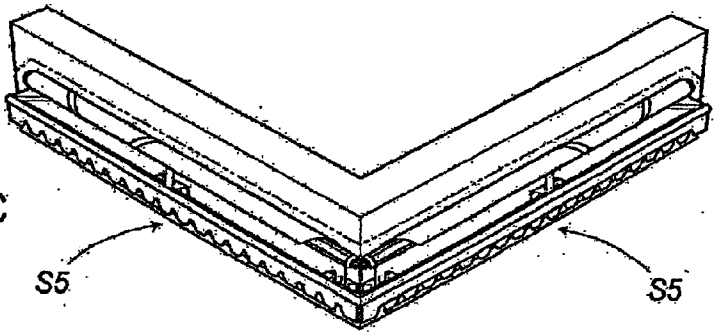


Fig. 38A

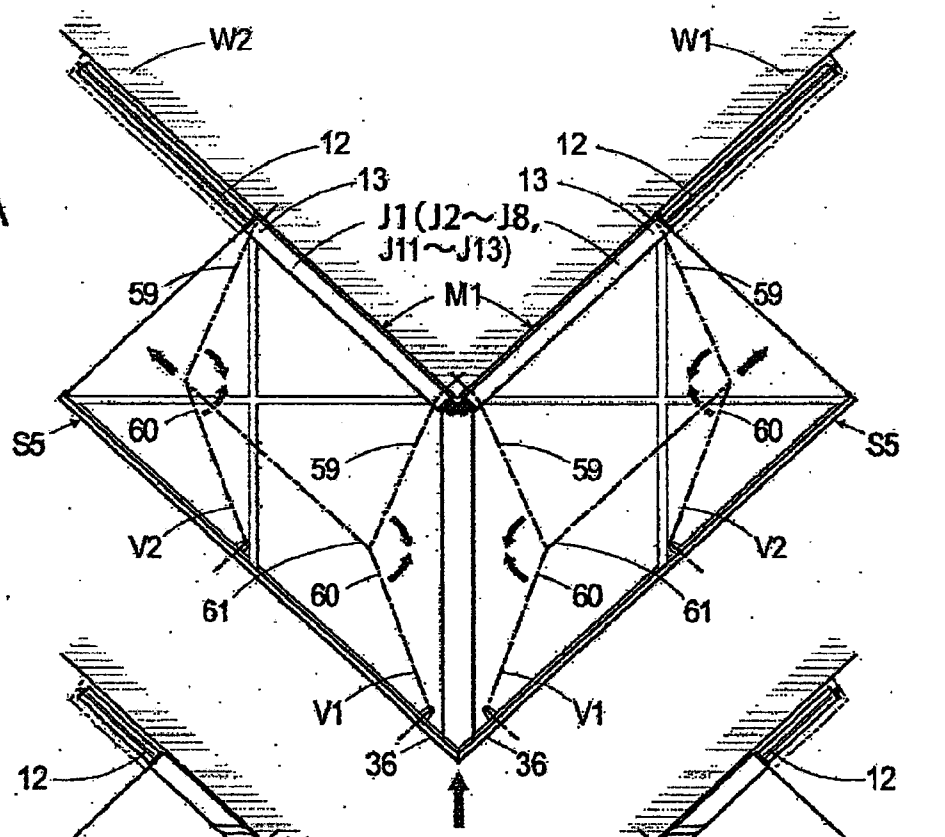


Fig. 38B

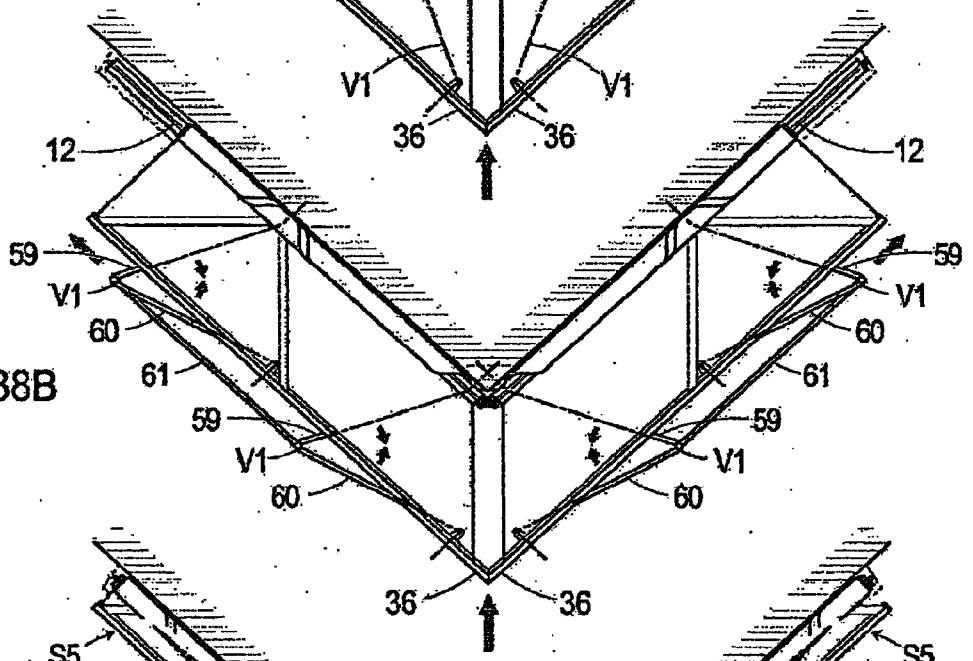
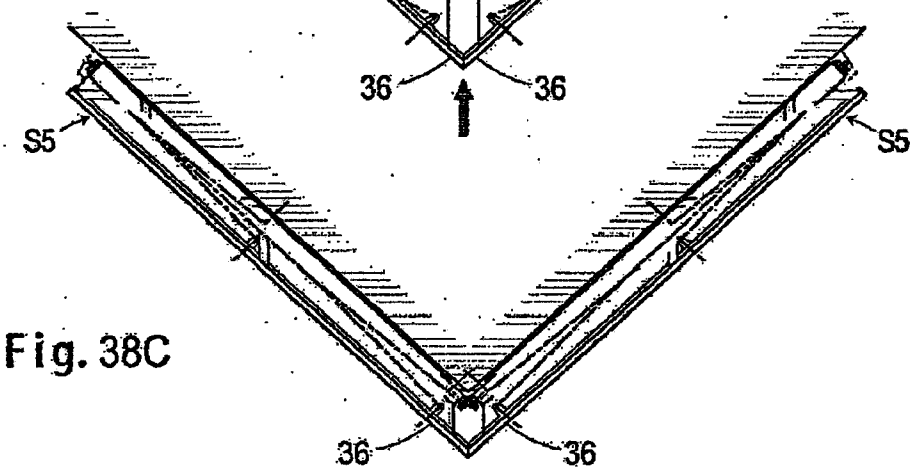


Fig. 38C



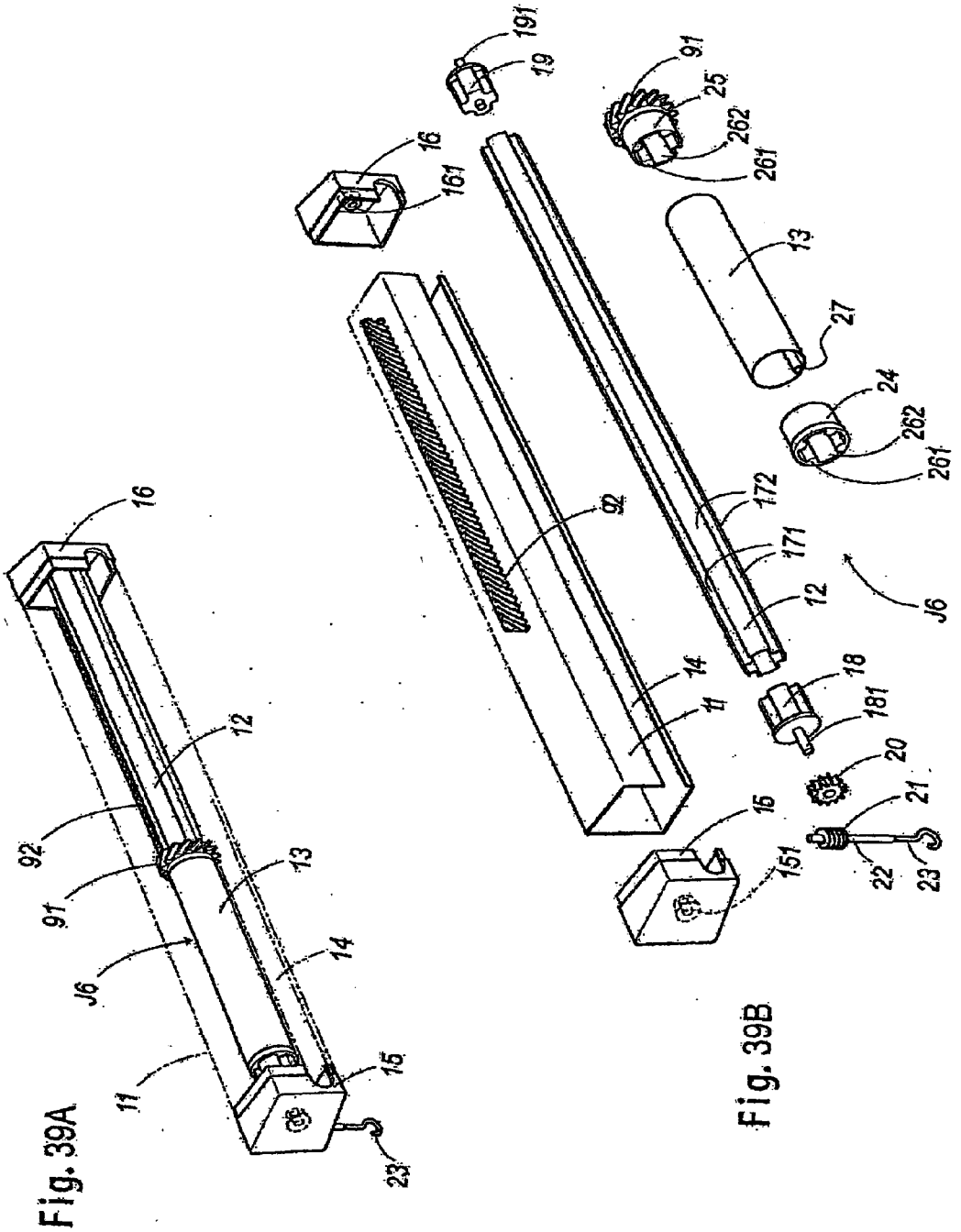


Fig. 39A

Fig. 39B

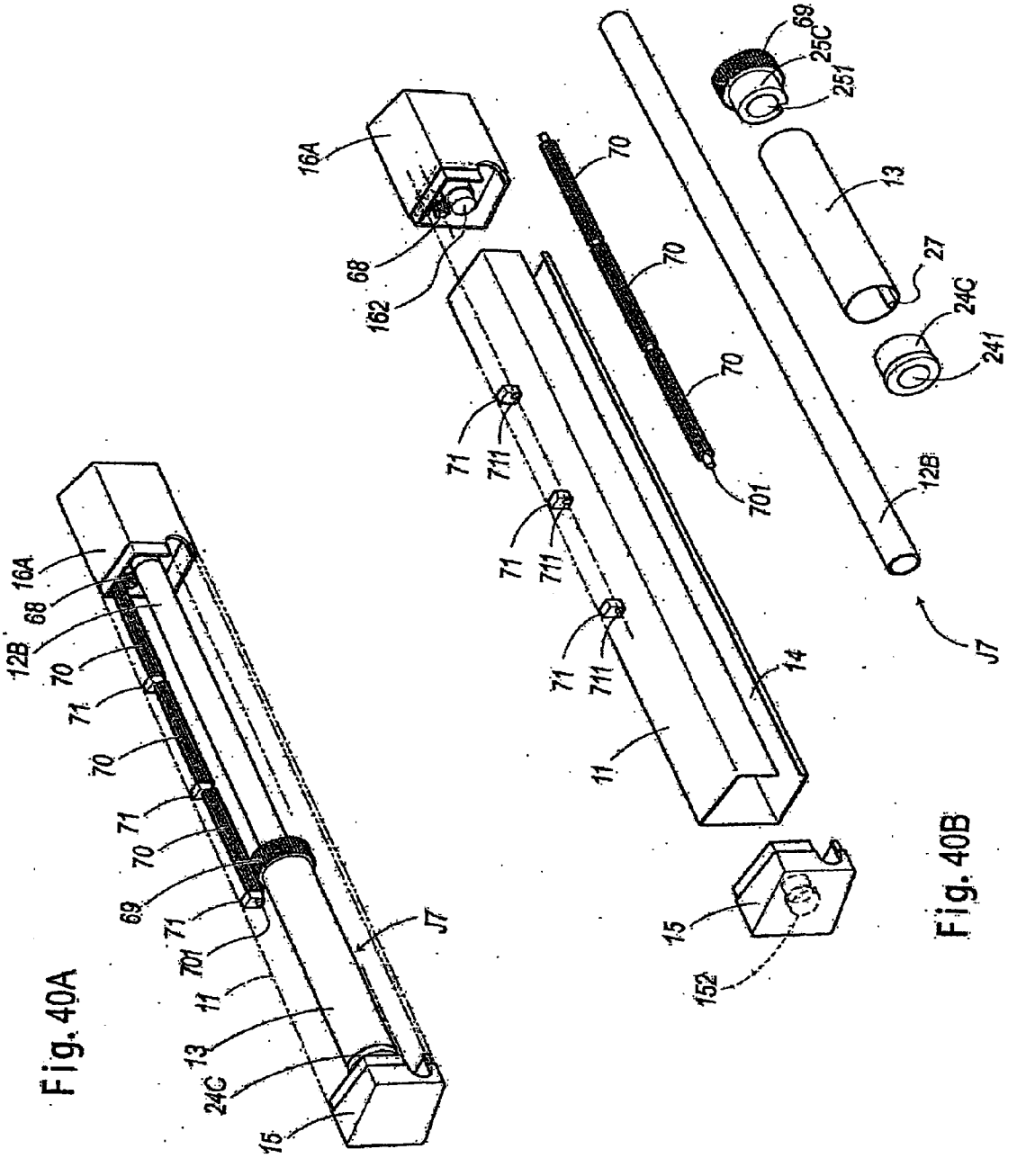


Fig. 40A

Fig. 40B

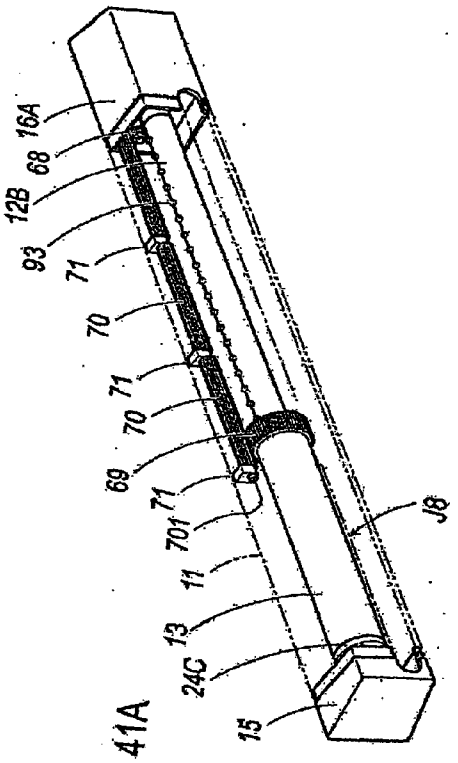


Fig. 41A

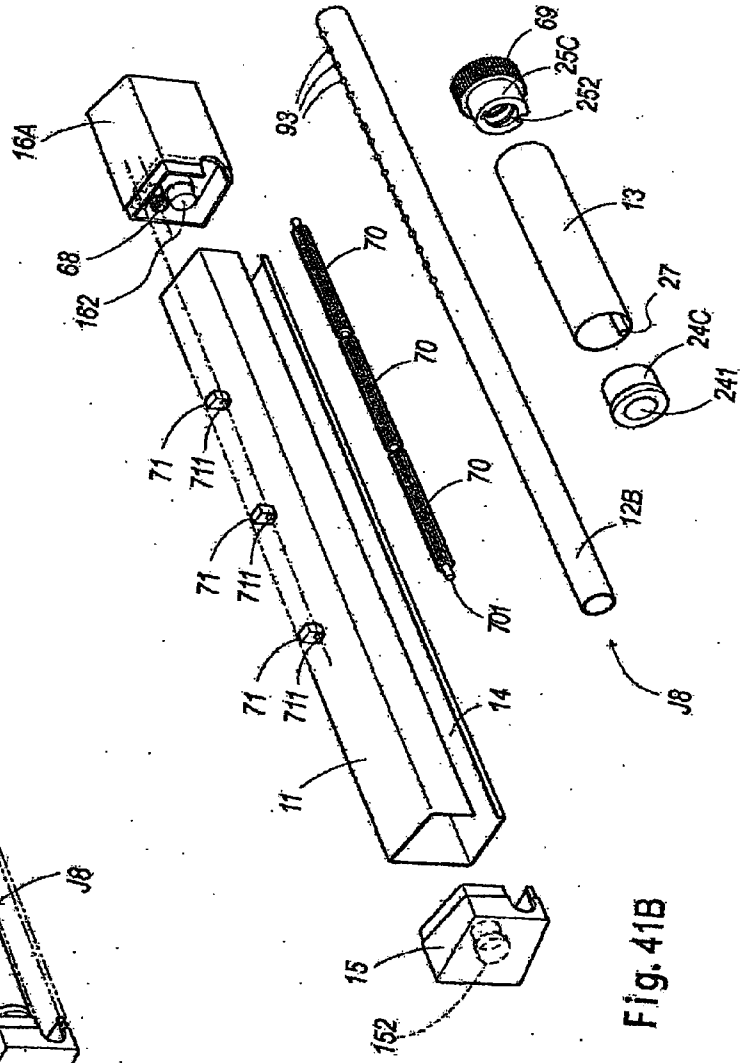


Fig. 41B

Fig. 42

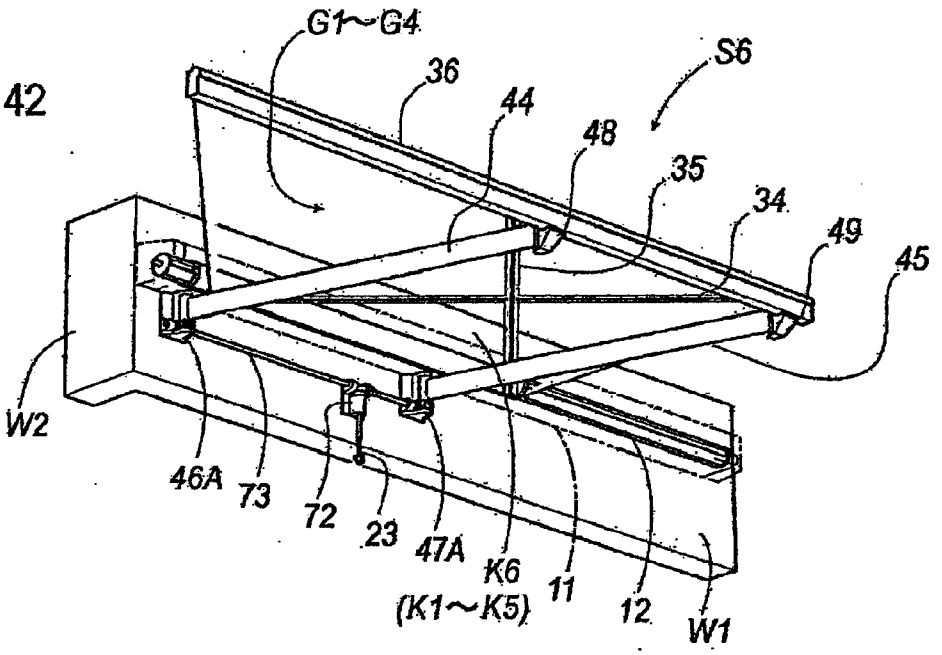
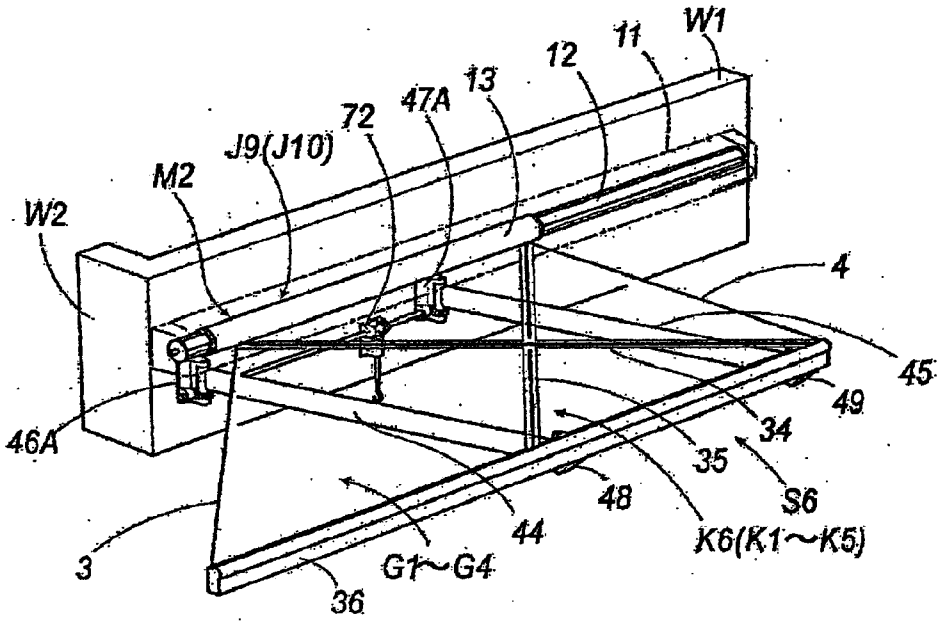

G1~G4
36
44
48
S6
35
34
49
45
W2
46A
73
72
23
47A
K6
(K1~K5)
11
12
W1

Fig. 43


W1
11
12
13
47A
72
J9(J10)
M2
W2
4
45
49
34
35
S6
48
K6(K1~K5)
44
G1~G4
46A
3
36

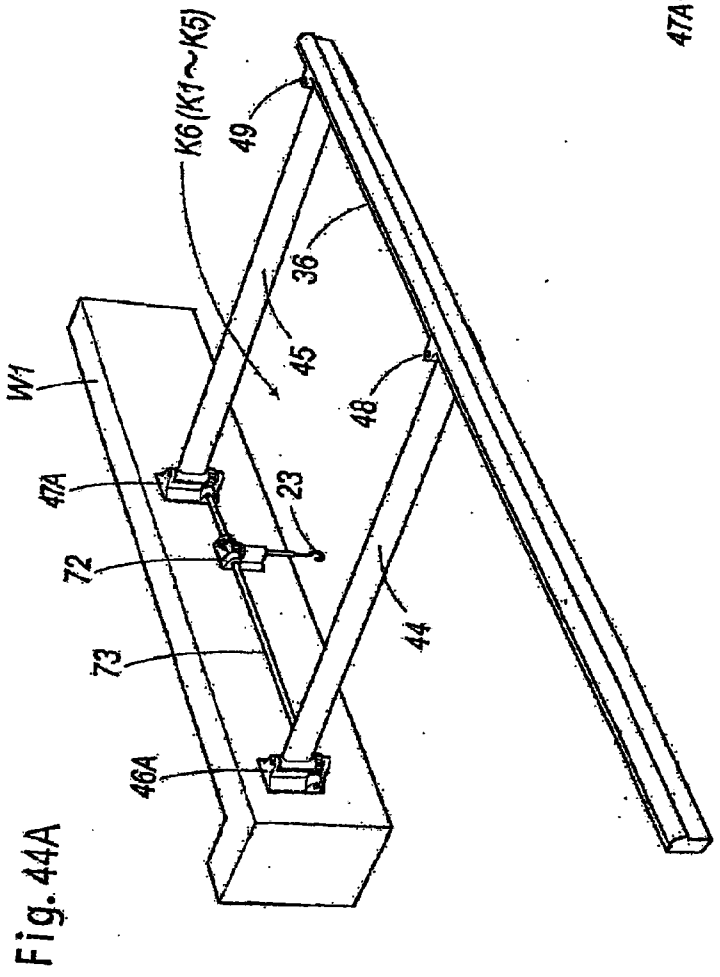


Fig. 44A

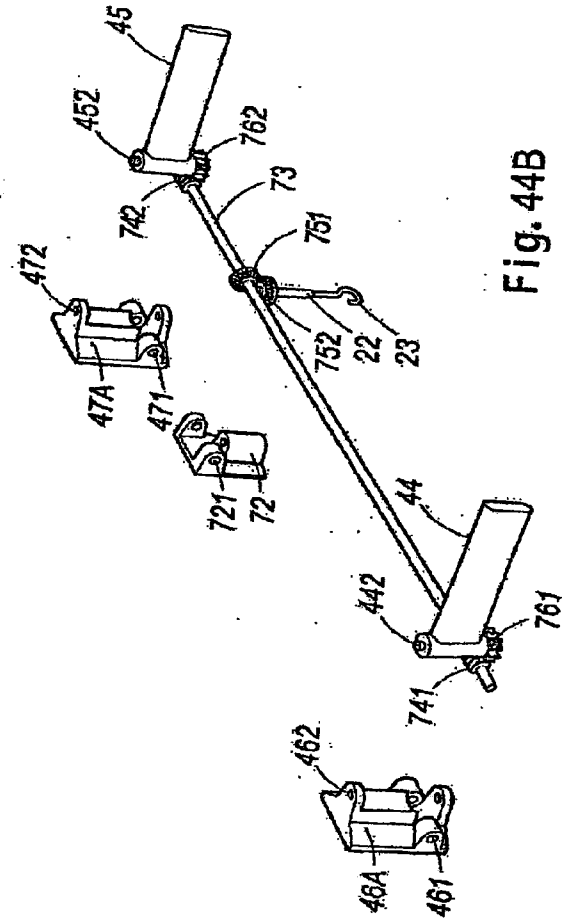


Fig. 44B

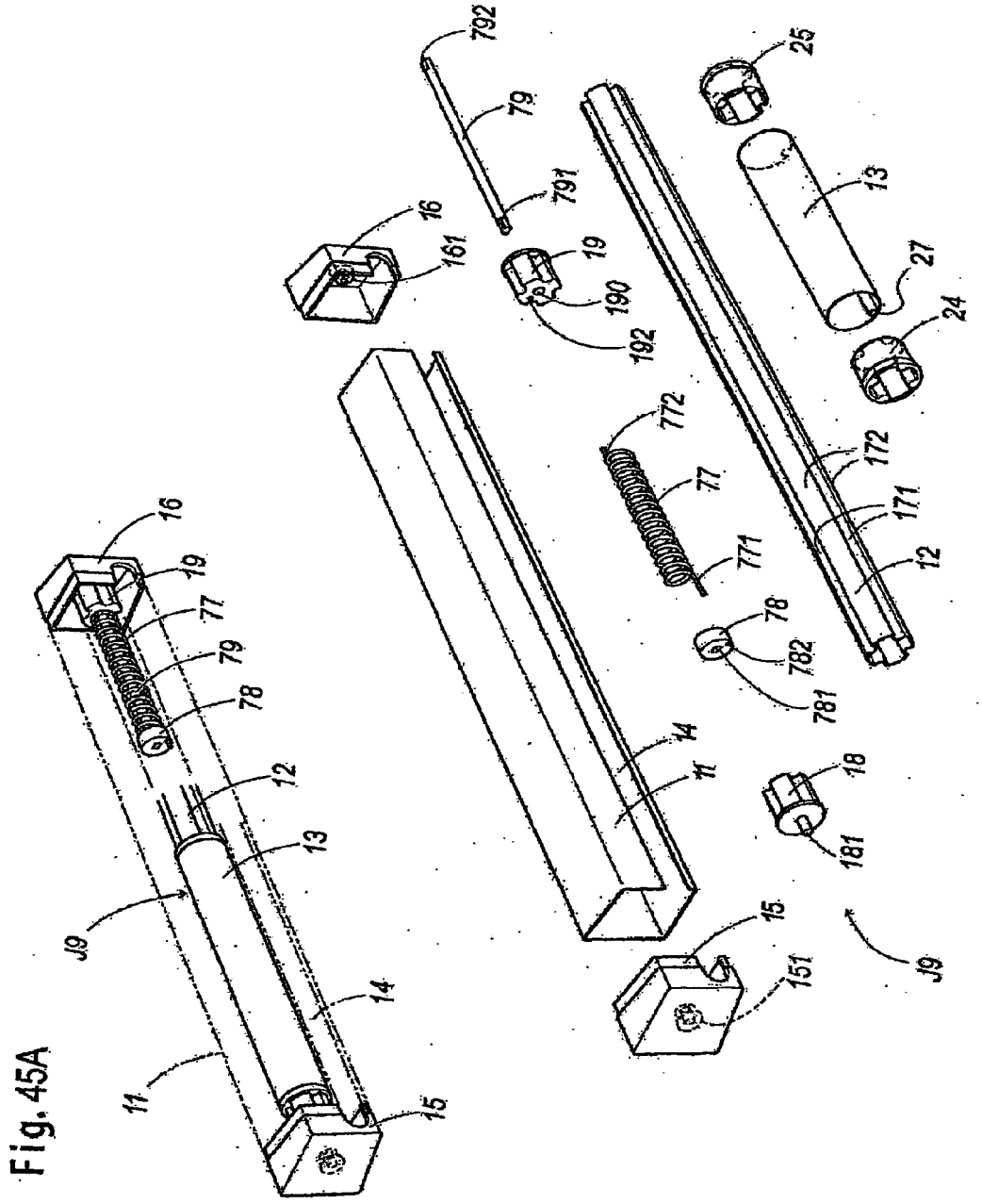


Fig. 45A

Fig. 45B

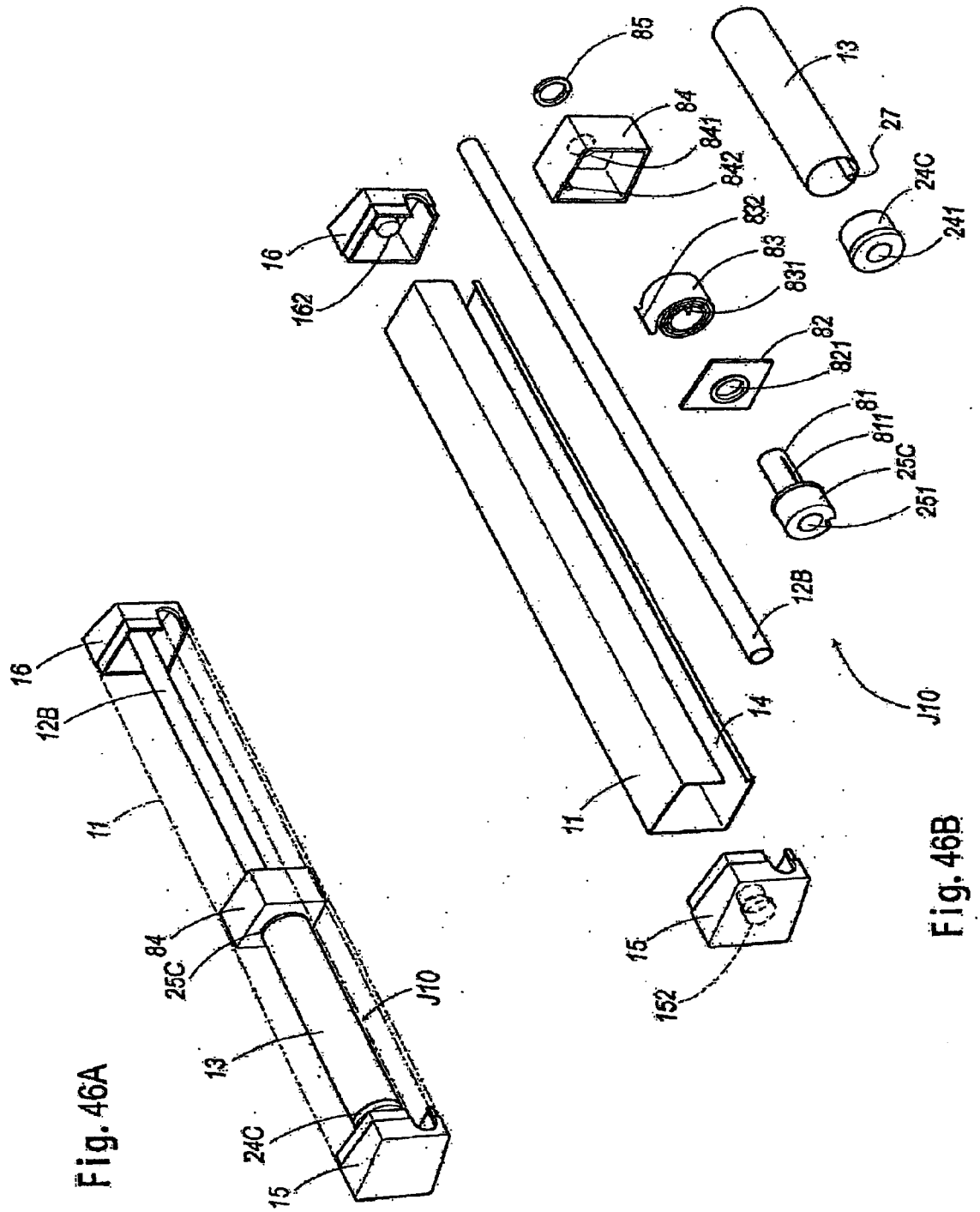


Fig. 46A

Fig. 46B

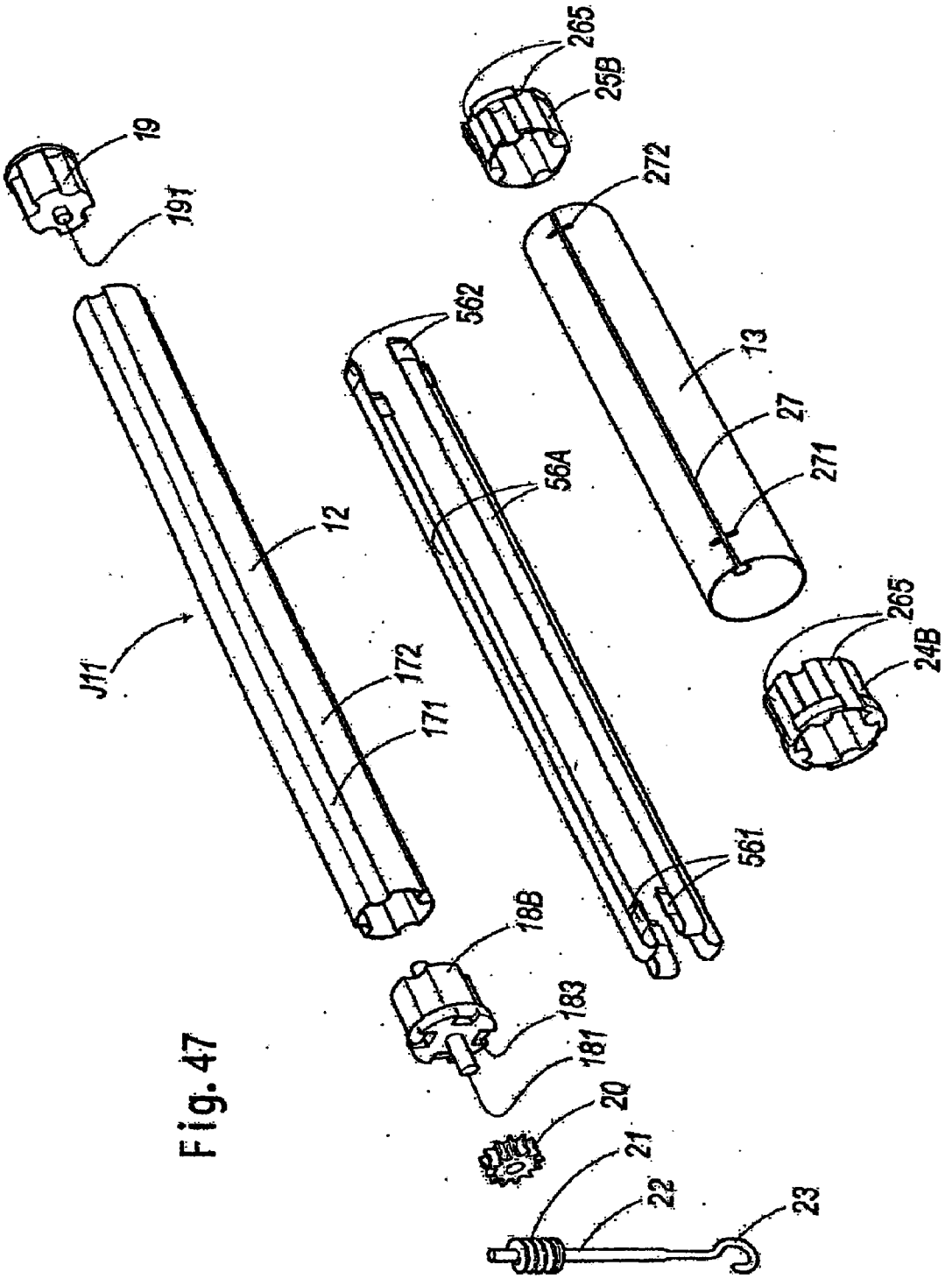

19
191
J11
12
172
171
562
56A
561
265
25B
272
13
27
271
265
24B
18B
183
181
20
21
22
23

Fig. 47

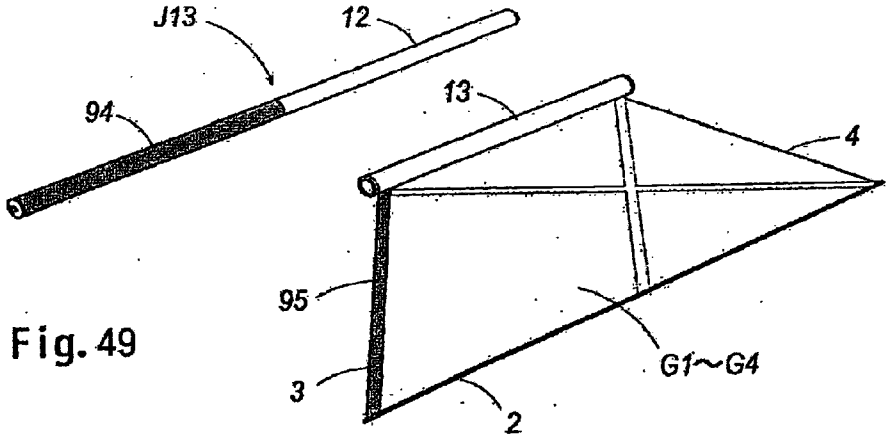


Fig. 49

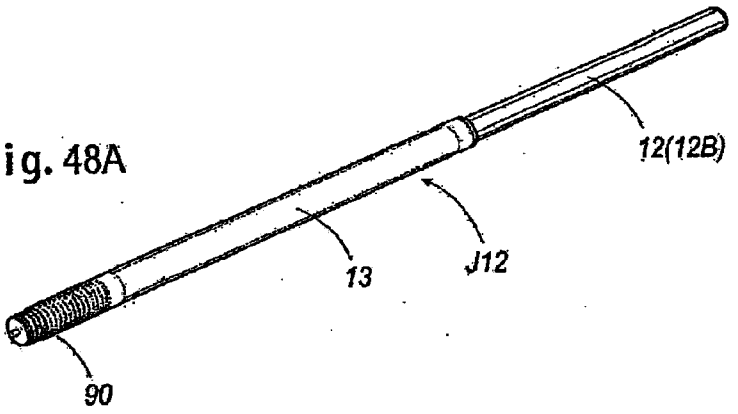


Fig. 48A

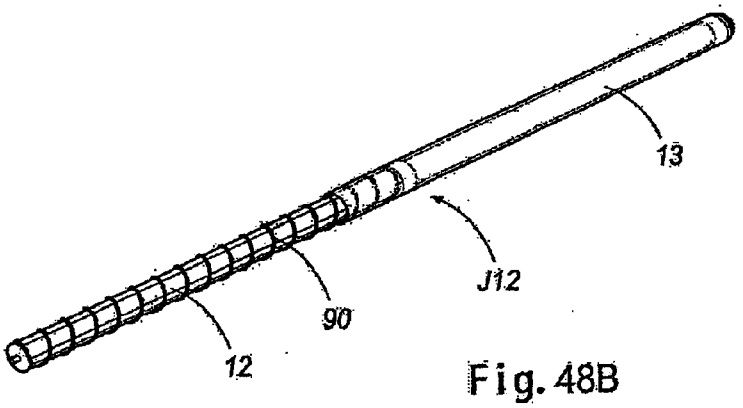
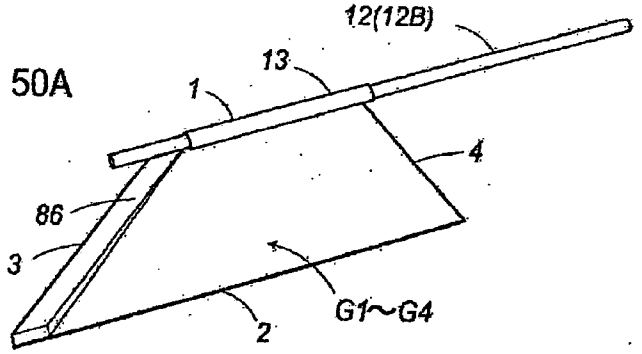


Fig. 48B

Fig. 50A



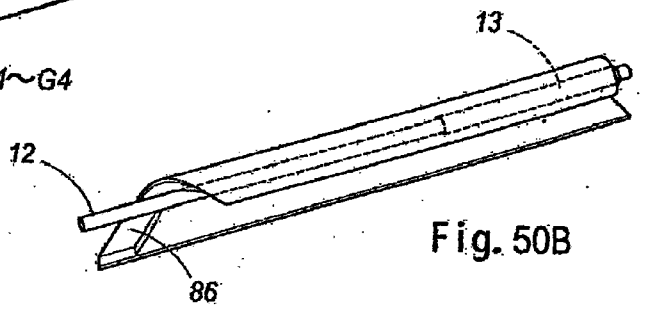


Fig. 50B

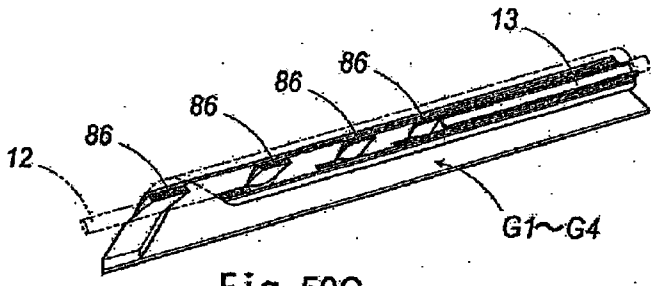


Fig. 50C

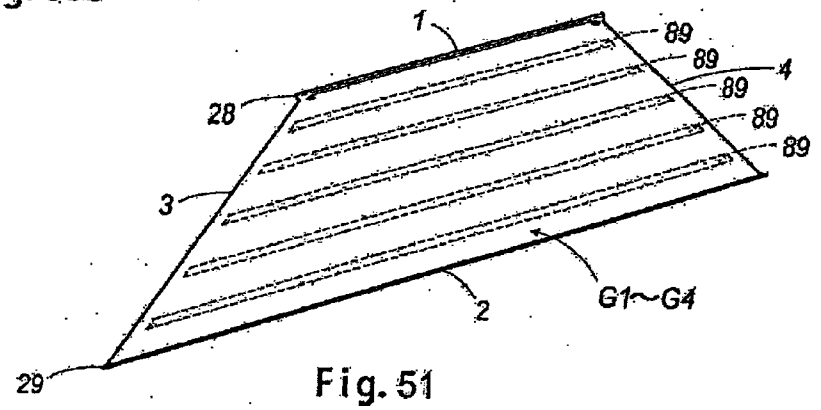


Fig. 51

Fig. 52A

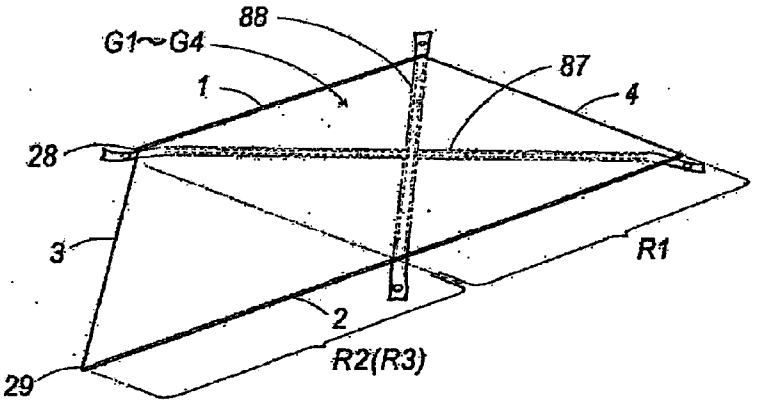


Fig. 52B

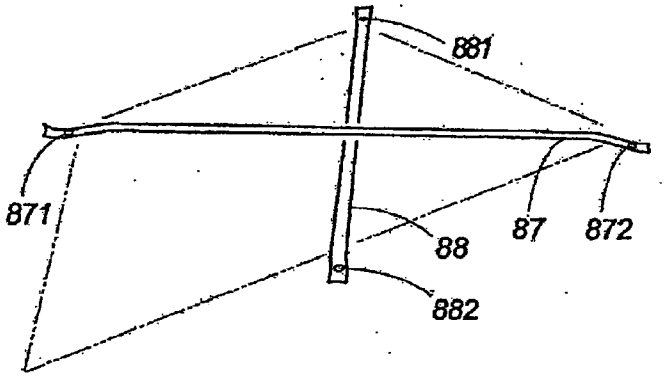
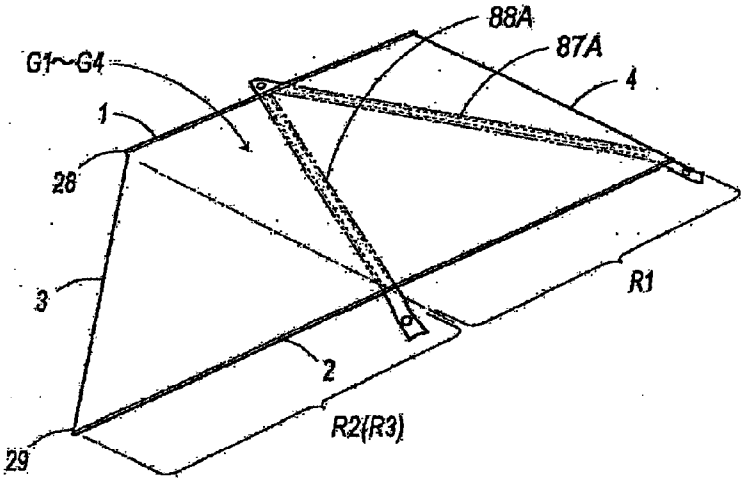


Fig. 53



CORNER CANVAS AND CORNER AWNING DEVICE

[0001] The present application is a divisional application of U.S. patent application Ser. No. 11/615,995, filed on Dec. 25, 2006, the entire contents of which are incorporated herein by reference. The 11/615,995 application claimed the benefit of the date of the earlier filed PCT Application No. PCT/JP2004/009751 filed Jul. 1, 2004.

FIELD OF THE INVENTION

[0002] This invention relates to a corner awning device, and the canvas take up shaft which comprises both of said essential parts which are used for attractively covering corners of various buildings or framework structures.

BACKGROUND OF THE INVENTION

[0003] Conventionally, movable awning devices are configured with a combination of: a canvas take-up device, which winds or unwinds a canvas that generally extends forward at an angle from a wall, on or from a canvas take-up shaft that is supported by an outer wall of a building, by means of a manual lever or electric motor, etc., and a canvas tension device, which connects bi-foldable swing arms and the like with a front bar fixed at the front edge of the canvas (for example, see the following patents 1-11, and publications 1 and 2). Many of them are used for sun-shielding or rain-shielding at terraces or along the perimeters of shops, or for ornamental purposes for buildings or shops, and various technical improvements and modifications have been made for such devices.

[0004] When the awning device is laid out along the perimeter of a building for an orthogonal corner shape as shown in FIG. **15**A, a chamfered one as shown in FIG. **15**B, at an obtuse angle as shown in FIG. **15**C, and at an acute angle as illustrated in FIG. **15**D, rectangular canvases P of various lengths are used around the perimeter that is orthogonal to either front wall W**1**, side wall W**2**, or oblique wall W**3**.

[0005] List of Publication Information of Prior Art

[0006] 1. JP Patent Publication No. S54-31768

[0007] 2. JP Patent Publication No. S62-19774

[0008] 3. JP Patent Publication No. S63-32250

[0009] 4. JP Patent Publication No. H4-1220

[0010] 5. JP Patent Publication No. H6-36156

[0011] 6. JP Patent Publication No. H7-51545

[0012] 7. JP Patent No. 2,937,748

[0013] 8. JP Patent No. 3,129,680

[0014] 9. JP Patent Laid-Open No. H11-270089

[0015] 10. JP Patent Laid-Open No. 2000-120242

[0016] 11. JP Patent Laid-Open No. 2001-123620

[0017] 12. Japan awning association, "Awning sales manual", Pages 9-11, issued in January 2004.

[0018] 13. "Technical Manual" (Awnings made in France) [online], Kabushiki-Kaisha Miyahan, "Searched on Jun. 28, 2002 and Jun. 9, 2004", Internet <URL:http://www.miyahan.co.jp/tecnicalm/index.html>

DISCLOSURE OF THE INVENTION

Problem 1 to be Solved by the Invention

[0019] Conventional awning devices cannot effectively cover a corner space along the perimeter of the building, for example, a rectangular space Z**1** shown in FIG. **15**A, an acute-angled space Z**2** shown FIGS. **15**B and **15**C, and an obtuse-angled space shown in FIG. **15**D.

[0020] The corner spaces Z**1**-Z**3** shown in FIGS. **15**A-**15**C can be covered if a canvas take-up shaft is installed at the corner of the front wall W**1**, and another canvas take-up shaft is installed by overlapping beneath or above the first take-up shaft, with the end of the take-up shaft projecting forward from the corner of the side wall **2** or oblique wall W**3**.

[0021] However, using such a cheap technique, the decorativeness and appearance of the corner spaces of the perimeter of the building will be impaired.

[0022] Particularly, corners of various buildings are, in many cases, faced with roads in two directions, at an intersection, and are thus located in a place seen by many in general public and may be used favorably (such as effective advertising) in a business such as a shop. Where the awning devices are set up at such an outstanding place without covering the corner spaces Z**1**-Z**3**, or set up with cheap techniques, they lack technical effectiveness or usability as movable awning devices.

Means to Solve Problem 1

Corner Canvas and its Effect

[0023] First, in order to solve the previously stated technical problem, this invention provides a corner canvas having a substantially right-angled trapezoidal shape when extended, as a basic structure. Specifically, there is provided a corner canvas G**1**-G**4** comprised of a rectangular canvas main body R**1** and a right-angled triangular canvas extension R**2**, R**3** that extends from one side of said canvas main body.

[0024] In other words, the corner canvas G**1**-G**4** is a corner canvas having: a canvas top side **1**, **1**A and a canvas bottom side **2**, **2**A formed in parallel; a canvas oblique side **3**, **5**, **5**A extending towards said canvas bottom side **2**, **2**A; and a canvas vertical side **4** formed substantially perpendicular to said canvas bottom side **2**, **2**A.

[0025] As shown in FIGS. **16**A-**16**D, two of the corner canvases G**1**-G**4** are extended at one side and the other side of the corner of outer walls W**1**-W**3** in side-to-side orthogonal relation as shown FIG. **16**A, or they are extended in a layout as shown in FIG. **16**B. In addition, when a corner of the building forms an obtuse angle or an acute angle, they are extended at an obtuse angle or an acute angle as shown in FIGS. **16**C and **16**D.

[0026] As a result, the corner canvases G**1**-G**4** are able to effectively and attractively cover corner spaces Z**1**-Z**3** of the perimeter of the building. Further they are able to be marketed independently as a compatible corner canvas.

Problem 2 to be Solved by this Invention

[0027] To wind the corner canvas G**1**-G**4** on a canvas take-up shaft having a conventional structure, the conventional take-up shaft and a front bar must be installed with some part of the take-up shaft projected out from the corner of the building.

[0028] In this manner, the canvas extension R**2**, R**3** will be wound projecting from the corner of the building toward the corner space, and thus it will not only lose the decorativeness or appearance for the corner, but also lacks technical effectiveness and advantages as an awning device.

[0029] Therefore, it has been necessary to develop corner awning devices S**1**-S**6** comprising: a take-up device M**1**, M**2** of the corner canvas G**1**-G**4**, which is able to extend the corner

canvas G1-G4 to the corner space Z1-Z3 as shown in FIGS. 16A-16D, and to wind them without protruding out from the corner of the building; and a canvas tension device K1-K6, which allows the corner canvas G1-G4 to be extended and tensionally supported or to be compactly stored into a place by the wall.

Means to Solve the Problem 2

Corner Canvas Take-Up Shaft (System) and its Effect

[0030] As such, this invention provides various corner canvas take-up shafts J1-J13 configured as a main part to wind or unwind the corner canvas G1-G4.

[0031] As the principle invention of the canvas take-up shaft J1-J13 to wind or unwind the corner canvas G1-G4 are comprised of an inner shaft **12**, **12**A, **12**B and an outer roller **13** axially movable on and supported with said inner rotation shaft **12**, **12**A, **12**B.

[0032] In other words, according to the present corner canvas take-up shaft system, the inner shaft **12**, **12**A, **12**B is moved forward (sliding) while rotating the outer roller **13** to unwind the corner canvas when the corner canvas G1-G4 is to be unwound. Thereby, the canvas take-up shaft J1-J13 of this invention can be installed at the corner of the building without protruding from the corner, and also it can wind the corner canvas G1-G4 without protruding from the shaft length of the canvas take-up shaft J1-J13.

[0033] The canvas take-up shaft J1-13 and can be provided as interchangeable single products, presented in independent distribution in the same manner of said corner canvas G1-G4.

[0034] In addition, to embody this invention, an inner shaft slidably and rotatably fitting in and supporting the outer roller **13** is provided as either of an inner rotation shaft **12**, **12**A, or an inner fixed shaft **12**B.

[0035] Thus in the case of the inner rotation shaft **12**, **12**A, the structures described in the following section (e1) is provided.

[0036] (e1) A corner canvas take-up shaft, wherein: a canvas outlet **14** is formed open in the front surface of a casing **11** for storing a corner canvas G1-G4; an inner rotation shaft **12**, **12**A having guide grooves **171** and guide projections **172** is bearing supported in end caps **15** and **16** fitted to said casing **11**; an outer roller **13** is slidingly and rotatably fitted on and supported by said inner rotation shaft **12**, **12**A; guide projections **261** and guide grooves **262** slidably engaging said guide grooves **171** and said guide projections **172** are formed on the internal perimeter surface of end caps **24** and **25**, **24**A and **25**A, **24**B and **25**B.

[0037] Now, with respect to the inner rotation shaft **13** as an invention, the following sections (g1) and (g2) are provided.

[0038] (g1) A corner canvas take-up shaft wherein a canvas outlet **14** is formed open in the front of a casing **11** for storing a corner canvas G1-G4, an inner fixed shaft **12**B is fixed with an end cap **15**, **16**, **16**A fitted into said casing **11**, an outer roller **13** is slidably and rotatably fitted on and supported by said inner fixed shaft **12**B, a spur gear **69** is fitted to the rear end of said outer roller **13**, a rod gear **70** engaging said spur gear **69** is attached on an inner wall of said casing **11** for storing said corner canvas G1-G4, and an electric drive unit for a driving gear **68** engaging said rod gear **70** is incorporated in said storing casing **16**A, or a manually operated or electrically operated drive unit is configured for forward/reverse rotating said rod gear **70**.

[0039] (g2) A corner canvas take-up shaft wherein said canvas outlet **14** is formed open in the front of the casing **11** for storing said corner canvas G1-G4, said inner fixed shaft **12**B is fixed to said end cap **15**, **16** fitted to said casing **11**, said outer roller **13** is slidably and rotatably fitted on and supported by said inner fixed shaft **12**B, said pipe shaft **81** is projected from said end cap **25**C fitted to the rear end of said outer roller **13**, a whorl spring **83** is fitted onto a pipe shaft **81**, the inner spring end **831** of said whorl spring is locked to said pipe shaft **81**, and the outer spring end **832** of said whorl spring **83** is locked to a slide case **84** fitted on said pipe shaft **81**.

Problem 3 to be Solved by the Invention

[0040] When the corner canvas G1-G4 is wound on said canvas take-up shaft J1-J3, the canvas is wound in layers from the canvas top side **1**, **1**A toward the canvas oblique side **2**, **2**A with a relatively wide breadth, on the external perimeter surface of the inner shaft **12**, **12**A, **12**B, which is exposed with the rearward movement of the outer roller **13**.

[0041] The state of the wound canvas has a space like "a mortar" having a moderate longitudinal section and being laid along, projecting in the axis direction as it goes toward the external perimeter surface from the surface of the inner shaft **12**, **12**A, **12**B, or a state having a space of a moderate-trapezoidal conical cone laid along.

[0042] However, in reality, the imaginary space is affected by elasticity biasing force and tensioning force, tensile force caused by the canvas winding/unwinding operation, and thus it is expected that the canvas can be wound in unequal strength because it is pushed onto and partially contacted with the external perimeter surface of the inner shaft **12**, **12**A, **12**B, or the canvas can be wound in a tapering form because it is affected by, for example, the obliquely rearward translation movement of the front bar **36**, **36**A.

[0043] As a result, when the canvas extension R2, R3 wound with the rearward movement of the outer roller **13** is contacted with the exposed part of the inner shaft **12**, **12**A, **12**B and is partially tightened, it is expected that a harmful effect may occur such as partially damaging or dirtying the canvas extension R2, R3 by hindering the axis rearward movement of the outer roller **13**, or by wearing the canvas extension R2, R3 on the external perimeter surface of the exposed inner shaft **12**, **12**A, **12**B as it is wound.

Means to Solve the Problem 3

Adhesive Winding Prevention Equipment and its Effect

[0044] Thus, in this invention, to deal with the technical problem expected in the reduction of practice of the above corner canvas take-up shaft J1-J13, there is provided means for preventing said canvas extension R1 and R2 from adherently winding on the surface of said inner shaft **12**, **12**A, **12**B exposed by the rearward movement of said outer roller **13**.

[0045] Thereby, the smooth forward/rearward movement of the outer roller **13** is ensured, and thus the wearing of the canvas extension R2, R3 is prevented.

[0046] Various kinds of dependent inventions with respect to the above are described in the following sections (h1)-(h11).

[0047] (h1) A corner canvas take-up shaft wherein said coil spring **90** is wound around the fore end of said inner shaft **12**, **12**A, **12**B, said coil spring **90** is exposed as extending on the outer perimeter surface of said inner shaft **12**, **12**A, **12**B with

the rearward movement of said outer roller **13**, and said canvas extension R**2**, R**3** is wound on the outer perimeter surface of said inner shaft **12**, **12**A, **12**B.

[0048] Thereby the canvas extension R**2**, R**3** is indirectly wound on the inner shaft **12**, **12**A, **12**B.

[0049] (h2) A corner canvas take-up shaft wherein a slide rope **50** is provided in a tensioned condition along a guide groove **171** formed along the axis of said inner rotation shaft **12** and the outer perimeter surface of the inner rotation shaft **12** is raised by said slide ropes **50**.

[0050] With a slide rope **50**, the inner rotation shaft **12** is raised, and the slide rope **50** is drawn or stored in the shaft in synchronization with the forward/rearward movement of the outer roller **13**. Therefore, it is also effective to prevent the wearing out of the canvas extension R**2**, R**3**.

[0051] (h3) A corner canvas take-up shaft wherein a slide belt **56** or elastic belt **56**A is provided in a tensioned condition along a guide projection **172** formed along the axis of said inner rotation shaft **12**, **12**A, and the outer perimeter surface of the inner rotation shaft **12**, **12**A is raised by said slide belt **56** or said elastic belt **56**A.

[0052] Because the canvas extension R**2**, R**3** is indirectly wound on the inner rotation shaft **12** via the slide belt **56** or the expansion and contraction belt **56**A, the forward/rearward movement of the outer roller is not hindered. In addition, the slide belt **56** is drawn in synchronization with the movement of the outer roller **13**, or the expansion and contraction belt **56**A is contracted, and thus the wearing of the canvas extension R**2**, R**3** is prevented.

Method for Solving Problem

Corner Awning Device and its Effect

[0053] In order to solve the problem in the most comprehensive way, various kinds of corner awning devices S**1**-S**6** are configured by organically combining the above corner canvas G**1**-G**4**, the canvas take-up device M**1**, M**2** provided with the canvas take-up shaft J**1**-J**13**, and the canvas tension unit K**1**-K**6**.

[0054] The corner awning devices S**1**-S**6** of this invention comprise and a canvas take-up shaft J**1**-J**13** winding and unwinding said corner canvas, said canvas take-up shaft J**1**-J**13** comprising an inner shaft **12**, **12**A, **12**B and an outer roller **13**, wherein said outer roller **13** is axially movable and supported on said inner shaft **12**, **12**A, **12**B; when winding and unwinding corner canvas G**1**-G**4**, a front bar **36**, **36**A supporting the bottom side of said corner canvas G**1**-G**4**, and foldable swinging arms **44** and **45**, N**1** and N**2**, T**1** and T**2**, V**1** and V**2**, wherein said front bar **36**, **36**A is pushed parallel obliquely forward parallel or drawn obliquely rearward by said foldable swinging arms **44** and **45**, N**1** and N**2**, T**1** and T**2**, V**1** and V**2**.

[0055] In other words, a corner awning device S**1**-S**6** comprises a corner canvas G**1**-G**4**, a canvas take-up shaft J**1**-J**13** winding and unwinding said corner canvas, said canvas take-up shaft J**1**-J**13** comprising an inner shaft **12**, **12**A and **12**B, and an outer roller **13** slidably and rotatably fitted on and supported with said inner shaft, a front bar **36**, **36**A supporting the bottom side of said corner canvas G**1**-G**4**, and swinging arms **44** and **45**, N**1** and N**2**, T**1** and T**2**, V**1** and V**2** pushing said front bar **36**, **36**A obliquely forward or drawing said front bar **36**, **36**A obliquely rearward to fold it.

[0056] In the above case, it is preferable that tension members such as connection wires **34**, **35** or connection belts **87** and **88**, **87**A and **88**A are provided in a tensioned condition between said outer roller **13** and said front bar **36**, **36**A.

[0057] Thereby, contortion or in-plane deformation when winding the corner canvas G**1**-G**4** is prevented, and the rearward movement of the outer roller **13** becomes smooth.

[0058] When the corner canvas G**1**-G**4** is wound for storage, said front bar **36**, **36**A is transferred parallel obliquely rearward by rotating said swinging arms **44** and **45**, N**1** and N**2**, T**1** and T**2**, V**1** and V**2** rearward, while said outer roller **13** rotates to wind said canvas main body R**1** and moves rearward with the sliding guidance of said inner shaft **12**, **12**A, **12**B, and the canvas extension R**2**, R**3** is wounded on said inner shaft **12**, **12**A, **12**B exposed by the rearward movement of said outer roller **13**.

[0059] On the other hand, when said corner canvas G**1**-G**4** is unwound to extend, said front bar **36**, **36**A is pushed parallel obliquely forward by rotating said swinging arms **44** and **45**, N**1** and N**2**, T**1** and T**2**, V**1** and V**2**, said corner canvas G**1**-G**4** wound on the canvas take-up shaft J**1**-J**13** is unwound while said outer roller **13** is moved forward toward the fore end of said inner shaft **12**, **12**A, **12**B, and thereby said canvas extension R**2**, R**3** is extended over the corner space. When the swinging arms **44** and **45**, N**1** and N**2**, T**1** and T**2**, V**1** and V**2** rotate rearward, and the front bar **36**, **36**A is transferred parallel obliquely rearward, canvas G**1**-G**4** tensionally supports between said outer roll **13** and front bar **36**, **36**A and the outer roller **13** slides in the axis direction of the inner shaft **12**, **12**A, **12**B by the tensile force of the tension member with the canvas main body R**1** wound on the outer roller **13**.

[0060] Thereby, corner spaces of the perimeters of various buildings can be covered effectively, while the awning devices can be stored compactly by the wall of a corner when stored.

[0061] As a result, an epoch-making novel product is provided to the industry, which dramatically enhances ornamentality and external appearances in the corners of various buildings and which abounds in technical interests and utility as a corner awning device.

[0062] Various dependent inventions wherein one corner awning device is installed at a corner of a building are described in the following sections (p1)-(p3).

[0063] (p1) A corner awning device supporting a pair of swinging arms **44** and **45**, T**1** and T**2** in parallel wherein the bottom ends of one of said swinging arms **44**, T**1** are attached adjacent a corner of a building while the fore end of the swinging arm is attached adjacent the intermediate part of said front bar **36**, and

the bottom end of the other swinging arm **45**, T**2** is attached at a position spaced-apart appropriately from said corner while the fore end of the swinging arm is attached adjacent the rear end of said front bar **36**.

[0064] (p2) A corner awning device wherein a corner awning device supports a pair of said swinging arms **44** and **45** in parallel, said slide rail **65** is slidably fitted to and supported by said front bar **36**A, the bottom end of one of said swinging arms **44** is attached adjacent the corner of the building while the fore end of said swinging arm **44** is attached adjacent the intermediate part or the fore end of said slide rail **65**, and the bottom end of the other swinging arm **45** is attached at a position spaced-apart appropriately from adjacent said corner while the fore end of said swinging arm **45** is attached adjacent the rear end of said slide rail **65**.

[0065] (p3) A corner awning device wherein said swinging arms are a pair of two-phase swinging arms N**1**, N**2** rotating

in parallel with two-phase action, said arms N1, N2 comprising said rear arm **59** and fore arm **60** foldably connected to each other, the intermediate part of said swinging arms N1 and N2 is connected with a connection rod **61**, the bottom end of said rear arm **59** of said swinging arm N1 is attached adjacent the corner of the building while the fore end of said front arm **60** is attached adjacent the intermediate part of said front bar **36**, and the bottom end of said rear arm **59** of the other swinging arm N2 is attached to a place spaced apart appropriately from said corner position while the fore end of said front arm **60** is attached adjacent the rear end of said front bar **36**.

[0066] In the structures of the embodiments described above, the corner canvas G1-G4 is effectively extended and stored.

[0067] In addition, the following embodiments described in sections (q1)-(q3) are provided as dependent inventions in relation to combinations of the corner awning device S1-S6 of this present invention and an awning device Q of a rectangular canvas P.

[0068] (q1) A corner awning device wherein the fore end of a canvas take-up shaft **51** of a rectangular canvas P is installed underneath or above the latter half of a corner canvas take-up shaft J1-J13 in a overlapping manner to combine a corner awning device S1-S6 and an awning device Q comprising said rectangular canvas P and said canvas take-up shaft **51** thereof.

[0069] (q2) A corner awning device upper-winding said rectangular canvas P on said take-up shaft **51**, and lower-winding said corner canvas G1-G4 on said canvas take-up shaft J1-J13.

[0070] (q3) A corner awning device lower-winding said rectangular canvas P on said take-up shaft **51**, and upper-winding said corner canvas G1-G4 on said canvas take-up shaft J1-J13.

[0071] By constructing embodiments as described in sections (q1)-(q3), the perimeter, including the corner spaces, of various buildings are covered effectively and integrally as if with a monolithic construction as shown FIGS. **12-14** and **33**. In particular, it is constructed so that the gap between the corner canvas G1-G4 and the rectangle canvas P when extended is minimized to the extent possible.

[0072] The following sections (r1)-(r11) describe various dependent inventions wherein two awning devices S1-S6 are installed at one side and the other side of a corner of a building in a face-to-face relation each other to cover the perimeter, including the corner space, of the building.

[0073] (r1) A corner awning device, wherein two of said corner awning devices S1-S6 are each installed on one side of a corner of the building and the other side of the corner in face-to-face relation, and a corner canvas G1-G4 is attached between said outer roller **13** of each corner canvas take-up shaft J1-J13 and each front bar **36**, **36**A.

[0074] (r2) In order to prevent the jutted out portions, beyond a line through one end of the canvas top side **1**A attached to the outer roller **13** and one end of canvas bottom side **2**, **2**A attached to front bar **36**, from hanging downwards, an appropriate position adjacent the lower end of said canvas oblique side **5**, **5**A of each corner canvas G2-G4 in face to face relation is connected each other with an elastic member **10**.

[0075] (r3) A corner awning device comprising said corner canvas G2 and said elastic member **10**, wherein the canvas top side **1**A is attached to said outer roller **13**, said canvas bottom side **2** is attached to said front bar **36**, and said elastic member **10** is attached proximate to the intersection point of said canvas vertical side **6** and the canvas oblique side **5**.

[0076] (r4) A corner awning device comprising said corner canvas G3 wherein said canvas top side **1**A is attached to said outer roller **13**, said canvas bottom side **2** is attached to said front bar **36**, and said elastic member **10** is attached proximate to the intersection point of said canvas vertical side **8** and said canvas oblique side **5**.

[0077] (r5) A corner awning device comprising said corner canvas G4 wherein said canvas top side **1**A is attached to said outer roller **13**, said canvas bottom side **2**A is attached to said front bar **36**, and said elastic member **10** is attached proximate to the intersection point of said canvas vertical side **8**A and said canvas oblique side **5**A.

[0078] By the structure of the embodiments described above in sections (r2)-(r5), the perimeter including the corner spaces of a building is covered effectively as shown in FIGS. **20**A-**20**C, and **20**AA-**20**CC.

[0079] (r6) A corner awning device wherein each of two of said corner awning devices S3 having a pair of said telescopic swinging arms T1, T2 is installed on one side of a corner of the building and the other side of the corner in face-to-face relation, said corner canvas G1-G4 is attached between said outer roller **13** of each corner canvas take-up shaft J1-J13 and each front bar **36**, **36**A, and tensionally supported by tension members and the fore ends of front bar **36** are fixed to each other.

[0080] (r7) A corner awning device wherein when said corner canvas G1 is wound by interlocking said canvas take-up shafts J1-J13, each telescopic swinging arm T1, T2 rotates rearward in parallel against the elastic biasing force while said rear arm **62** and front arm **63** of said swinging arms T1, T2 rotate rearward with relative telescopic movement while said front bars **36** integrally connected to one another are moved linearly in parallel toward a place by the wall that exists obliquely rearward.

[0081] (r8) A corner awning device wherein when said canvas take-up shafts J1-J13 rotate interlockingly for unwinding, each telescopic swinging arm T1, T2 is rotated in the spread direction obliquely forward with telescopic sliding movement by the elastic biasing force, and said front bars **36** integrally connected to one another are pushed linearly with parallel movement obliquely forward.

[0082] By the structure of the embodiments described above in sections (r6)-(r8), the perimeter including the corner spaces of a building is covered effectively as shown in FIG. **32**A, and the structure can be stored compactly by the wall.

[0083] (r9) A corner awning device S4 wherein said slide rail **65** is slidably fitted into and supported by said front bar **36**A, the fore ends of swinging arms **44**, **45** are attached to the intermediate part or the fore end of said slide rail **65**, and rear end of said slide rail **65**, two of said awning devices S4 are installed on one side and the other side of the corner of the building respectively in a face-to-face symmetrical position, said corner canvas G1-G4 is attached between said outer roller **13** and front bar **36**A of each corner canvas take-up shaft J1-J13 and tensionally supported by tension members and the fore ends of said front bars **36**A are fixed and connected to each other.

[0084] (r10) A corner awning device wherein when said corner canvas G1 is wound by interlocking said canvas take-up shafts J1-J13, a pair of said swinging arms **44**, **45** rotates rearward against an elastic biasing force and temporarily slides said slide rail **65** rearward relative to said front bar **36**A

then slides it forward while it draws said integrally connected front bars **36**A toward a corner area for storage on the wall surface.

[0085] (r11) A corner awning device wherein when said canvas take-up shaft J**1**-J**13** is interlockingly rotated for unwinding, a pair of said swinging arms **44**, **45** are rotated parallel in the spread direction obliquely forward by an elastic biasing force, said front bar **36**A is pushed linearly toward the corner space in parallel, and thus said corner canvas G**1** is extended over the corner space.

[0086] By the structures of the embodiments described in sections (r9)-(r11), the perimeter including the corner spaces of a building is covered effectively as shown in FIG. **36**, and the structure can be stored compactly by the wall.

[0087] (r12) A corner awning device wherein said swinging arms are bi-foldable swinging arms V**1**, V**2** that bend and stretch, said swinging arms V**1**, V**2** are each formed with said rear arm **59** and said front arm **60**, both of which are bi-foldably connected with each other; said swinging arms V**1**, V**2** are connected with each other by a connection rod **61** between bi-foldable joints thereof, the bottom end of said rear arm **59** of said swinging arm V**1** is attached adjacent a corner of a building, the fore end of said front arm **60** of said swinging arm V**1** is attached toward the fore end of said front bar **36**; the bottom end of said rear arm **59** of the other swinging arms V**2** is attached on a position adequately spaced apart from the corner, the fore end of said front arm **60** is attached toward the intermediate portion of a front bar **36**, wherein two of said awning devices S**5** are installed on a building corner position in face-to-face-relation, said corner canvas G**1**-G**4** is attached between said outer roller **13** of each corner canvas take-up shaft J**1**-J**13**, and said front bar **36**, **36**A, tension members and the fore ends of front bars **36** are fixed to be connected with one another.

[0088] (r13) The corner awning device wherein when said canvas G**1** is wound by interlocking said canvas take-up shafts J**1**-J**13**, said bi-foldable swinging arms V**1** and V**2** each rotate rearward bi-folding toward obliquely rearward overcoming the spread biasing force, while said front bar **36** integrally connected with each other moves linearly rearward in parallel to the line dividing the corner space equally with parallel movement toward said front wall W**1** and side wall W**2** respectively, then said bi-foldable swinging arms V**1**, V**2** are folded into place by the wall, and said front bars **36** integrally connected are drawn toward the corner to be stored on the wall.

[0089] (r14) A corner awning device wherein when said canvas take-up shafts J**1**-J**13** interlockingly rotate to unwind the corner canvas G**1**, said bi-foldable swinging arms V**1**, V**2** each rotate forwardly in the spread direction by the elastic biasing force and push said front lever **36** integrally connected obliquely forward in parallel, and thus said corner canvas G**1** is extended over the corner space.

[0090] Since both bi-foldable arms V**1**, V**2** expand and contract as if frog leaping as described above in sections (r12)-(r14), they can achieve the technical interests, and the perimeter, including the corner spaces, of a building can be covered effectively, or they can be stored compactly by the wall as shown in FIGS. **37**A, **37**C, **38**A, and **38**C.

BRIEF DESCRIPTION OF DRAWINGS

[0091] FIGS. **1** and **2** are perspective views showing two awning devices extended in a orthogonal face-to-face relation at one corner of a building, one of which is installed at the corner of the front wall, with the other installed at the corner of the side wall.

[0092] FIGS. **3** and **4** are perspective views of one awning device installed at a corner of a front wall, FIG. **3** showing the awning device seen from below, and FIG. **4** showing the awning device seen from above.

[0093] FIGS. **5** and **6** are exploded perspective views showing the components of the canvas take-up device, FIG. **5** showing the components of the canvas take-up shaft, such as a casing, an inner rotation shaft, an outer roller, and in the lower right of FIG. **5**, the enlarged end of the outer roller is shown upside down, and FIG. **6** showing components such as an outer roller, a corner canvas, a front bar, and in the sides of the lowest of FIG. **6**, enlarged ends of the connection wires inserted into the crossing holes of the canvas main body.

[0094] FIGS. **7**A-**7**C show the basic structure of the corner canvas and each part thereof, FIG. **7**A showing a canvas plan view, and FIG. **7**B and FIG. **7**C showing enlarged vertical longitudinal sectional views of each part of the canvas that has wires inserted.

[0095] FIG. **8** shows a cross-sectional plan view of enlarged main parts of the canvas take-up device.

[0096] FIGS. **9**A and **9**B are vertical longitudinal side-views of FIG. **8**, FIG. **9**A showing a sectional view of the canvas take-up device, and FIG. **9**B showing a sectional view of the driving device.

[0097] FIGS. **10**A-**10**D and FIGS. **11**A-**11**D are plan views and perspective views showing the process for winding a corner canvas. The opposite order will be the process for extending the corner canvas.

[0098] FIGS. **12**-**14** are perspective views showing two extended awning devices of this invention installed in an orthogonal face-to-face relation at a corner, and two extended conventional awning devices, wherein the fore part of each conventional awning device is attached beneath the rear part of each awning device of this invention to overlap each other. Of these drawings, FIG. **12** shows the devices seen upwardly from below, FIG. **13** shows the devices seen downwardly from above, and FIG. **14** shows a perspective view of the canvas.

[0099] FIGS. **15**A-**15**D are schematic plan views showing rectangular canvases extended near a corner of a building. FIGS. **16**A-**16**D are schematic plan views showing corner canvases of this invention and rectangular canvases of the prior art covering the corner space of the building. Of these figures, the corner in FIGS. **15**A and **16**A is orthogonal, the corner in FIGS. **15**B and **16**B is beveled, the corner in FIGS. **15**C and **16**C has an obtuse angle, and the corner in FIGS. **15**D and **16**D has an acute angle.

[0100] FIG. **17**A is a perspective view showing a canvas take-up shaft provided with an electric driving means according to the second embodiment, and FIG. **17**B is its exploded perspective view.

[0101] FIGS. **18**A and **18**B are a plan view and a perspective view showing a substantial part of the manually operated unit that interlocks two canvas take-up shafts.

[0102] FIGS. **19**A-**19**C are plan views showing a pair of corner canvases of the second-fourth examples in a face-to-face relationship.

[0103] FIGS. **20**A-**20**C, and FIGS. **20**AA-**20**CC are perspective views, seen is two ways, of two sets of awning devices provided with corner canvases shown in FIGS. **20**A-**20**C when extended in a face-to-face relation.

[0104] FIGS. **21**A and **21**B are perspective views showing a third example of the canvas take-up shaft, wherein FIG. **21**A shows the outer roller when moved forward to the first half of the casing and FIG. **21**B shows the outer roller when moved rearward to the latter half of the casing.

[0105] FIG. **22** is a perspective view of a take-up shaft, the intermediate part of which is cut off, in a forth example of a canvas take-up shaft provided with a slide rope.

[0106] FIGS. **23**A-**23**C show each component of the take-up shaft of FIG. **22**, wherein FIG. **23**A is a half sectional view of the vicinity of the end, FIG. **23**B is a longitudinal sectional view taken along X-X of FIG. **23**A, and FIG. **23**C is a longitudinal sectional view taken along Y-Y.

[0107] FIG. **24** is an exploded perspective view showing components of the canvas take-up shaft.

[0108] FIG. **25** is a perspective view showing a fifth example of a canvas take-up shaft provided with slide belts, wherein the intermediate part of the take-up shaft is cut off.

[0109] FIGS. **26**A-**26**C show each component of the take-up shaft of FIG. **25**, wherein FIG. **26**A is a half sectional view of the vicinity of the end, FIG. **26**B is a longitudinal sectional view taken along X-X of FIG. **26**A, and FIG. **26**C is a longitudinal sectional view taken along Y-Y of FIG. **26**A.

[0110] FIG. **27** is an exploded perspective view showing components of the canvas take-up shaft.

[0111] FIGS. **28**A-**28**C, **29**D, **29**E, and **30**A-**30**E show a second embodiment of the corner awning device provided with two-phase swinging arms, wherein in the perspective views of FIGS. **28**A-C and FIGS. **29**D and **29**E, and the plane views of FIGS. **30**A-**30**E, processes for taking-up and extending the corner canvas in two phases are shown, and FIGS. **30**A-**30**E show processes for taking-up the canvas and, in the opposite order, show the process for extending the canvas.

[0112] FIGS. **31**A, **31**B, and **32**A-**32**C show a third embodiment of the corner awning device provided with telescopic swinging arms, wherein FIG. **31**A is a perspective view showing the substantial parts thereof and FIG. **31**B is an exploded perspective view of the telescopic swinging arms.

[0113] FIGS. **32**A-**32**C are plan views showing each stage when the canvas is fully extended, half extended, and wound to be stored.

[0114] FIGS. **33**-**36** show a fourth embodiment of the corner awning device provided with a slide rail attached to the front end of the swinging arms, wherein FIG. **33** is a perspective view of a combination of the awning device of this invention and an awning device of the prior art, wherein an ornamental panel is attached to the front bar.

[0115] FIG. **34** is a perspective view of the canvas, and a front bar of the front side is shown separately in the right of the lower part.

[0116] FIG. **35** is a perspective view showing the longitudinal section of a substantial part of the front bar.

[0117] FIG. **36** is a plan view showing each stage when the canvas is wound to be stored, half extended and fully extended.

[0118] FIGS. **37**A-**37**C and FIGS. **38**A-**38**C show a fifth embodiment of the corner awning device provided with bi-foldable swinging arms, wherein the perspective views of FIGS. **37**A-**37**C and the plane views of FIGS. **38**A-**38**C show processes for taking-up the canvas and, in the opposite order, show the process for extending the canvas.

[0119] FIGS. **39**A, **39**B, **40**A, **40**B, **41**A and **41**B are exploded views showing sixth-eighth examples of the canvas take-up shafts, each drive unit and the components thereof, wherein in the case of the sixth example shown in FIGS. **39**A and **39**B, the outer roller moves with the guidance of a worm rack. FIGS. **40**A and **40**B show the seventh example, wherein the outer roller itself rotates by means of the electric driving means. FIGS. **41**A and **41**B show the eighth example, wherein the outer roller is moved with the guidance of the rack formed on the inner rigid shaft.

[0120] FIGS. **42**, **43**, **44**A, **44**B, **45**A and **45**B are exploded perspective views showing a sixth embodiment of the corner awning device in which the canvas tension device is the drive side, and components thereof, wherein FIG. **42** shows the awning device seen from below and FIG. **43** shows the awning device seen from the above. FIGS. **44**A and **44**B show a perspective view of the canvas tension device and an exploded view showing the drive unit thereof, respectively.

[0121] FIGS. **45**A and **45**B are an exploded view showing the ninth example of the canvas take-up shaft provided with a coil spring, and a perspective view showing the components thereof, respectively.

[0122] FIGS. **46**A and **46**B are an exploded view showing the tenth example of the canvas take-up shaft provided with a whorl spring, and a perspective view showing the components thereof.

[0123] FIG. **47** is an exploded perspective view showing the eleventh example of the canvas take-up shaft provided with elastic belts.

[0124] FIGS. **48**A and **48**B are perspective views showing the twelfth example of a canvas take-up shaft provided with a coil spring, wherein FIG. **48**A shows an outer roller when moved forward, and FIG. **48**B shows the outer roller when moved rearward.

[0125] FIG. **49** is a perspective view showing a sheet magnet incorporated on the first half of the inner shaft and the edge of the canvas oblique side for magnetic levitation by magnetic repellant force.

[0126] FIGS. **50**A-**50**C are perspective views showing the corner canvas that has the edge cloths adjacent the oblique side of the canvas extension, the edge cloth continuously getting thicker toward the canvas bottom side, wherein FIG. **50**A shows the corner canvas when extended, FIG. **50**B shows the corner canvas when wound on the canvas take-up shaft, and FIG. **50**C shows a sectional view when wound.

[0127] FIG. **51** is a perspective view showing the condition that band-plate ribs are incorporated in a lengthwise, parallel arrangement.

[0128] FIGS. **52**A and **52**B are perspective views showing a corner canvas provided with connection belts sewn thereon in the form of a letter X, wherein FIG. **52**A shows the connection belts fixed intersectingly to each other, and FIG. **52**B shows the connection belts separately.

[0129] FIG. **53** shows the connection belts fixed on the canvas main body in the form of a letter V.

EXPLANATIONS OF THE LETTERS AND NUMERALS

[0130] S**1**-S**6** Corner awning device
[0131] M**1**, M**2** Canvas take-up device
[0132] K**1**-K**6** Canvas tension device
[0133] J**1**-J**13** Canvas take-up shaft
[0134] W**1** Front wall
[0135] W**2** Side wall
[0136] W**3** Oblique wall
[0137] G**1**-G**4** Corner canvas
[0138] R**1** Canvas main body

[0139] R2, R3 Canvas extension
[0140] P Rectangular canvas
[0141] Q Awning device of prior art
[0142] L1, L2 Double folding swinging arm
[0143] N1, N2 Two-phase swinging arm
[0144] T1, T2 Telescopic swinging arm
[0145] V1, V2 Double folding swinging arm
[0146] 1, 1A Canvas top side
[0147] 2,2A Canvas bottom side
[0148] 3, 5, 5A, 8, 8A Canvas oblique side
[0149] 4, 6 Canvas perpendicular side
[0150] 7 Through hole
[0151] 9 Canvas upward folding line
[0152] 10. Elastic member
[0153] 11 Casing
[0154] 12,12A Inner rotation shaft
[0155] 12B Inner fixed shaft
[0156] 13 Outerwear roller
[0157] 14 Canvas outlet
[0158] 15,16 End cap
[0159] 16A Storing case
[0160] 151,161 Bearing
[0161] 171 Guide groove
[0162] 172 Guide projection
[0163] 18, 18A, 18B, 19, 19A-19C End cap
[0164] 190, 192 Through holes
[0165] 181,191 Spindle
[0166] 182,192 Rope passage
[0167] 183,193 Belt passage
[0168] 20 Worm gear
[0169] 21 Worm
[0170] 22 Worm rotation shaft
[0171] 23 Hook
[0172] 24, 24A-24C, 25, 25A-25C End cap
[0173] 241, 251 Through hole
[0174] 252 Internal thread
[0175] 261 Guide projection
[0176] 262 Guide groove
[0177] 263 Hole
[0178] 264 Guide groove
[0179] 265 Belt passage
[0180] 27 fitting groove
[0181] 271,272 Engagement slot
[0182] 28,29 Passage
[0183] 30, 31, 43 Wire
[0184] 32,33 Cross passage
[0185] 321,331 Front face outlet
[0186] 322,332 Rear face outlet
[0187] 34,35 Connection wire
[0188] 341,351 Engagement piece
[0189] 341,352 Clamp
[0190] 36,36A Front bar
[0191] 37, 38 Fitting groove
[0192] 39,40 Engagement hole
[0193] 41 Decoration skirt
[0194] 42 Passage
[0195] 44, 45 Swinging arms
[0196] 441, 451 Folding portion
[0197] 46, 46A, 47, 47A Bracket
[0198] 48,49 Bracket
[0199] 50 Slide rope
[0200] 51 Take-up shaft
[0201] 52 Casing
[0202] 53 Front bar
[0203] 54 Electric motor
[0204] 541 Output shaft
[0205] 542 Shank
[0206] 55 Bearing socket
[0207] 551 Axial bore
[0208] 56 Slide belt
[0209] 56A Elastic belt
[0210] 501, 502, 561, 562 Clip
[0211] 57 Corner cap
[0212] 571 Bearing
[0213] 58 Slide bearing
[0214] 59 60 Rear arm
[0215] 60 Front arm
[0216] 61 Connection rod
[0217] 62 Rear arm
[0218] 63 64 Front arm
[0219] 64 Coil spring
[0220] 65 Slide rail
[0221] 66 rollers
[0222] 67 Connector
[0223] 67A Decorative panel
[0224] 68 Driving gear
[0225] 69 Spur gear
[0226] 70 Rod gear
[0227] 701 Rotation shaft
[0228] 71 Bearing nut
[0229] 711 Hole
[0230] 72 Middle bracket
[0231] 73 Rotation shaft
[0232] 741,742 Worm
[0233] 751, 752 Bevel gear
[0234] 761,762 Worm gear
[0235] 77 Coil spring
[0236] 771, 772 Fore/rear end
[0237] 78 Spring stopping socket
[0238] 781, 782 Holes
[0239] 79 Rigid shaft
[0240] 791, 792 Fore/rear end
[0241] 81 Pipe shaft
[0242] 811 Slit
[0243] 82 Cover plate
[0244] 821 Hole
[0245] 83 Spiral spring
[0246] 831, 832 Spring end
[0247] 84 Slide case
[0248] 841 Hole
[0249] 842 locking portion
[0250] 85 Washer
[0251] 86 Edge cloth
[0252] 87, 88, 87A, 88A Connection belt
[0253] 89 Rib
[0254] 90 Coil spring
[0255] 91 Worm gear
[0256] 92 Worm rack
[0257] 93 Rack
[0258] 94, 95 Sheet magnet

THE BEST MODE FOR CARRYING OUT THE INVENTION

[0259] Corner awning devices S1-S6 are configured by organically combining: a canvas take-up device M1, M2 winding and unwinding a corner canvas G1-G4; and a canvas tension device K1-K6 extending and tensionally supporting said canvas G1-G4.

[0260] Of these, awning devices S1-S5 of the first-fifth embodiments shown in FIGS. **1-4**, FIGS. **10**A-**14**, FIGS. **20**A-**20**CC, FIGS. **28**A-**34**, and FIGS. **36-38**C are embodiments in which a manual or electric drive unit is configured in a canvas take-up device M1, and a canvas tension device K1-K5 is a driven side.

[0261] On the contrary, in the awning device S6 of the sixth embodiment shown in FIG. **42** and FIG. **43**, a manual or electric drive unit is configured in the canvas extension device K6, and the canvas take-up device M2 is the driven side.

First Embodiment of Corner Awning Device

[0262] Now, I will explain the awning device S1 of the first embodiment comprising the canvas take-up device M1 of the first example and the canvas extension device K1 of the first example with reference to the attached FIGS. **1-14**.

The First Example of Canvas Take-Up Device and its Take-Up Shaft

[0263] Prior to explanation of the canvas take-up device M1, I will explain the canvas take-up shaft J1 of the first example shown in FIGS. **5**, **8** and **9**, which is a substantial part of the canvas take-up device M1.

[0264] Reference character **11** refers to a casing for storing a wound corner canvas G1, wherein a canvas take-up shaft J1 is incorporated therein, the casing being attached on an outer wall W1-W3 in proximity to a corner of various buildings or frame structures (hereinafter "buildings"), and being fixed indirectly on the outer wall W1-W3 through an appropriate supporting bracket (not shown), or being fixed on brackets of the bottom end of various swinging arms described later.

[0265] The canvas take-up shaft J1 is comprised of a hollow inner rotation shaft **12**, and an cylindrical outer roller **13** fitted on (or inserted into) and supported by the rotation shaft **12** slidably along the axis of the rotation shaft.

[0266] Reference character **14** refers to a canvas outlet formed open in the front surface of the casing **11**, and reference numerals **15** and **16** refer to end caps fitted onto both the fore and the rear end of the casing **11**, the end cap having bearings **151** and **161** projected from the inner surface thereof. Reference numerals **171** and **172** indicate guide grooves and guide projections respectively, both formed along the axis direction on each one-fourth of the outer circumference of the inner rotation shaft **12** in parallel to other grooves and projections. Reference numbers **18** and **19** refer to end caps fitted onto both the fore and the rear end of the inner rotation shaft **12**. The cap main body is formed in substantially the same shape as the internal surface of the inner rotation shaft **12**. Spindles **181** and **191** penetratingly fixed to the cover portion of the cap are fitted into the bearings **151** and **161** rotatably.

[0267] Reference number **20** indicates a worm-gear fittingly fixed to the spindle **181** of the end cap **18**. Reference character **21** refers to a worm engaging with the worm gear **20**. Its worm rotation shaft **22** is bearing supported vertically by the end cap **18**. A hook **23** is formed at the bottom end of the rotation shaft **22**.

[0268] Reference numerals **24** and **25** refer to hollow end caps fitted into both the fore and the rear end of the outer roller **13**. A guide projection **261** and a guide groove **262** are formed in parallel to each other on the internal surface of the cap main body. The end caps **24** and **25** are slidably fitted on the guide grooves **171** and guide projections of the inner rotation shaft **12**.

[0269] Thereby, the inner rotation shaft **12** and the outer roller **13** integrally rotate and the outer roller **13** moves forward or rearward slidably guided by the inner rotation shaft **12**.

[0270] Reference numeral **27** indicates a fitting groove formed on the bottom part of the outer roller along the axial direction. References **271** and **272** refer to engaging holes formed in the outer roller at the fore and the rear part of the fitting groove **27**, and perpendicular to the fitting groove **27**.

[0271] In addition, in the above embodiment, when end caps **15**, **16** themselves are mounted on the wall W1-W3 with some projection from the wall as end brackets for bearing the canvas take-up shaft J1, the necessity for the casing **11** will be optional.

Corner Canvas

[0272] Now, I will explain the configuration of the first example of the corner canvas G1 on the basis of the plainly extended form as shown in FIGS. **7**A-**7**C.

[0273] A corner canvas G1 is made of a textile like that for tents (i.e., fabric or synthetic resin), formed into a right-angled trapezoidal shape when extended, and comprised of a rectangular canvas main body R1 and a right-angled triangle canvas extension R2 extended from one side of said canvas main body.

[0274] As for the geometry, the top side **1** of the canvas G1 (hereinafter, a canvas top side) and the bottom side **2** of the canvas G1 (hereinafter, a canvas bottom side) are formed in parallel to each other. An oblique side **3** extends from the canvas bottom side **2** towards the canvas top side **1** at about a 45 degree angle of inclination (hereinafter, a canvas oblique side). A vertical side **4** (hereinafter, a canvas vertical side) is formed substantially perpendicular to the canvas bottom side **2**.

[0275] Although the angle of inclination of the canvas oblique side **3** is based on around 45 degrees in principle, in some cases it can be wider, for example, 60 degrees, or 75 degrees as shown in FIG. **19**C.

[0276] Reference numerals **28** and **29** refer to pouched passages formed on the canvas top side **1** and the canvas bottom side **2**, the passages having fixing members such as wires **30**, **31** or ropes inserted therein.

[0277] References numbers **32** and **33** indicate pouched cross passages formed on the diagonal lines of canvas main body R1, which are lines that obliquely connect the four corners, the passages having tension members such as wires **34** and **35** or connection belts or ropes inserted therein. Engagement pieces **341** and **351** of the fore ends of those wires are drawn upward from outlets **321** and **331** of the front face of the cross passages **32** and **33**. The rear ends of the wires and their fasteners **342** and **352** are drawn downward from outlets **322** and **332** of the rear face of the cross passages **32** and **33**. Then, to attach the corner canvas G1 on the canvas take-up shaft J1, firstly, the engagement pieces **341** and **351** of fore ends of the connection wires **34**, **35** drawn from the front face outlets **321**, **331** are fitted into engagement holes **271**, **272** of the outer roller **13** to be engaged as shown in FIG. **8** or FIG. **9**A. The canvas top side **1** having the wire **30** is then fitted into a fitting groove **27** of the outer roller **13** to be fixed.

[0278] Reference numeral **36** indicates a front bar for fixing the canvas bottom side **2**, the front bar having fitting grooves

37, 38 formed on the upper part of the front-bar frame and the upper part of the front part of the front-bar frame in the longitudinal direction.

[0279] Reference characters 39 and 40 are engagement holes drilled adjacent the intermediate part of the upper part and the rear end of the upper part of front bar 36.

[0280] Then, the rear ends of the connection wires 34 and 35 drawn from the rear face outlet 322 and 332 are inserted into the engagement holes 39 and 40, and the fasteners 342 and 352 are fixed with screws where the drawn corner canvas G1 is disposed in an appropriately tensioned condition.

[0281] Subsequently, the canvas bottom side 2 having a wire inserted is fitted into the engagement groove 37 of the front bar 36 to be fixed.

[0282] Reference number 41 indicates a decorative skirt hanging down from the front bar 36, the decorative skirt being fixed to the front bar by fitting into the engagement groove 38 after a wire 43 is inserted into the pouched passage 42 formed on the upper edge of the front bar.

[0283] Thereby, the canvas take-up device M1 of the corner canvas G1 is configured.

First Example of Canvas Tension Device

[0284] Now, a canvas tension device K1 of the first example is explained below.

[0285] Reference numbers 44 and 45 refer to a pair of swinging arms in parallel to each other. These are pivotally supported with a bias so that they manually translate the front bar 36 toward the corner space obliquely forward. Brackets 46 and 47 pivoting the arm bottom ends with pins are fixed adjacent the corner of the building and the fore end of the canvas take-up shaft J1, and adjacent the interlineate of the canvas take-up shaft J1, on the outer wall W1-W3, the underside of the casing 11, or at the supporting bar (not shown) fixed across the wall.

[0286] Reference numerals 48 and 49 indicate brackets for pivoting the fore ends of the swinging arms 44 and 45 with pins, the brackets being fixed on the back of the rear end of the front bar 36, and on the back adjacent the intermediate part of the front bar 36, spaced apart from each other by the same distance as the distance between the bracket 46 and the bracket 47.

[0287] A spring (not shown) with appropriate elasticity is incorporated in the pivot portion of either or both of the fore ends and rear ends of the swinging arms 44, 45. By the elastic biasing force of the spring(s), the pair of swinging arms 44 and 45 rotates in parallel to each other in the spreading direction and pushes and translates the front bar 36 toward the corner space obliquely forward.

[0288] On the other hand, when the corner canvas G1 is wound, the pair of swinging arms 44 and 45 is driven and rotates against the elastic biasing force, and thus retracts and translates the front bar 36 toward a place by the wall obliquely rearward.

[0289] In addition, the swinging arms 44 and 45 are mounted in parallel to each other spacing an appropriate distance to rotate in synchronization with each other in one direction. When the distance between the swinging arms 44 and 45 is less than the arm length, it is preferable to form a refraction part closer to the bottom end of each arm.

[0290] These refraction parts 441, 451 allow the swinging arms 44, 45 to be compactly stored by the wall.

Effect of Corner Awning Device

[0291] To wind the corner canvas G1 on the canvas take-up shaft J1, firstly a user engages an operating lever to a hook 23 (not shown), and rotates it manually. Then an inner roller shaft 12 and an outer roller 13 integrally rotate through engaged gears 20 and 21, and wind the canvas so that the face of the canvas is wound inside and the rear face of the canvas is wound on the outside. That is, the corner canvas G1 is wound under the roller as shown in FIGS. 10B and 10C, or FIGS. 11B and 11C.

[0292] The swinging arms 44 and 45 are driven and rotate rearwardly against the elastic biasing force, and translate the front bar 36 obliquely rearward.

[0293] At the same time, the tensioning force of the canvas tension device K1 affects the outer roller 13 through canvas G1, and the tensile force of connection wires 34, 35 affects the outer roller 13, and then these effects are transmitted into rearward sliding force of the outer roller 13.

[0294] Thereby the outer roller 13 is moved rearward along the axis of the inner rotation shaft 12.

[0295] Then, the canvas main part R1 is wound on the outer roller 13 gradually, and the canvas extension R2 is wound on the external perimeter surface of the inner rotation shaft 12 exposed with the outer roller 13 moved rearward, as shown in FIGS. 10A-10C, and FIGS. 11A-11C.

[0296] Thus, the corner canvas G1 is taken up without protruding from the shaft length of the canvas take-up shaft J1, and the swinging arms 44, 45 are folded by the wall and overlaid with the front bar 36 to be stored compactly, as shown in FIGS. 10D and 11D.

[0297] In this case, the connection wires 34, 35 cross-connect the front bar 36 and the outer roller 13, and the tensile force to move the outer roller 13 rearward occurs as the front bar 36 moves obliquely rearward. Therefore, it prevents the canvas main body R1 from distortion or in-plane deformation when the corner canvas G1 is taken up, and the canvas G1 can thus be taken up in a smooth and regular manner.

[0298] In this regard, if the front bar 36 and the outer roller are not cross-connected through connection wires 34, 35, the canvas main body R1 is susceptible to distortion or in-plane deformation with the effect of, for example, hardness and softness of the canvas textile, stretching property, knitting density. As a result, it is expected that the corner canvas G1 will be taken up irregularly, and the smooth rearward movement of the outer roller 13 impaired.

[0299] Now, to the contrary to the above, to extend the corner canvas G1 wound on the canvas take-up shaft 1 over a corner space along the periphery of the building, a user rotates the operational assembly in the opposite direction from the above. Then, the elastic biasing force of the two swinging arms 44, 45 folded by the wall is released, and the swinging arms 44, 45 are rotated toward the spreading direction by the pressure biasing force, thereby pushing and translating the front bar 36 over the corner space obliquely forward.

[0300] At the same time, the inner rotation shaft 12 and the outer roller 13 integrally reverse rotate to unwind the corner canvas G1 wound on the canvas take-up shaft J1, and the sliding force for the forward movement of outer roller 13 caused by the elastic biasing force of swinging arms 44, 45 affecting the front bar 36, the tensioning force of the canvas G1, and the retraction force of wires 34, 35 retracted, operate

so that the outer roller **13** is reverse rotated with the forward movement along the inner rotation shaft **12**.

[0301] In this manner, the corner canvas G**1** is smoothly extended over the corner space obliquely forward by the extension of the front bar **36** with the elastic biasing force of the swinging arms **44**, **45**, by the integral reverse rotation of the inner rotation **12** and the outer roller **13**, and by the forward movement of the outer roller **13**.

[0302] Thus, two of the awning devices S**1** are installed at the corner position of the front wall W**1** and the side wall W**2** in an orthogonally face-to-face relation, and the corner canvases G**1** each wound on the respective canvas take-up shaft J**1** are unwound.

[0303] Thereby two corner canvases G**1** are drawn obliquely forward, extended in a face-to-face relation, and thus the corner spaces Z**1**-Z**3** of the building are effectively covered.

[0304] In addition, in the above case, although the inner rotation shaft **12** is rotated manually, the rotation shaft **22** as shown FIGS. **5**, **8**, and **9**B may be forward/reverse rotated by an electric motor (not shown), or a drive unit that engages with a spur gear, which may be mounted instead of the worm-gear **20**, may be forward/reverse rotated by a electric motor (not shown).

Combination with Awning Device of Conventional Structure

[0305] In the rear half of awning device S**1** according to the present invention, an awning device Q having a conventional structure extending or taking up a rectangular canvas P is combined as shown in FIG. **12**-FIG. **14**.

[0306] In FIGS. **12**-**14**, reference character **51** refers to a canvas take-up shaft mounted in a casing **52**. The take-up shaft is attached with a rectangular canvas P. A canvas outlet is opened in the upper portion of the casing **52**. Reference number **53** indicates a front bar for fixing the front edge of the canvas P. Reference characters L**1**, L**2** indicate a pair of bi-foldable swinging arms biased by springs, wires or the like, to the direction spreading out the bi-foldable swinging arms L**1**, L**2**.

[0307] In the awning device Q, a part in proximity to the end of the casing **52** is attached substantially overlaying beneath the latter half of the casing **11**, and the bottom ends of the bi-foldable swinging arms L**1**, L**2** are fixed on the outer wall W**1**-W**3** and spaced apart from each other.

[0308] Thus, when the canvas take-up shaft **51** is rotated for winding the canvas with a manual or electric motor, the rectangular canvas P is wound on the take-up shaft **51** with the back face of the canvas inside and the front face outside, and the bi-foldable swinging arms L**1**, L**2** are bi-folded inwardly against their elastic biasing force and the front bar **53** translates toward the wall for storage.

[0309] Therefore, a combination of the corner awning device S**1** of this invention and an awning device Q of the prior art effectively and integrally cover the peripheries of various buildings including the corner spaces as if they were one piece.

[0310] In the above case, it is configured not to stand out the gap between the corner canvas G**1** and the rectangular canvas P when extended, by lower-winding the corner canvas G**1** and upper-winding the rectangular canvas P. However, the corner canvas G**1** may be upper-wound and the rectangular canvas P lower-wound by changing the layer of the casing **11** of the awning device S**1** of this invention and the casing **52** of the awning device Q to be upside-down.

Second Example of Canvas Take-Up Shaft

[0311] Now, the structure of the canvas take-up shaft J**2** of the second example, in which the inner rotation shaft **12** is driven electrically, is explained below in connection with FIGS. **17**A and **17**B.

[0312] Reference character **54** indicates a cylindrical electrical motor inserted into the rear part of the inner rotation shaft **12**. A motor output shaft **541** is projected from the fore end of the motor, and a fixed shaft **542** is projected from the rear end of the motor. Reference numeral **55** refers to a bearing socket having a projection and depression surface to be fitted in the inner rotation shaft **12**. The motor output shaft **541** is engaged in an axial hole **551**.

[0313] Reference character **19**C refers to an end cap to be fitted in a rear end of the inner rotation shaft **12**. The cylindrical hole **194** of the cap main body bearing supports the rear end of the main body of the electric motor **54**.

[0314] After the bearing socket **55** engages the motor output shaft **541**, the electric motor **54** is inserted into the rear part of the inner rotation shaft **12**. On the other hand, after the rear end of the main part of the electric motor is inserted into the end cap **19**C, the cap C is fitted into the inner rotation shaft **12**, and the shaft **542** of the electric motor **54** is fitted into the bearing **161** of the end cap **16** to be fixed. In this manner, the electric motor **54** is incorporated in the inner rotation shaft **12**.

[0315] Thus, when the eclectic motor is driven, the output shaft **541**, the bearing socket **55** and the inner rotation shaft **12** integrally forward/reverse rotate, and thereby the processes of winding and unwinding the corner canvas G**1** becomes automatic and requires less power.

[0316] In the above case, an electric drive unit is incorporated in the rear part of the inner rotation shaft **12**, while substantially the same structure can be incorporated in the fore part of the rotation shaft **12**.

Interlocking Device of Awning Device

[0317] In the above case, it is explained that two awning devices S**1** face each other at the corner of a building and that each canvas take-up shaft J**1**, J**2** is rotated manually or electrically. A manually operated unit as shown in FIGS. **18**A and **18**B may be adapted to interlock those awning devices.

[0318] In FIG. **18**A, reference number **57** indicates a corner cap formed at a right angle. The inside of the corner cap is divided with the bearing **571**. Casings **11** each having canvas take-up shafts J**1** are each fitted into one side and the other side of the corner cap. Each spindle **181** of the inner rotation shafts **12** facing each other at a right angle is supported with a bearing **571**.

[0319] A rotation shaft **22** having a hook **23** is bearing-supported vertically at the rear part of the back of the bearing **571**. A worm **21** fitted into the upper portion of the rotation shaft **22** engages the worm-gears **20** that engage the spindles **181** of the inner rotation shafts **12**.

[0320] In this manner, two canvas take-up shafts J**1** facing the front wall W**1** and the side wall W**2** are interlockingly forward/reverse-rotated, and thus winding and unwinding of two corner canvases G**1** are interlockingly achieved.

[0321] Although the above two canvas take-up shafts J**1** are installed in a face-to-face relation at a right angle at a corner of a building as shown in FIGS. **18**A and **18**B, similarly the

canvas take-up shaft J1 can be applied at a corner having either obtuse angles or acute angles as shown in FIGS. **16**C and **16**D, by forming the bending angle of the corner cap **57** into a cap shape having an obtuse angle or an acute angle.

[0322] In addition, the rotation shaft **22** for the interlock can be forward/reverse-rotated by an electric motor (not shown).

[0323] It should be understood that in the case of the canvas take-up shaft J2, in which an electric drive device as shown in FIGS. **17**A and **17**B is incorporated in the inner rotation shaft **12**, the manual or electric interlocking device as shown in FIGS. **17**A and **17**B are not required because two awning devices S1 installed at a corner can be interlocked by electrically synchronizing them.

Modified Example of Corner Canvas

[0324] In the case of the above canvas tension device K1, the spreading angle of the swinging arms **44**, **45** is practically limited to 75-80 degrees, when the smoothness of the rearward movement of the outer roller **13** is considered.

[0325] Therefore the length extended obliquely forward, of the corner canvas G1 is limited by the spreading angle of the swinging arms **44** and **45**, and thus a gap of 20-30 cm between canvases extended in a face-to-face relation is made.

[0326] Thus, to make the gap between the oblique sides facing each other as narrow as possible without changing the spreading angle of the swinging arms **44** and **45**, there is provided a corner canvas G2-G4 in 3 aspects as shown in FIGS. **19**A-**19**C.

[0327] Of these, in the case of a canvas G2 of FIG. **19**A, a canvas oblique side **5** parallel to a canvas oblique side **3** (shown in a phantom line) of the canvas G1 of the first example is formed based on the fore end of the outer roller **13**. A canvas vertical line **6** is raised vertically from the fore end of the canvas G1, and a through hole **7** for the connection of two canvases is formed at a place of an obtuse angle where the sides **5** and **6** intersect.

[0328] In addition, crossing through holes **32** and **33** are formed on the elongated canvas main body R1, and a canvas extension R3 is formed in a sideways trapezoidal shape with the fore end of the canvas bottom side cut vertically.

[0329] In the case of a canvas G3 of FIG. **19**B, a canvas oblique side **5** is formed in the same manner as the above. An oblique side **8** extending obliquely upward from the fore end of the canvas bottom side is formed. Sides **5** and **8** form a substantially right angle, and through hole **7** for the connection of two canvases is formed at a place of an obtuse angle where the sides **5** and **6** intersect.

[0330] Thus, in the canvas G2 and G3 shown in FIGS. **19**A and **19**B, a portion protruded from a line connecting the fore end of the canvas top side **1**A fixed on the outer roller **13** and the fore end of the canvas bottom side **2** fixed on the front bar hangs down, if it is not held, when the canvas is extended or wound.

[0331] Thus, as shown in FIGS. **18**A and **18**B, two canvas take-off shafts J1 installed on the corner of the front wall W1 and the side wall W2 are configured to be interlocked with each other, and then through holes **7** of the canvas extensions R3 of 2 canvases G2, G3 facing each other are connected through an elastic member **10** such as an elastic cord or a coil spring.

[0332] Thereby, as shown in FIGS. **20**A, **20**AA, **20**B, and **20**BB, the protruded portions are pulled toward each other by the elastic member **10**, and the canvas main bodies R1 and the canvas extensions R3 are interlockingly wound or unwound on the canvas take-up shafts J1 in a tensioned condition due to the elastic bias of the swinging arms **44** and **45**.

[0333] As a result, compared with the case of the corner canvases G1, the gap between opposed canvas oblique sides **5** can be made still less.

[0334] In addition, in a canvas G4 of FIG. **19**C, which is different from the ones in FIGS. **19**A and **19**B, the length of the front bar **36** is relatively shortened, and a canvas upward folding line **9**, which is an oblique line connecting one end of the canvas bottom side **2**A fixed on the front bar **36** and the end of the canvas top side **1**A fixed on the outer roller **13**, is formed.

[0335] In addition, the canvas oblique side **5**A having an angle of 50 degrees toward the fore end of the canvas top side **1**A and the canvas oblique side **8**A extending obliquely upward from the fore end of the canvas bottom side **2**A form a right angle, and those opposed right angles are connected through an elastic member **10**.

[0336] Thereby, when the corner canvases G4 are wound, they are gradually folded from the canvas upward folding line **9**.

[0337] On the contrary, when the canvas extensions R3 are wound on the inner rotation shafts **12** of the canvas take-up shafts J1, they are wound so that the bottom end portions of the downwardly folded portions are raised to keep the extension surface tensed to be flush.

[0338] In this manner, as shown in FIGS. **20**C and **20**CC, the canvas oblique sides **5**A are tensely supported folded from the canvas upward folding lines **9** in relatively steep condition, thereby the gap between canvas oblique sides facing each other gets narrower, and the appearance of the corner space when the canvases are extended improves.

Third Example of Canvas Take-Up Shaft

[0339] Now, the canvas take-up shaft J3 shown in FIGS. **21**A and **21**B is explained below.

[0340] This canvas take-up shaft J3 requires a casing, which the canvas take-up shaft J1, J2 of the first or second example does not require. The fore end of the inner rotation shaft **12**A having a shaft length that is ½-⅔ of the length of the casing **11** is supported with the end cap **15**. The inner rotation shaft **12**A is slidably and guidably inserted into the outer roller **13**.

[0341] Reference numeral **58** refers to a slide bearing fixed on the rear end of the outer roller **13**. The slide bearing slides forward and rearward with the guidance of the inner wall surface of the casing **11**.

[0342] To wind the canvas G1-G4, the inner rotation shaft **12**A and the outer roller **13** are integrally rotated, the swinging arms **44** and **45** are rotated in an arc rearward against the elastic biasing force, and the canvas G1-G4 is wound by the tensioning force of the canvas G1-G4 or the tensile force of the connection wires, with the rearward movement of the outer roller of the casing **11**.

[0343] On the other hand, when the canvas G1-G4 is extended, the front bar **36** is extended obliquely forward by the elastic biasing force of the swinging arms **44** and **45**, the outer roller **13** reverse-rotating integrally with the inner rotation shaft **12**A is moved toward the end of the casing **11**, and the canvas G1-G4 wound on the canvas take-up shaft is drawn out and extended.

Adherent Winding Preventing Equipment of Canvas Extension

[0344] The following canvas take-up shaft J4, J5 of the fourth example and the fifth example, or canvas take-up shafts

J11-J13 described later are embodiments to solve the problem 3 discussed above. They are provided with a structure to prevent adherent winding when the canvas extension R2, R3 is wound, and to secure smooth rearward movement of the outer roller 13.

Fourth Embodiment of Canvas Take-Up Shaft

[0345] Now, a canvas take-up shaft J4 of the fourth example shown in FIGS. 22-24 is explained below.

[0346] Reference number 50 indicates a slide rope made of synthetic resin having a moderate elastic property. Approximately four slide ropes are incorporated in the inner rotation shaft 12 along the axis of the inner rotation shaft.

[0347] References characters 18A and 19A refer to end caps engaging both fore and rear ends of the inner rotation shaft 12. The end caps have rope passages 182 and 192 for turning each slide rope 50 out by bending the rope in the shape of the letter U, the rope passages being formed on 4 places on the external perimeter surface from the cap main body to the cover.

[0348] Reference characters 24A and 25A refer to end caps engaging in both the fore and rear ends of the outer roller 13. Rope insertion holes 263 are formed inside of the end caps. In the cap main body, a guide groove 264, in which the guide projection 273 of the engaging groove 27 engages, is formed.

[0349] To incorporate the slide ropes 50 into the canvas take-up shaft J4, first, the slide ropes are inserted along the rear side of the guide projection 172 of the inner rotation shaft 12 along the axis of the inner rotation shaft 12. Secondly the slide ropes are temporarily drawn from either of the rope passages 182, 192 of the end caps 18A, 19A fitted into the ends of the canvas take-up shaft. Then the slide ropes are bent over, and drawn along the guide groove 171 on the inner rotation shaft 12 upon turning them out. Further, the ends of the ropes from the holes 263 of the end caps 24A, 25A are drawn out, and fixed for retaining by fitting a clip on both ends of the ropes.

[0350] The other slide ropes are incorporated in the same manner, whereby 4 of the slide ropes are put across the inside and outside of the canvas take-up shaft J4 along the axis of the canvas take-up shaft J4.

[0351] Thus, when the outer roller 13 moves rearward, the slide ropes 50 of the fore end of the outer roller 13 are correspondingly drawn to the guide groove 171 of the inner rotation shaft 12, and the slide ropes 50 exposed on the rear end of the outer roller 13 are drawn to the inside of the inner rotation shaft 12.

[0352] As a result, the canvas extension R2, R3 wound on the inner rotation shaft 12 exposed by the rearward movement of the outer roller 13 is indirectly wound on the external perimeter surface of the slide ropes 50, the external diameter of which is increased by the exposure of the upper portion in the axis direction.

[0353] Therefore, it prevents the canvas extension R2, R3 from adherence when wound, and thus ensures the smooth rearward movement of the outer roller 13.

[0354] In addition, because the slide ropes 50 are drawn from the inside of the inner rotation shaft 12 by corresponding to the rearward movement of the outer roller 13, it prevents the canvas extension R2, R3 from wearing when wound on the external perimeter surface of the slide rope 50.

Fifth Embodiment of Canvas Take-Up Shaft

[0355] Now, a canvas take-up shaft J5 of the fifth example shown in FIGS. 25-27 is explained.

[0356] Reference numeral 56 indicates a slide belt made of synthetic resin having a moderate elastic property. Approximately four of the slide belts are incorporated in the inner rotation shaft 12 extending along its axis.

[0357] Reference characters 18B and 19B refer to end caps engaged in both the fore and the rear ends of the inner rotation shaft 12. Belt passages 183 and 193 for bending over each belt 56 in a U shape are formed on each one quarter of the external perimeter surface of the end cap from the cap main body to the cover portion.

[0358] References characters 24B and 25B indicate end caps engaging both fore and rear ends of the outerwear roller 13, and each one quarter of the cap collar is formed with belt passages 265 for drawing the slide belts 56 formed on the cap main body along the axis of the inner shaft.

[0359] Thus, the slide belts 56 along the inside of the guide projection 172 of the inner rotation shaft 12 are inserted along the axis of the inner rotation shaft 12; temporally drawn out from the inside of the belt passages 183, 193 of the end caps 18B, 19B; bent over; and drawn along the belt passage 265. Both ends of the belts are fixed with a clip 561, 562 for retention.

[0360] The other slide belts 56 are incorporated in the same manner, and thereby four of the slide belts 56 are put across the inside outside of the canvas take-up shaft J5 along the axis of the inner shaft.

[0361] As a result, the canvas extension R2, R3 wound on the inner rotation shaft 12 exposed by the rearward movement of the outer roller 13 is indirectly wound on the external perimeter surface of the slide belts 56 along the guide projections 172 of the inner rotation shaft 12, the external diameter of which is increased by the exposure of the upper portion along the axis of the inner rotation shaft.

[0362] As a result, the smooth forward movement of the outer roller 3 is ensured, and the wearing of the canvas extension R2, R3 is prevented.

[0363] In addition, to motorize the inner rotation shaft 12 to operate the above canvas take-up shaft J4, J5 electrically, components such as an electric motor 54, a bearing socket 55, and end caps 19C shown in FIGS. 17A and 17B are incorporated in the inner rotation shaft 12 as shown in FIG. 23C or FIG. 26C, or an electric motor (not shown) is incorporated in one of the end caps 15, 16 of the casing.

Second Embodiment of Corner Awning Device

[0364] Now, an awning device S2 of the second embodiment shown in the perspective views of FIGS. 28A-28C and FIGS. 29D and 29E, and in the plan views of FIGS. 30A-30E, is explained below.

[0365] The awning device S2 is comprised of the canvas tension device K2 of the second example having a pair of two-phase swinging arms N1, N2 in parallel, which circularly rotate in a two-phase motion, and a canvas take-up device M1 having either one of the above canvas take-up shafts J1-J5 or either one of canvas take-up shafts J6-J8 explained later.

[0366] The two-phase swinging arms N1 and N2 are each comprised of rear arm 59 and front arm 60 connected foldably. The intermediate portions of the swinging arms are connected through a connection rod 61. The arm front ends are pivoted at the brackets 48 and 49 of the front bar 36.

[0367] The brackets 46 and 47 of the bottom of the two-phase swinging arms N1, N2, that is, the bottom of the rear arm 59, are provided with a spring having a relatively low

resilience, while the joint of the front arm **60** of the rear arm **59** is provided with a spring having a relatively strong resilience.

[0368] Thus, when the corner canvas G**1** extended as shown in FIG. **28**A or **30**A is wound on the canvas take-up shaft J**1**-J**5**, firstly a pair of rear arms **59** biased by a low spring resilience starts being rotated arcuately rearward against the resilience bias, and folded by the wall through the swinging process shown in FIGS. **28**A-**28**C, or FIGS. **30**A-**30**C, with the movement of the front bar **36** obliquely rearward in parallel.

[0369] Furthermore, when the canvas take-up shaft J**1**-J**5** rotates for winding, a pair of front links **60** biased by the strong spring resilience moves the front bar **36** obliquely rearward in parallel against the resilience bias, and the fore arm **60** is folded by the wall through the swinging process shown in FIGS. **29**D and **29**E, or in FIGS. **30**C-**30**E.

[0370] On the other hand, when the canvas take-up shaft J**1**-J**5** is to be wound, first, a pair of the front arms **80** biased by a strong spring resilience is arcuately rotated in the forward spreading direction by the bias, pushing the front bar **36** obliquely forward in parallel.

[0371] When the front arm **60** swings to the spreading angle as shown in FIG. **28**C or FIG. **30**C, a pair of the rear arms **59** biased by a weak spring resilience rotates and swings to the spreading angle as shown in FIG. **28**A or FIG. **30**A, and thereby the front bar **36** is pushed further obliquely forward in parallel.

[0372] In this manner, the corner canvas G**1** extends to the corner space and covers it.

[0373] Thus, when the front bar is extended in two-phases towards the corner space obliquely forward by a linkage comprising two-phase swinging arms N**1** and N**2** and a connection rod **61** for the arms, the front bar is able to push the front bar **36** further obliquely forward, compared with the case of the swinging arms **44** and **45** incorporated in the canvas tension device K**1** of the first example.

[0374] In addition, in the above case, the angle connecting the bottom end and front end of the two-phase swinging arms N**1** and N**2** biasing the front bar **36** is adjusted to be around 70-80 degrees of the spreading angle as shown in FIG. **30**A, and the arms are controlled in their rotation by a stopper (not shown) as desired to be less than about 45-50 degrees of the swinging angle, and the swinging angle between the connection rod **61** and the rear arm **60** is to be less than about 120 degrees.

[0375] In addition, the corner canvas G**2**-G**4** may be extended or stored in such a manner that two of the awning devices S**2** of the second embodiment are placed to face each other at the corner of the front wall W**1** and the side wall W**2**, and each canvas take-up shaft J**1**-J**5** is constructed with an interlocking structure as shown in FIGS. **18**A and **18**B. Corner canvas G**2**-G**4** of the second-fourth example as shown in FIGS. **19**A-**19**C, instead of the corner canvas G**1** of the first example, is connected via expansion and contraction members **10**, and one of the canvas take-up devices M**1** and the other of the canvas take-up device M**1** are interlocked.

Third Embodiment of Corner Awning Device

[0376] Now, an awning device S**3** of the third embodiment shown in perspective views in FIGS. **31**A and **31**B, and in plan views in FIGS. **32**A-**32**C, is explained below.

[0377] The awning device S**3** is comprised of the canvas tension device K**3** of the third example provided with a pair of telescopic arms T**1** and T**2** in parallel, which are free to expand and contract, a canvas take-up shaft M**1** provided with either one of the above described canvas take-up shafts J**1**-J**5**, or a canvas take-up shaft J**6**-J**8** described later, wherein two of the awning devices are installed at the corner of the front wall W**1** and the corner of the side wall W**2** in an orthogonally face-to-face relation.

[0378] In the above case, one of the canvas take-up shafts J**1**-J**5** and the other of the canvas take-up shafts J**1**-J**5** are configured so that both ends of the front bars **36** are fixed orthogonally in a face-to-face relation, or fixed through the connection member **67** as shown FIG. **34**.

[0379] In the telescopic swinging arms T**1**, T**2**, the fore end of the rear arm **62** is slidably fitted in the fore arm **63**, and configured to be expandable and contractible with a coil spring **64** or a rubber elastic body. The fore end of each front arm **63** is pivoted on the brackets **48**, **49** of each front bar **36**.

[0380] A spring (not shown) biasing telescopic arms T**1**, T**2** in the spreading direction is incorporated in the brackets **46**, **47** of the bottom of the swinging arms T**1**, T**2**, as is the case with the canvas tension device K**1**, K**2** of the first and second examples.

[0381] Thus, as shown in FIG. **32**A, when the corner canvases G**1** extended in one way and the other way are wound by interlocking the canvas take-up shafts J**1**-J**5**, each telescopic swinging arm T**1**, T**2** is rotated rearward against the elastic biasing, and then the winding on the canvas take-up shafts J**1**-J**5** is started, while one and the other front bars **36** translate toward the front wall W**1** or the side wall W**2** with the rearward movement.

[0382] However, because the fore ends of front bar **36** are integrated with each other, the telescopic swinging arms T**1**, T**2** are rotated arcuately rearward, and are rotated rearward with expansion and contraction with the rear arm **62** and the front arm **63** sliding relatively, then folded by the wall as shown in FIG. **32**C, as simultaneously the integrated font bars **36** are drawn to the corner to be stored by the walls.

[0383] On the other hand, as shown in FIG. **32**C, when two canvas take up shafts J**1**-J**5** are rotated to unwind in an interlocking manner, each telescopic swinging arm T**1**, T**2** is rotated with expansion and contraction in the spreading direction obliquely forward by the elastic biasing force, the integrated front bar **36** is pushed obliquely forward with parallel movement, and the corner canvas G**1** is extended to the corner.

[0384] In this manner, the telescopic swinging arms T**1**, T**2** of the canvas tension unit K**3** are rotatably supported with bias, and make the arm length free for expansion and contraction, and thus a corner ornamental panel **67**A orthogonal as shown in FIG. **33** is attached on the integrated front bar **36**, which allows the corner ornamental panel **67**A to have the function of advertisements for shops or sign-boards.

Fourth Embodiment of Corner Awning Device

[0385] Now, a corner awning device S**4** of the fourth embodiment shown in FIGS. **33**-**36** is explained below.

[0386] Reference number **65** corresponds to a slide rail comprising a guide-roller **66**. As shown in FIG. **35**, the slide rail is inserted in the front bar **36**A to form a guide groove **361** of a guide roller **66** within the frame of the front bar. Brackets **48**, **49** are fixed in the intermediate position of the slide rail **65**, and in the end position of the slide rail **65** respectively. The front ends of swinging arms **44**, **45** are pivoted on the brackets **48**, **49** respectively.

[0387] The guide-rollers **66** are bearing supported and spaced apart on the rail projection **651** projected in the front, central position of the slide rail **65**, and retained by an engagement collar **362** formed in the back and upper/lower positions of the front bar **36**.

[0388] Thus, as shown in FIG. **34**, when the corner canvases G**1** extended in one way and the other way are wound by interlocking canvas take-up shafts J**1**-J**5**, each telescopic swinging arm **44**, **45** is rotated rearward against the elastic biasing, and the winding on the canvas take-up shaft J**1**-J**5** is started, while one and the other front bar **36** moves rearward, toward the front wall W**1** or the side wall W**2** in parallel.

[0389] In the above case, one of the canvas take-up shafts J**1**-J**5** and the other of the canvas take-up shafts J**1**-J**5** are configured so that the portion where both shafts meet is configured in an interlocking structure as shown in FIGS. **18**A and **18**B. Both ends of the front bars **36** are fixed orthogonally in a face-to-face relation, or fixed through the connection member **67** as shown FIG. **34**.

[0390] A spring (not shown) biasing swinging arms **44**, **45** in the spreading direction is incorporated in the bracket **46**, **47** of the bottom of the swinging arms **44**, **45** as is the case with the canvas tension device K**1**-K**3** of the first-third examples.

[0391] Thus, as shown in FIG. **34**, when the corner canvases G**1** extended in one way and the other way are wound by interlocking canvas take-up shafts J**1**-J**5**, each telescopic swinging arm **44**, **45** is rotated rearward against the elastic biasing and the winding on the canvas take-up shaft J**1**-J**5** is started, while one and the other front bar **36** moves rearward, toward the front wall W**1** or the side wall W**2** in parallel.

[0392] However, because the fore ends of front bars **36**A are integrated with each other, the swinging arms **44**, **45** are rotated arcuately rearward, first by sliding the sliding rail **65** rearward temporarily on each front bar as shown in the intermediate stage of FIG. **36**, and then by sliding it forward, and the swinging arms are folded by the wall as shown in FIG. **36**, as simultaneously the integrated font bars **36**A are drawn to the corner to be stored by the wall.

[0393] On the other hand, when both of the canvas take-up shafts J**1**-J**5** are rotated for unwinding in an interlocking manner, each swinging arm **44**, **45** is rotated arcuately obliquely forward in the spreading direction by the elastic biasing force, which pushes and translates linearly the integrated front bars **36**A over the corner spaces obliquely forward, and thus the corner canvases G**1** are extended over the corner spaces.

[0394] In the above case, the bracket **48** of the fore end of the swinging arm **44** is attached adjacent the intermediate part of the slide rail slightly shorter than the length of the front bar **36**A as shown in FIG. **34**. However, if the length of the slide rail is about half, the bracket **48** is attached on a portion in proximity to the fore end of the slide rail **65**.

Fifth Embodiment of Corner Awning Device

[0395] Now, an awning device S**5** of the fifth embodiment shown in the perspective views of FIGS. **37**A-**37**C and in the plane views of FIGS. **38**A-**38**C is explained.

[0396] This awning device S**5** is comprised of a combination of a canvas tension device K**5** of the fifth example having double foldable swinging arms V**1**, V**2** bending and stretching like a leapfrog, the canvas take-up device M**11** having either one of the above described canvas take-up shafts J**1**-J**5**, or canvas take-up shafts J**6**-J**8** described later, with two of the awning devices being configured in the corner place of the front wall W**1**, and the corner of the side wall W**2**, in an orthogonally face-to-face relation.

[0397] In the above case, one of the canvas take-up shafts J**1**-J**5** and the other of the canvas take-up shafts J**1**-J**5** are configured so that the portion where both shafts meet is configured in an interlocking structure as shown in FIG. **18**. Both ends of the front bars **36** are fixed orthogonally in a face-to-face relation, or fixed through the connection member **67** as shown FIG. **34**.

[0398] The bi-foldable swinging arms V**1**, V**2** are each comprised of a rear arm **59** and a fore arm **60**, both of which are bi-foldably connected. The swinging arms V**1**, V**2** are connected by extending a connection rod **61** between the bi-foldable joints thereof. The fore end of the bi-foldable swinging arm V**1** that is closer to the corner is pivoted at the bracket **48** fixed toward the fore end of the front bar **36**, while the fore end of the bi-foldable swinging arm V**2** that is located rearward of the other arm is pivoted at the bracket fixed on the front bar **36** near the intermediate part.

[0399] In the brackets **46**, **47** at the bottom end of the bi-foldable swinging arms V**1**, V**2**, that is, in the bottom end of the rear arms **59**, a spring (not shown) biasing the arms in the spreading direction is incorporated. Also, in the bi-foldable joints of the rear arm **59** and the front arm **60**, a spring (not shown) biasing the arms **59**, **60** in the spreading direction is incorporated.

[0400] Thus, as shown in FIGS. **37**A and **38**A, when the corner canvases G**1** extended to one and the other directions are wound by interlocking the canvas take-up shafts J**1**-J**5**, each bi-foldable swinging arm V**1**, V**2** rotates obliquely rearward against the spreading biasing force while bi-folding, and at the same time moves the integrated front bar **36** linearly rearward toward in parallel to the line that divides the corner into two, and translates it toward the front wall W**1** and the side wall W**2**. Then the arms are folded by the wall while they draw the integrated front bar **36** to be stored by the wall.

[0401] On the other hand, when both of the canvas take-up shafts J**1**-J**4** are interlockingly rotated for unwinding, each bi-foldable swinging arm **44**, **45** is rotated forward in the spreading direction by the elastic biasing force, which pushes and translates linearly the integrated front bar **36** obliquely forward, and thus the corner canvas G**1** is extended over the corner space.

Sixth Example of Canvas Take-Up Shaft

[0402] A canvas take-up shaft J**6** shown in the sixth example of FIGS. **39**A and **39**B is explained below.

[0403] This take-up shaft J**6** is configured so that the outer roller **13** rotating integrally with the inner rotation shaft **12** moves forward/rearward in the axis direction by means of a rack work.

[0404] Reference number **91** refers to a worm-gear fitted to the rear end of the end cap **25**. Reference **92** indicates a worm rack formed on the internal surface of the back of the casing **11**. The worm gear **91** engages the rack **92**.

[0405] Thus, when the inner rotation shaft **12** and the outer roller **13** are integrally rotated by means of a manually operated device, the outer roller starts moving in the axis direction with rotation via engagement of the worm gear **91** and the worm rack **92**, while the outer roller **13** is moved forward/rearward with the sliding guidance by the inner rotation shaft **12** by the tension force of the canvas tension unit K**1**-K**5** and the tensile force of the connection wires **34**, **35**.

[0406] Thereby, the canvas main body R**1** is wound on the outer roller **13**, and the canvas extension R**2**, R**3** is wound on the inner rotation shaft **12** exposed by the rearward movement of the outer roller **13**.

[0407] In addition, by winding the corner canvas G**1** on the canvas take-up shaft J**6**, the take-up diameter varies, and then the circumferential speed of the take-up shaft J**6** becomes gradually fast or slow. Thus, to secure the interlocking, it is preferable to gradually widen the space of the rack of the worm rack **92**.

[0408] In addition, in the above case, because the outer roller **13** is secured to be moved forward/rearward by the rackwork, the connection wires **34**, **35** are not required.

[0409] In addition, although structures other than the above described structure are shown as is the case with the canvas take-up shaft J**1** of the first example, a rackwork as described above can be incorporated in any of the canvas take-up shafts J**2**-J**5** of the first-fifth examples.

Seventh Example of Canvas Take-Up Shaft

[0410] A canvas take-up shaft J**7** of the seventh example shown in FIGS. **40**A and **40**B is explained below.

[0411] This take-up shaft J**7** is comprised of: an inner fixing member **12**B supporting the outer roller **13** slidably and rotatably. An electric drive unit (a manually operated device is also acceptable) forward/reverse rotates the outer roller itself.

[0412] In this regard, in the canvas take-up shaft J**1**-J**6** of the first-sixth examples, the inner rotation shaft **12** and the outer roller **13** are integrally rotated by forward/reverse rotating the inner rotation shaft **12**, **12**A with a manually or electrically operated unit, while in the canvas take-up shaft J**7** of the seventh example, the outer roller is provided with the drive unit that forward/reverse rotates the outer roller **13** itself.

[0413] Therefore, it makes the rotation of the inner shaft unnecessary, and the inner shaft is just for guiding the outer roller **13** and enabling its rotation. The rotation of the shaft itself is not an issue. Upon consideration of these factors, the word "inner fixed shaft **12**B" is adopted instead of the inner rotation shaft **12**, **12**A.

[0414] Reference character **16**A represents a storing case for the drive unit, also serving as a end cap fitted to the rear end of the casing **11**, the fore/rear ends of the inner fixed shaft **12**B are fittingly fixed at a bearing **152** of the end cap and a bearing **162** is projected from the storing case **16**A.

[0415] An electric motor (not shown) is mounted in the storing case **16**A, and a drive gear **68** is fitted on the output shaft.

[0416] Reference characters **24**C and **25**C represent end caps respectively fitted into the fore and rear ends of the outer roller, and a spur gear **69** is fittingly fixed on the rear end of the end cap **25**C.

[0417] Reference numeral **70** represents three rod spur gears fittingly fixed on the gear rotation shaft **701**. Reference number **71** represent a bearing nut fixed at the upper back corner of the casing **11**. The gear rotation shaft **701** is passed through holes **711** at the offset corner, and three rod gears **70** are rotatably borne between the bearing nuts **71**.

[0418] The spur gear **69** fitted on the outer roller **13** engages the rod gear **70**, and the rear end of the rod gear **70** engages the driving gear **68**.

[0419] Thus, the driving gear **68** drives by means of the electric motor to rotate the outer roller **13** via engagement of the rod gear **70** and the spur gear **69**, while the outer roller **13** is moved forward and rearward with the sliding guide of the inner fixed shaft **12**B by elastic bias force of the canvas tension device K**1**-K**5**, tension of the canvas G**1**, and tensile force of the connection wires **34** and **35**.

[0420] Thereby, the canvas main body R**1** is wound on the outer roller **13**, and the canvas extensions R**2**, R**3** are wound on the inner fixed shaft **12** exposed by the rearward movement of the outer roller **13**.

Eighth Example of Canvas Take-Up Shaft

[0421] A canvas take-up shaft J**8** of the eighth example shown in FIGS. **41**A and **41**B is explained below.

[0422] This take-up shaft J**8** serves to move forward and rearward the outer roller **13** in the axis direction by a rack work in the canvas take-up shaft J**7** of the example 7.

[0423] Reference number **92** indicates a rack projected from the inner fixed shaft **12**B by spacing one another in an axis direction, the rack engaging an internal thread formed on the inner perimeter surface of the end cap **25**C.

[0424] Thus, the outer roller **13** is moved forward and rearward with the sliding guide of the inner fixed shaft **12**B by the rotation of the outer roller **13** via the engagement of the rod gear **70** and the spur gear **69** when an electric motor drives, while the engagement of the internal thread **252** of the end cap **25**C to the rack **93** of the inner fixed shaft **12**B, and further by the elastic biasing force of the canvas tension device K**1**-K**5**, the tension force of the canvas G**1**, and the tensile force of the connection wires **34**, **35**.

[0425] Thereby, the canvas main body R**1** is wound on the outer roller **13**, and the canvas extensions R**2**, R**3** are wound on the inner fixed shaft **12** exposed by the rearward movement of the outer roller **13**.

[0426] Although in the above case the rack **92** engaging the internal thread **252** is formed on the inner fixed shaft **12**B in the axis direction, it is also possible to form a helical thread (not shown), e.g., an external thread, on the outer perimeter surface to move the outer roller **13** forward and rearward by the engagement of the two threads.

[0427] In addition, instead of the internal screw **252**, an engaging projection (not shown) may be formed on the inside of the end cap **25**C to engage the external thread.

[0428] In addition, in the case of the canvas take-up shaft J**7**, J**8** of the above described seventh and eighth examples, a manually operated drive unit for directly driving the drive gear **68** or the rear end of the rod gear **70** may be incorporated in the storing case **16**A.

[0429] Similarly, if slide ropes or slide belts shown in the canvas take-up shaft J**4**, J**5** of the fourth and fifth examples are incorporated in the canvas take-up shaft J**7**, J**8**, the adhesive winding at the time of the winding of the canvas extension R**1**, R**2** will be prevented, and the smooth movement of the outer roller **13** will not be impaired as is the case of the canvas take-up shaft J**4**, J**5**.

Sixth Embodiment of Corner Awning Device

[0430] Now, a corner awning device S**6** of the sixth embodiment shown in FIGS. **42**-**45**B is explained below.

[0431] This is an embodiment in which a drive unit of the swinging arms **44**, **45** is incorporated in the canvas tension device K**6** of the sixth example, and the canvas take-up shaft J**9** of the ninth example being the main part of the canvas take-up device M**2** is made to be the driven side.

[0432] The drive unit of the swinging arms **44**, **45** shown in FIGS. **44**A and **44**B is explained below.

[0433] Reference characters **46**A and **47**A are associated with brackets pivoting the bottom end of the swinging arms **44** and **45**. Reference number **72** represents an intermediate bracket attached on the front wall along the line connecting the bracket **46**A with the bracket **47**A. Reference number **73** indicates a rotation shaft crossed across the bottom ends of the swinging arms **44**, **45**. Worms **741** and **742**, and a bevel gear **751**, are placed in lateral bearings **461**, **471**, and **742** of brackets **46**A, **47**A, and **72** respectively, with the worms **741** and **742** inserted onto both ends of the rotation shaft **73**. The bevel gear **751** is inserted onto the intermediate part of the rotation shaft **73**, which passes though the lateral bearing.

[0434] Reference numbers **761** and **762** indicate worm gears each fixed on the bottom end of spindles **442**, **452** of swinging arms **44**, **45**, the worm gears being pivoted in vertical bearings **462**, **472** and engaging with the worms **741**, **742**.

[0435] Reference **752** refers to a bevel gear engaging a bevel gear **751**. The bevel gear is fitted on the top end of the rotation shaft **22** fitted to bearing **722** of the middle bracket **72**. A hook **23** is formed on the bottom end of rotation shaft **22**.

[0436] Thus, swinging arms **44** and **45** are interlockingly parallel-rotated by forward and reverse rotating the rotation shaft by attaching an operating lever on the hook **23**.

Ninth Example of Canvas Take-Up Shaft

[0437] Now, a canvas take-up shaft J**9**, which is the driven side shown in FIGS. **45**A and **45**B, is explained below.

[0438] Reference number **77** indicates a coil spring inserted into the latter half of the inner rotation shaft **12**. Reference number **78** refers to a disc-shaped spring-stopping socket. The fore end and the rear end of the coil spring **771** are inserted into a hole **782** made in an off center position of the spring stopping socket, and a hole **192** made in an off center position of the end cap **19**, respectively.

[0439] Reference number **79** indicates a fixed axle extending from a central hole **190** of the end cap **19** through a coil spring **77**. The fore end **791** and rear end **792** of the axle are fitted into the central hole **781** of the socket **78**, and the central hole of a bearing **161** of the end cap **16**, respectively.

[0440] Thus, when the inner rotation shaft **12** is rotated via outer roller **13**, the coil spring **77** is compressed gradually via the end cap **19** of the rotation shaft **12**, and then elastic energy is accumulated in the coil spring **77**, or the accumulated elastic energy is released.

[0441] Specifically, when winding of the canvas G**1**-G**4** on the canvas take-up shaft J**9** is completed, the elastic energy is released with some preload remaining.

[0442] On the other hand, as the canvas G**1**-G**4** is extended, the elastic energy is gradually accumulated in the coil spring **77**, and the maximum elastic biasing force is accumulated therein at the completion of the extension.

Effect of Awning Device of Sixth Embodiment

[0443] Thus, as shown in FIGS. **42** and **43**, to wind the extended corner canvas G**1**-G**4** on the canvas take-up shaft J**9**, an operating lever (not shown) engaged to a hook **23** of the manually operated unit is rotated. The rotation shaft **73** is rotated via the engagement of spur gears **752** and **751**, while swinging arms **44** and **45** are arcuately rotated rearward via the engagement of the worms **741** and **742** and the worm gears **761** and **762**, so that the front bar **36** is translated obliquely rearward.

[0444] In the above case, tensioning force works on the front bar **36** with enough elastic energy to wind the extended corner canvas G**1**-G**4**.

[0445] Therefore, when the restraint force by swinging arms **44**, **45** against the extended canvas G**1**-G**4** fades, the elastic biasing force of the coil spring **77** with the maximum elastic energy accumulation at the completion of the extension is released.

[0446] Thereby the inner rotation shaft **12** and the outer roller **13** are integrally rotated to wind the canvas top side **1** and **1**A fixed on the outer roller **13**.

[0447] In this way, the swinging arms **44** and **45**, which is the driven side, are rotated rearward and the front bar **36** is translated obliquely rearward while the tensile force of the connection wires **34**, **35** is converted to the rearward sliding force of the outer roller **13** and the outer roller **13** is moved rearward in the axis direction of the inner rotation shaft **12**.

[0448] Thereby the canvas body part R**1** is wound on the outer roller **13**, and the canvas extension R**2**, R**3** is wound on the inner rotation shaft **12** exposed by the rearward movement of the outer roller **13**.

[0449] On the other hand, when the canvas G**1**-G**4** wound on the canvas take-up shaft J**9** is to be extended toward the corner space of the building, the user rotates the operating lever in the opposite direction from the above. The two swinging arms **44** and **45** folded by the wall are accurately rotated in the spreading direction thereof, and the front bar **36** attached to the fore ends of the arms is pushed and translated toward the corner space obliquely forward.

[0450] In addition, the inner rotation shaft **12** and the outer roller **13** are integrally reverse rotated, the corner canvas G**1** wound on the canvas take-up shaft J**1** is unwound, and the elastic energy is accumulated by compressing the coil spring **77**.

[0451] In addition, the sliding force to the outer roller **13** in the forward direction is actuated by the rotation force of the swinging arms **44**, **45** affecting the front bar **36** and the tensile force of the connection wires **34**, **35** unwound. Thereby the outer roller **13** is reverse rotated with forward movement along the inner rotation shaft **12**.

[0452] In this manner the corner canvas G**1** is smoothly extended towards the corner space obliquely forward by the extension of the front bar **36** with the elastic biasing force of the swinging arms **44**, **45**, by the integral reverse rotation of the inner rotation member **12** and the outer roller **13**, and by the forward movement of the outer roller **13**.

Tenth Example of Canvas Take-Up Shaft

[0453] Now, a canvas take-up shaft J**10** of the driven side of the tenth example shown FIGS. **46**A and **46**B is explained.

[0454] Reference character **25**C refers to an end cap fittingly fixed on the rear end of the outer roller **13**, the end cap having a pipe shaft **81** projected rearward thereon.

[0455] Reference number **82** is a cover plate fitted onto the pipe shaft **81**. Reference number **83** points to a whorl spring made of a spirally-wound leaf spring, the whorl spring fittingly supported by the pipe shaft **81**. The spring end **831** of the whorl spring is fitted into a slit **811**.

[0456] Reference number **84** indicates a slide case fixed at the rear end of the outer roller **13**, the slide case being fitted into a pipe shaft **81** as the storage case of the whorl spring **83**,

and being moved forward and rearward with the sliding guidance of the internal surface of the casing **11**. Reference number **842** shows a locking portion, which is projected from a corner of the slide case **84**, and which lockingly fixes an outer spring end **832** of the whorl spring **83**.

[0457] Reference number **85** refers to a retaining washer, which is fitted on a rear end of the pipe shaft **81**, and which retains and supports the cover plate **82**, the whorl spring **83**, and the slide case **84**, which are sequentially fitted on to the pipe shaft **81**. Reference numbers **241** and **251** indicate through holes for the inner fixed shaft **12**B. Reference number **821** is associated with a hole in the cover plates **82**. Reference number **841** indicates a hole in a slide case.

[0458] Thus, when the outer roller **13** slidably fitted on, supported, and guided by the inner fixed shaft **12**B is rotated, the whorl spring **83** is gradually compressed via the end cap **25**C of the outer roller **13**, and the elastic energy is accumulated in the spring **83** or the accumulated elastic energy is released.

[0459] Specifically, when the winding of the canvas G**1**-G**4** on the canvas take-up shaft J**10** is completed, the elastic energy is released with some pre-load remaining.

[0460] On the other hand, as the canvas G**1**-G**4** is extended, the elastic energy is gradually accumulated in the coil spring **77**, and the maximum elastic biasing force is accumulated therein at the completion of the extension.

[0461] In addition, in case that the canvas take-up shaft J**7**, J**8** shown respectively in FIGS. **40**A and **40**B, and FIGS. **41**A and **41**B is the driven side, the drive gear **68** is not required, and the winding and unwinding of the corner canvas G**1**-G**4** is achieved by accumulating or releasing the elastic energy in the whorl spring by driving the rotating rod gear **70** via the outer roller **13** by incorporating the whorl spring (not shown) in the storage case **16**A as shown in FIG. **46**B.

Modified Example of the Adhesive Winding Prevention Means

Eleventh Example of Canvas Take-Up Shaft

[0462] In FIG. **47** showing the canvas take-up shaft J**11** of the eleventh example, the reference character **56**A indicates an elastic belt made of rubber (which may also be a rope). Around four of the elastic belts are incorporated between the external perimeter surface of the inner rotation shaft **12** and the internal perimeter surface of the outer roller **13**.

[0463] The elastic belts **56** are each inserted into and between a guide projection **172** of the external perimeter surface of the inner rotation shaft **12** and the internal perimeter surface of the outer roller **13**, in the axis direction. The fore and rear ends of each elastic belt are drawn out along a belt passage **265** of end caps **24**B and **25**B. The fore end of each belt is turned inside through a belt passage **183** of the end cap **18**B, and is retained with a clip **561** in the inside of the end cap **18**B.

[0464] Further, the rear end of each belt is drawn out from the belt passage **265** of the end cap **25**B, and retained with a clip **562**.

[0465] Further, all of the elastic belts **56**A are incorporated in the same manner as the above, and thereby four elastic belts **56**A are disposed across the inner rotation shaft **12** in the axis direction.

[0466] When the outer roller is moved rearward, correspondingly the elastic belts **56**A are extended along the guide projections **172** of the inner rotation shaft **12** and exposed, and the canvas extension R**2**, R**3** is indirectly wound on the external perimeter of the elastic belt.

[0467] As a result, the smooth forward movement of the outer roller **13** is ensured, and the wear of the canvas extension R**2**, R**3** is prevented.

[0468] In addition, an elastic rope instead of the elastic belt **56**A may be incorporated in the canvas take-up shaft J**4** shown in FIGS. **22**-**24**.

Twelfth Example of Canvas Take-Up Shaft

[0469] Now, in FIGS. **48**A and **48**B showing the canvas take-up shaft of the twelfth example, reference number **90** indicates a coil spring wound on the fore end of the inner rotation shaft **12**, **12**A or the inner rotation fixed shaft **12**B. When the canvas is extended, the coil spring is housed in a compressed state in the fore end of the outer roller **13** moved forward as shown in FIG. **48**A.

[0470] At the time of winding of the corner canvas G**1**-G**4**, as the outer roller **13** is moved rearward, the coil spring **90** is extended on the external perimeter surface of the inner shaft **12**, **12**A, **12**B and exposed, and the canvas extension R**2**, R**3** is thus indirectly wound on the external perimeter surface of the coil spring.

[0471] Thereby, the smooth rearward and rearward movement of the outer roller **13** is ensured.

Thirteenth Example of Canvas Take-Up Shaft

[0472] In FIG. **49** showing the canvas take-up shaft J**13** of the thirteenth example, reference number **94** is a sheet magnet that is attached on the front half of the external perimeter surface, and reference number **95** is a sheet magnet fixed on the edge of the oblique side **3**, **5**, **5**A of the corner canvas G**1**-G**4**.

[0473] In addition, the outerwear roller **13** is made of non-magnetic material.

[0474] Thus, when the canvas extension R**2**, R**3** are wound on the external perimeter surface of the inner shaft **12**, **12**A, **12**B exposed by the rearward movement of the outer roller **13**, adhesive winding is prevented because the canvas oblique side **3**, **5**, **5**A is magnetically levitated with the magnetic force.

[0475] In the above case, a sheet magnet **94** may be fixed across the overall length of the external perimeter surface of the inner shaft **12**, **12**A, **12**B.

[0476] In that case, the outer roller **13** is supported in a state of magnetic levitation against the inner shaft **12**, **12**A, **12**B, and the sliding friction at the time of the forward and rearward movement of the outer roller **13** is eliminated or substantially reduced, which makes the forward and rearward movement of the outer roller **13** dramatically smoother.

Other Modified Examples of Corner Canvas

[0477] Finally, some modifications of the corner canvas G**1**-G**4** are explained below. In FIGS. **50**A-**50**C, Reference number **86** indicates an edge cloth fixed on the front surface of the canvas oblique side **3**, **5**, **5**A, the thickness of the edge cloth increasing continuously toward the canvas bottom side **2**, **2**A from the canvas top side.

[0478] Thus, when the canvas extension R**2**, R**3** is wound into a roll on the external perimeter surface of the inner rotation shaft **12**, **12**A or the inner fixed shaft **12**B exposed by

the rearward movement of the outer roller **13**, the sheet **86** is wound in a helically rising condition as shown in the cross-sectional view of FIG. **50**C.

[0479] Thereby, it prevents the canvas extension R**2**, R**3** from being adhesively wound on the external perimeter surface of the inner rotation shaft **12**, **12**A or the inner fixed shaft **12**B, and thus the edge sheet **86** wound helically is utilized as a spacer, which ensures the smooth movement of the outer roller **13**.

[0480] Further, although the edge sheet **86** is formed to be continuously thicker in the thickness in the above manner, it may be formed to be thicker step-by-step, e.g., every winding or every two windings.

[0481] In FIG. **51**, reference number **89** refers to a band plate rim with spring elastic. The plurality of the band plates is fixed by sewing in the canvas in a length wise, parallel densely arrangement spaced apart from one another and extending from the canvas main body R**1** to the canvas extension R**2**, R**3**, or they are inserted into the inside of the pouch passage formed in a lengthwise, parallel arrangement.

[0482] Thus, when the canvas G**1**-G**4** provided with the ribs **89** is wound on the outer roller **13**, they are wound with some clearance between the inner shaft **12** having a smaller diameter than the outer roller **13** and the external perimeter surface of the canvas extension R**2**, R**3**.

[0483] Therefore, the smooth movement of the outer roller **13** is ensured, and the wear of the canvas extension R**2**, R**3** is prevented.

[0484] In FIGS. **52**A and **52**B, reference numbers **87** and **88** indicate connection belts fixed by sewing on the diagonal lines connecting the corners of the canvas main body R**1**. The ends of the belts, which project from the canvas R**1**, have holes **871**, **872**, **881** and **882**.

[0485] Thus, to attach the canvas top side **1**, **1**A of the corner canvas G**1**-G**4** and the canvas bottom side **2**, **2**A on the outer roller **13** and the front bar **36**, **36**A respectively, they are fixed by screwing a screw (not shown) into each engagement hole **271**, **272**, **39**, **40**.

[0486] Although the connection belts **87** and **88** are fixed on the canvas main body R**1** in the form of a letter of X in the above case, the connection belts **87**A and **88**B may be fixed by sewing in the inverted V as shown in FIG. **53**, ropes may be used instead of the belts, or the connection wires **34**, **35** are fixed in the form of a letter of X or V.

INDUSTRIAL APPLICABILITY

[0487] The present invention provides the corner canvas and the take-up shaft therefore, and corner awning device, as described above. Thus, an epoch-making novel product is provided to the industry, which dramatically enhances ornamentality and external appearance in the corners of various buildings and which abounds in the technical interests and utility as a corner awning device.

1-109. (canceled)

110. A corner canvas take up shaft to wind up or unwind a corner canvas, the corner canvas take up shaft comprising:
- an inner shaft; and
- an outer roller axially movable on and supported with the inner shaft.

111. A corner canvas take up shaft according to claim **110**, wherein the corner canvas comprises:
- a rectangular canvas main body; and
- a canvas extension extended from one side of the canvas main body.

112. A corner canvas take up shaft according to claim **111**, wherein the outer roller is slidably and rotatably fitted on the inner shaft;
- the outer roller winds the rectangular canvas main body thereon;
- the inner shaft is exposed by a set back movement of the outer roller to a canvas extension; and
- wherein the corner canvas take up shaft moves forward while rotating the outer roller to unwind the corner canvas when the corner canvas is to be unwound.

113. A corner canvas take up shaft according to claim **110**, wherein the inner shaft is either an inner rotation shaft or an inner fixed shaft and
- the outer roller is slidably and rotatably fitted on and supported by the inner rotation shaft or the inner fixed shaft.

114. A corner canvas take up shaft for use with a corner canvas, the corner canvas take up shaft comprising:
- a casing for storing the corner canvas;
- a canvas outlet formed open in a front surface of the casing;
- end caps fitted to the casing;
- an inner rotation shaft having guide grooves and guide projections, the inner rotation shaft being supported by bearings in the end caps;
- an outer roller slidingly and rotatably fitted on and supported by the inner rotation shaft; and
- guide projections and guide grooves formed on an internal perimeter surface of the end caps and slidably engaging the guide grooves and the guide projections of the inner rotation shaft.

115. A corner canvas take up shaft for use with a corner canvas, the corner canvas take up shaft comprising
- a casing for storing the corner canvas;
- a canvas outlet formed open in a front of the casing;
- an end cap fitted to the casing;
- an inner fixed shaft fixed to the end cap;
- an outer roller slidably and rotatably fitted on and supported by the inner fixed shaft;
- a spur gear fitted to a rear end of the outer roller;
- a rod gear attached on an inner wall of the casing, the rod gear engaging the spur gear;
- wherein an electric drive unit for a driving gear engaging the rod gear incorporated in a storing casing, or a manually operated or electrically operated drive unit forward/reverse rotating the rod gear.

116. A corner canvas take up shaft for use with a corner canvas, the corner canvas take up shaft comprising:
- a casing for storing the corner canvas;
- a canvas outlet formed open in a front of the casing;
- an end cap fitted to the casing;
- an inner fixed shaft fixed to the end cap;
- an outer roller slidably and rotatably fitted on and supported by the inner fixed shaft;
- a pipe shaft projected from an end cap fitted to a rear end of the outer roller; and
- a whorl spring fitted onto the pipe shaft;
- wherein an inner spring end of the whorl spring is locked to the pipe shaft; and
- an outer spring end of the whorl spring is locked to a slide case fitted on the pipe shaft.

117. A corner canvas take up shaft according to claim **111**, further comprising means for preventing the canvas extension from adherently winding on the surface of the inner shaft exposed by the rearward movement of the outer roller.

118. A corner canvas take up shaft according to claim **117**, wherein a coil spring is wound around a fore end of the inner shaft;

the coil spring is exposed as extending on an outer perimeter surface of the inner shaft with rearward movement of the outer roller; and

the canvas extension is wound on the outer perimeter surface of the inner shaft.

119. A corner canvas take up shaft according to claim **117**, wherein the inner shaft is inner rotation shaft; and

a slide rope is provided in a tensioned condition along a guide groove formed along an axis of the inner rotation shaft;

and the outer perimeter surface of the inner rotation shaft is raised by the slide rope.

120. A corner canvas take up shaft according to claim **117**, wherein the inner shaft is an inner rotation shaft;

a slide belt or an elastic belt is provided in a tensioned condition along a guide projection formed along the axis of the inner rotation shaft; and

the outer perimeter surface of the inner rotation shaft is raised by the slide belt or the elastic belt.

121. A corner awning device for use on a building, the corner awning device comprising:

a corner canvas; and

a canvas take up shaft structured to wind and unwind the corner canvas, the canvas take up shaft comprising:

an inner shaft; and

an outer roller axially movable on and supported with the inner shaft; a front

bar supporting a bottom side of the corner canvas; and

swinging arms structured to push the front bar parallel obliquely forward or draw the front bar obliquely rearward to fold the front bar.

122. A corner awning device according to claim **121**, wherein when the corner canvas is wound to be stored, the front bar is transferred parallel obliquely rearward by rotating the swinging arms rearward, while the outer roller rotates to wind a canvas main body of the corner canvas and moves rearward with the sliding guidance of the inner shaft;

a canvas extension of the corner canvas is wound on the inner shaft exposed by the rearward movement of the outer roller;

when the corner canvas is unwound to extend, the front bar is pushed parallel obliquely forward by rotating the swinging arms; and

the corner canvas wound on the canvas take up shaft is unwound while the outer roller is moved forward toward a fore end of the inner shaft, and thereby the canvas extension is extended over the corner space.

123. A corner awning device according to claim **121**, wherein the swinging arms comprise a pair of the swinging in parallel;

a bottom end of one of the swinging arms is attached adjacent to a corner of the building while a fore end of the swinging arm is attached adjacent to an intermediate part of the front bar; and

a bottom end of an other swinging arm is attached to a position spaced apart from adjacent the corner while a fore end of the other swinging arm is attached adjacent to a rear end of the front bar.

124. A corner awning device according to claim **121**, wherein the swinging arms comprise a pair of the swinging in parallel;

a slide rail is slidably fitted to and supported by the front bar;

a bottom end of one of the swinging arms is attached adjacent to a corner of the building while a fore end of the swinging arm is attached adjacent to a intermediate part or a fore end of the slide rail;

and a bottom end of an other swinging arm is attached to a position spaced apart from adjacent the corner while a fore end of the other swinging arm is attached adjacent to the rear end of the slide rail.

125. A corner awning device according to claim **121**, wherein the swinging arms are a pair of two-phase swinging arms rotating in parallel with two-phase action; the swing arms comprising a rear arm and a fore arm foldably connected with each other;

an intermediate part of the swinging arms is connected with a connection rod;

a bottom end of the rear arm of one of the swing arms is attached adjacent to a corner of the building while a fore end of the fore arm is attached adjacent to an intermediate part of the front bar; and

a bottom end of the rear arm of an other of the swinging arms is attached to a place spaced apart from the corner position while a fore end of the fore arm is attached adjacent to a rear end of the front bar.

126. A corner awning device according to claim **121**, further comprising:

a rectangular canvas; and

a second canvas take up shaft for the rectangular canvas;

wherein a fore end of the second canvas take up shaft is installed underneath or above a latter half of the corner canvas take up shaft in a overlapping manner.

127. A corner awning device according to claim **121**, further comprising:

a second corner canvas;

a second canvas take up shaft structured to wind and unwind the second corner canvas, the second canvas take up shaft being similar in structure to the canvas take up shaft;

wherein the corner canvas and the corner canvas take up shaft are installed on one side of a corner of the building; and

the second corner canvas and the second canvas take up shaft are installed on an other side of the corner of the building.

128. A corner awning device according to claim **121**, further comprising:

a second corner canvas;

a second canvas take up shaft structured to wind and unwind the second corner canvas, the second canvas take up shaft being similar in structure to the canvas take up shaft;

wherein the swing arms comprise telescopic swinging arms;

wherein the corner canvas and the corner canvas take up shaft are installed on one side of a corner of the building;

the second corner canvas and the second canvas take up shaft are installed on an other side of the corner of the building;

the corner canvas and the second corner canvas are tensionally supported by tension members;

the tension members comprise connection wires or connection belts formed in the shape of the letter X or V; and

fore ends of the front bars are fixed to be connected with each other.

129. A corner awning device according to claim **128**, wherein a position adjacent to a lower end of a canvas oblique side of each corner canvas is connected to each other with an elastic member structured to prevent a jutted out portion, beyond a line through one end of a canvas top side attached to outer roller and one end of canvas bottom side attached to the front bar, from hanging downwards.

130. A corner awning device according to claim **121**, further comprising:

a second corner canvas;

a second canvas take up shaft structured to wind and unwind the second corner canvas, the second canvas take up shaft being similar in structure to the canvas take up shaft;

slide rails slidably fitted into and supported by the front bars;

wherein the corner canvas and the corner canvas take up shaft are installed on one side of a corner of the building; and

the second corner canvas and the second canvas take up shaft are installed on an other side of the corner of the building;

fore ends of the swinging arms are attached to an intermediate part or a fore end of the slide rail, and the rear end of the slide rail;

the corner canvas and the second corner canvas are attached between the respective outer rollers and front bars of each corner canvas take up shaft; and

the fore ends of the front bars are fixed to connect each other.

131. A corner awning device according to claim **121**, further comprising:

a second corner canvas;

a second canvas take up shaft structured to wind and unwind the second corner canvas, the second canvas take up shaft being similar in structure to the canvas take up shaft;

wherein the swinging arms are bi-foldable swinging arms that bend and stretch;

the swinging arms are each formed with a rear arm and a front arm, both of which are bi-foldably connected with each other;

the swinging arms are connected with each other by a connection rod between bi-foldable joints thereof;

a bottom end of the rear arm of one of the swinging arm is attached adjacent to a corner of the building;

a fore end of the front arm of the one of the swinging arms is attached toward a fore end of the front bar;

a bottom end of the rear arm of an other of the swinging arms is attached at a position spaced apart from the corner;

a fore end of the front arm is attached toward an intermediate portion of the front bar;

the corner canvas and the corner canvas take up shaft are installed on one side of a corner of the building; and

the second corner canvas and the second canvas take up shaft are installed on an other side of the corner of the building;

the corner canvas and the second corner canvas are attached between the respective outer rollers and front bars of each corner canvas take up shaft; and

the fore ends of the front bars are fixed to be connected with each other.

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