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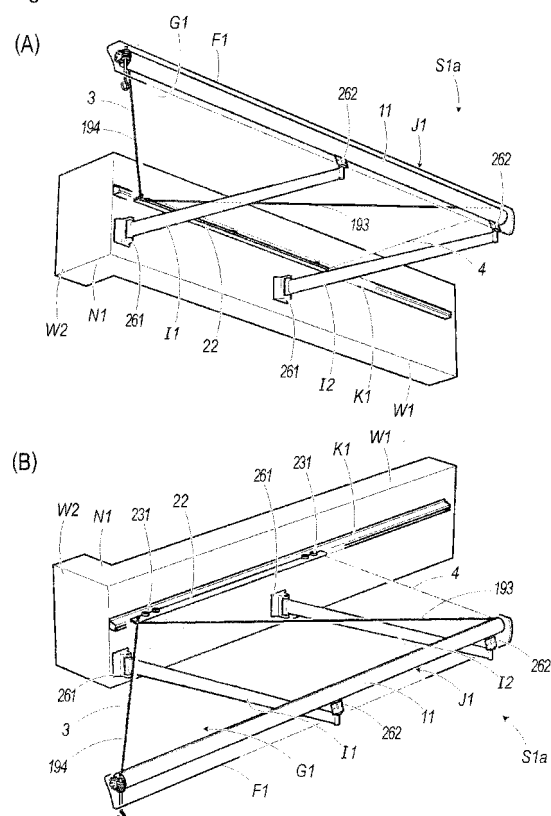
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(54) **MOVABLE AWNING DEVICE**

(57) A roller supporting frame or a transverse guide rail is attached to the front end portion of a foldable arm, and the roller supporting frame is attached to the guide rail in such a manner as to be freely slidable. A winding roller for a projected corner canvas is supported by the roller supporting frame through bearings, and a slider is attached to the transverse guide frame provided on the wall side, and thus, a movable awning device having a front winding structure where the top hem of the projected corner canvas is attached to the slider is provided. A complex awning device where an awning device for a projected corner having a front winding structure for a projected corner canvas and a rectangular awning device having a rear winding structure for a rectangular canvas are combined and integrated is also provided. As a result, the appearance around buildings which include a corner space portion in the projected corner portion can be greatly improved, and a pioneering, original product which is technically interesting and useful as a movable awning device is provided in the art.

Fig.2



Description

Technical Field

[0001] The present invention relates to a movable awning device having a structure for the front winding structure of a projected corner canvas which is used to cover a corner space portion of a projected corner portion of various buildings and the peripheral appearance of buildings in the vicinity of a projected corner so as to provide a good appearance.

Background Art

[0002] The present inventors have recently provided an awning device for a corner where a winding roller supported through bearings in a wall portion close to a corner in a projected corner portion of a building is formed of an inner roller and an outer roller which is engaged with and inserted on the inner roller in such a manner so as to be freely slidable, so that a corner canvas wound around the winding roller (hereinafter referred to as projected corner canvas) can be translated and pushed out diagonally forward to corner space portion while being unwound and spread or, conversely, a projected corner canvas that is projected into a corner space portion that can be drawn in parallel diagonally backward while being wound around a winding roller to store it, in order to cover the outside of the building including a corner space portion in a projected corner portion of the building (see following Patent Document 1).

[0003] Thereafter, a complex awning device which is complex, so that a projected corner portion of a building and a linear section in the vicinity thereof, a projected corner portion and a recessed corner portion, as well as the outside of the building, including one projected corner portion and another projected corner portion, can be covered with a projected corner canvas, a rectangular canvas and a recessed corner canvas or the like so that the appearance becomes better, is provided in the following Prior Art Application 2, which is currently not disclosed and known.

[0004] Subsequently, in the following Prior Art Applications 3 and 4, single type and complex type movable awning devices having a transversely slidable structure where a projected corner canvas that is spread from a wall portion forward and then transversely slid toward the corner space portion in a projected corner portion while maintaining a spread state and wound up after being moved backward at the time of storage are provided.

[0005] In addition, in the following Prior Art Application 5, a complex awning device where a number of canvases, including a projected corner canvas, are wound around a single winding roller in such a manner so as to overlap and unwind, and a spread projected corner canvas from among the number of canvases that is transversely slidable, is provided.

[0006] Furthermore, in the following Prior Art Applica-

tion 6, a movable awning device where a projected corner canvas is freely and transversely slidable along a winding roller and the front bar of the projected corner canvas is movable in a parallel forward and backward direction by means of foldable arms, and the front bar of a projected corner canvas that is spread forward and transversely slidable, is provided.

[0007] Meanwhile, the awning devices disclosed in the following Patent Documents 2 to 4 are spread to the front when a front support frame is attached in the front end portion of the foldable arms which are freely foldable in two, a winding roller for a rectangular canvas is supported by the foldable arms through bearings, an attachment axis for supporting the rear end portion of the rectangular canvas is attached to a wall portion, and the rectangular canvas wound around the above described winding roller is unwound or, conversely, translated toward the wall portion so as to be stored in the wall when the spread rectangular canvas is wound around a winding roller and the foldable arms are folded in two as a whole. In other words, a movable awning device having a front winding structure for a rectangular canvas is disclosed.

Document Information List of Prior Art

[0008]

Patent Document 1: Japanese Translation of International Unexamined Patent Publication WO 2006/003720A1 (disclosed January 12th, 2006) (Prior Art Application 1: PCT/JP2004/009751)

Patent Document 2: Japanese Utility Model Application Laid-Open No. 61-65131 (laid open: May 2nd, 1986)

Patent Document 3: Japanese Utility Model Application Laid-Open No. 61-65132 (laid open: May 2nd, 1986)

Patent Document 4: Japanese Utility Model Application Laid-Open No. 4-11723 (laid open: January 30th, 1992)

List of Prior Art Applications (not laid-open, unknown)

[0009]

2 ... PCT/JP2005/004843 (filed March 10th, 2005)

3 ...PCT/JP2005/018599 (filed October 3rd, 2005)

4 ...PCT/JP2005/018997 (filed October 11th, 2005)

5 ... PCT/JP2005/023688 (filed December 13th, 2005)

6 ... PCT/JP2006/300323 (filed January 6th, 2006)

Disclosure of the Invention

Problem to Be Solved by the Invention

[0010] The present inventors do not recognize any special technical problems with the movable awning de-

vices having a rear winding structure described in Patent Document 1 (Prior Art Application 1) and Prior Art Applications 2 to 6, which relate to their own inventions at present, and recognize technological usefulness in the movable awning devices having a front winding structure as shown in Patent Documents 2 to 4.

[0011] Therefore, the focus of the present invention is to provide a single type and complex type movable awning devices which are novel and technically interesting for covering the outer periphery of a building including a corner space portion of a projected corner portion so as to provide a good appearance in the case where an awning device having a front winding structure is used as a base in the field.

[0012] In addition, an accompanying device for addressing various related technical problems which may arise in order to implement the present invention is also provided.

[0013] In the following, single types are referred to as single device or single awning device, and complex types are referred to as complex device or complex awning device. Means for Solving the Problem

[0014] Two inventions concerning single type movable awning devices S1a, S1b, S2a, S2b, S3a and S3b (hereinafter referred to as first invention and second invention) as well as the effects thereof are described in the following.

[0015] Here, the symbols attached within the parentheses at the end of each paragraph indicate the embodiment of the disclosed single device or complex device.

[0016] The first invention is characterized in that (1) ... a roller supporting frame F1 is attached to the front end portion of foldable arms I1, I2, L1, L2, V1 and V2, winding rollers J1 to J3 for winding and unwinding a projected corner canvas G1 are supported by the roller supporting frame F1 through bearings, a slider 22 is attached to a transverse guide frame K1 provided on the wall side, and the top hem 1 of the above described projected corner canvas G1 is attached to the slider 22 (S1a, S1b, S2a, S2b, S3a, and S3b).

[0017] As a result, the corner space portion in the projected corner portion N1 can be covered so as to provide a good appearance, or the canvas can be stored compactly without protruding from the projected corner portion N1 and with good appearance in the vicinity of the corner.

[0018] The concrete configuration of the first invention and various dependent inventions relating to the operation thereof are listed below.

(2) ... The foldable arms described in the above (1) are straight I-shaped arms I1, I2 which are formed so as to be parallel to each other at a distance from each other, the projected corner canvas G1 is wound and unwound around the winding rollers J1 to J3 so that the roller supporting frame F1 is translated diagonally, and the slider 22 of the canvas top hem 1 slides in both directions, to the front and to the rear,

of the transverse guide frame K1 in the configuration (S1a).

(3) ... The projected corner canvas G1 wound around the winding rollers J1 to J3 described in the above (1) and (2) is unwound so as to be spread while the winding rollers J1 to J3 and the roller supporting frame F1 are pushed out in parallel toward the diagonally front corner space portion so that the slider 22 of the canvas top hem 1 slides forward to the front end portion of the transverse guide frame K1 (S1a).

(4) ... The projected corner canvas G1 which protrudes in the corner space portion described in the above (1) and (2) is wound around the winding rollers J1, J2 while the winding rollers J1, J2 and the roller supporting frame F1 thereof are drawn diagonally backward in parallel so as to be stored, and the slider 22 of the canvas top hem 1 slides backward to the rear of the transverse guide frame K1 in the configuration (S1a).

(5) ... The base end portion of one I-shaped arm I1 from among the I-shaped arms I1, I2 described in the above (2) is attached in the vicinity of the corner of the projected corner portion N1 and the front end portion of the I-shaped arm I1 is attached in the vicinity of the middle of the roller supporting frame F1, while the base end portion thereof is attached in the middle of the vicinity of the transverse guide frame K1 and the front end portion the I2 is attached in the vicinity of the rear end of the roller supporting frame F1 (S1a).

In the above 2 to 5, unwinding and spreading toward the outside of the building including a corner space portion of the projected corner canvas G1, as well as winding and storage in the wall of the projected corner canvas G1 spread outward including in the space portion, can be carried out stably and smoothly without fail.

(6) ... The foldable arms described in the above (1) are a pair of L-shaped arms L1, L2 which rotate in parallel through an operation having two stages, and these L-shaped arms L1, L2 are formed of a rear link 271 and a front link 272 which are connected so as to be freely foldable, where the connection portion which is foldable in two are formed of the links connected through a connection rod 273 so that the protruded corner canvas G1 can be wound and unwound around the winding rollers J1, J2, and thus, the above described L-shaped arms L1, L2 are bent and extended through an operation having two stages, and thereby, the roller supporting frame F1 translates in a diagonal direction and the slider 22 of the top hem 1 of the canvas slides in either the front or rear direction of the transverse guide frame K1 in the configuration (S1b).

(7) ... The base end portion of the rear link 271 of the L-shaped arm L1, from among the L-shaped arms L1, L2 described in the above (6), is attached in the vicinity of the corner of the projected corner

portion N1, the front end portion of the front link 272 is attached in the vicinity of the middle of the roller supporting frame F1, the base end portion of the rear link 271 of the L-shaped arm L2 is attached to a location at an appropriate distance from the above described location of the corner, the front end portion of the front link 272 of L2 is attached in the vicinity of the rear end of the roller supporting frame F1, a spring having a relatively weak elasticity is incorporated in the base end portion of the above described rear link 271, and a spring having a relatively strong elasticity is incorporated in the connection portion which is foldable in two between the rear link 271 and the front link 272 (S1b).

(8) ... When the spread projected corner canvas G1, as described in the above (6) and (7), is wound around the winding rollers J1, J2, first, the pair of rear links 271, which are pressed by a spring having a somewhat weaker elasticity, rotate in parallel to the rear against the pressure of the elasticity, and thus, the roller supporting frame F1 is translated diagonally to the rear so that the projected corner canvas G1 is folded, and then, the pair of front links 272, which are pressed by a spring having a somewhat stronger elasticity, rotate in parallel to the rear against the pressure of the elasticity, and thus, the roller supporting frame F1 is translated further diagonally backward, and the L-shaped arms L1, L2 are stretched to an approximate linear form and the projected corner canvas G1 is folded in the configuration (S1b).

(9) ... When the projected corner canvas G1 wound around the winding rollers J1, J2 described in the above (6) and (7) is unwound, first, the pair of front links 272 which are pressed by a spring having a somewhat stronger elasticity are rotated in parallel to the front so as to spread at a predetermined angle by means of the spring having the elasticity, and thus, the roller supporting frame F1 is pushed out while being translated diagonally to the front, and then, the pair of rear links 271 which are pressed by a spring having a somewhat weaker elasticity are rotated in parallel so as to spread at a predetermined angle, and thus, the roller supporting frame F1 is pushed out further in parallel diagonally forward in the configuration (S1b).

Through the above 6 to 9, the unwinding of the projected corner canvas G1 and the operation of spreading the projected corner canvas G1 to the outer periphery of the building, including a corner space portion, are carried out through an operation having two stages, and the winding and storing of the projected corner canvas G1 that has been spread to the outer periphery of the building, including the space portion, are carried out stably and smoothly without fail through an operation having two stages.

In particular, it is possible to have the operation of spreading the projected corner canvas G1 into the

corner space portion further diagonally forward in comparison with the case of I-shaped arms I1, I2 described in the above (2) to (5).

(10) ... The foldable arms described in the above (1) are V-shaped arms V1, V2 where the rear link 251 and the front link 252 are connected so as to be freely foldable in two, and the projected corner canvas G1 is wound or unwound around the winding rollers J1, J2 so that the roller supporting frame F1 translates in the front and rear directions, and the roller supporting frame F1 of the projected corner canvas G1 that has been spread to the front transverses, and thus, the slider 22 of the top hem 1 of the canvas slides in either direction, front or rear, of the transverse guide frame K1 in the configuration (S2a, S2b).

(11) ... The projected corner canvas G1 wound around the winding rollers J1, J2 described in the above (1) and (10) is unwound and spread, and in addition, the roller supporting frame F1 of the above described winding rollers J1, J2 transverses toward the corner space portion so that the slider 22 of the top hem 1 of the canvas slides forward along the transverse guide frame K1, and thus, the projected corner canvas G1 stretches out to the outer periphery of the building including the above described corner space portion (S2a, S2b).

(12) ... The projected corner canvas G1 that has stretched out into the corner space portion described in the above (10) is maintained in a spread state while the winding rollers J1, J2 and the roller supporting frame F1 thereof transverse to the rear of the device, and thus, the slider 22 of the top hem 1 of the canvas slides to the rear of the transverse guide frame K1, and in addition, the spread projected corner canvas G1 is wound around the winding rollers J1, J2 (S2a, S2b).

Through the above 10 to 12, the unwinding operation of the projected corner canvas G1 and the operation of pushing out the spread projected corner canvas G1 into the corner space portion are carried out stably and smoothly without fail.

The operation of withdrawing the projected corner canvas G1 from the corner space portion and the operation of winding and storing the projected corner canvas G1 are, of course, carried out smoothly.

The second invention is characterized in that (13) ... A transverse guide rail R1 is attached to the front end portion of the foldable arms V1, V2, Y1 and V2, a roller supporting frame F1a is attached to the guide rail R1 so as to be freely slidable, winding rollers J1 to J3 for winding or unwinding the projected corner canvas G1 are supported by the roller supporting frame F1a through bearings, a slider 22 is attached to the transverse guide frame K1 provided on the wall side, and the top hem 1 of the above described projected corner canvas G1 is attached to the slider 22 (S3a, S3b).

As a result, the outside around the building, which

includes the corner space portion of the projected corner portion N1, is covered so as to provide a good appearance, and furthermore, it is possible to contain the entirety of the device in a wall portion in a compact manner with a good appearance.

The concrete configuration of the second invention and various dependent inventions relating to the operation thereof are listed below.

(14) ... The foldable arms described in the above (13) are V-shaped arms V1, V2 where the rear link 251 and the front link 252 are connected so as to be freely foldable in two, and the projected corner canvas G1 is wound and unwound around the winding rollers J1 to J3 so that the roller supporting frame F1a translates in the front and rear directions, and the roller supporting frame F1a of the spread projected corner canvas G1 is operated so as to slide along the transverse guide rail R1, and thus, the slider 22 of the top hem 1 of the canvas slides in either direction, to the front or rear, of the transverse guide frame K1 (S3a).

(15) ... The base end portions of the V-shaped arms V1, V2 described in the above (14) are attached to the lower portions in the vicinity of the front end and the middle of the transverse guide frame K1 while the front end portions of the arms are attached in the vicinity of the both ends, front and rear, of the transverse guide rail R1 (S3a).

(16) ... The projected corner canvas G1 wound around the winding rollers J1 to J3 described in the above (13) and (14) is unwound and spread, and in addition, slid forward along the transverse guide frame K1 and the transverse guide rail R1 so as to stretch out into the corner space portion (S3a).

(17) ... The projected corner canvas G1 that has stretched out into the corner space portion described in the above (14) is slid backwards along the transverse guide frame K1 and the transverse guide rail R1 while maintaining its spread state, and in addition, wound around the winding rollers J1 to J3 in the configuration (S3a).

The above described (14) to (17) allow the projected corner canvas G1 which is spread to move forward to the corner space portion or allow the projected corner canvas G1 which is spread out around the building including the corner space portion to move backward stably and smoothly without fail.

(18) ... The foldable arms described in the above (13) are formed of an arm Y1 in Y shape, which is formed of a main link 291 and a sub-link 292 connected in a reverse Y shape, and a V-shaped arm V2 where a rear link 251 and a front link 252 are connected so as to be freely foldable in two, and the projected corner canvas G1 is wound or unwound around the winding rollers J1 to J3 so that the roller supporting frame F1a translates in a diagonal direction, and the slider 22 of the top hem 1 of the canvas slides in either direction, front or rear, of the transverse guide frame K1 in the configuration (S3b).

(19) ... The base end portion of the main link 291 of the Y-shaped arm Y1 described in the above (18) is attached in the vicinity of the corner of a projected corner portion N1, the front end portion is attached in the vicinity of the middle of the roller supporting frame F1a, the front end portion of the sub-link 292 of the Y arm Y1 is attached in the vicinity of the front end of the transverse guide rail R1, the base end portion of the V-shaped arm V2 is attached in the vicinity of the middle lower portion of the transverse guide frame K1, and the front end portion thereof is attached in the vicinity of the rear end of the transverse guide rail R1 (S3b).

Through the above 18 and 19, the winding and unwinding of the projected corner canvas G1 as well as the translation of the roller supporting frame F1a in a diagonal direction can be efficiently carried out in synchronization.

Dependent inventions in the case where a movable awning device Q for a rectangular canvas P1 is combined with any of single devices S1a, S1b, S2a, S2b, S3a and S3b of the first or second invention are listed below.

(20) ... In order to combine a movable awning device Q having a rear winding structure which is provided with a rectangular canvas P1, a winding roller 30 and a front bar 31 for the rectangular canvas P1, and foldable arms V3 and V4 for supporting the front bar 31 with the movable awning device S1a, S1b, S2a, S2b, S3a or S3b having the front winding structure described in the above (1) and (13), a portion of the winding roller 30 of the above described rectangular canvas P1 close to the front end is approximately overlapped and attached to the lower portion or the upper portion of the rear half portion of the transverse guide frame K1.

(21) ... The rectangular canvas P1 which is wound around the winding roller 30 described in the above (20) is wound from above, and the projected corner canvas G1 which is wound around the winding rollers J1 to J3 is wound from above.

(22) ... The rectangular canvas P1 which is wound around the winding roller 30 described in the above (20) is wound from below, and the projected corner canvas which is wound around the winding rollers J1 to J3 is wound from above.

With the above described (20) to (22), a corner space portion in the projected corner portion N1 and the outer periphery of a building, including a straight line section which continues to the corner space portion is integrally covered so as to provide a good appearance.

In the case where the single devices S1c, S1d, S3c, S3a, S3b and S3d, which belong to either the first or the second invention, are linked, the dependent inventions are listed below.

(23) ... Two from among the movable awning devices S1c, S1d, S3c, S3a, S3b and S3d having the front

winding structure described in the above (1) and (13) are attached on either side of the projected corner portion N1 so as to face each other, and the front end portions of the both roller supporting frames F1, F1a are made to face each other and linked together, and thus, the two are integrated.

Thus, the outer periphery around the building including the corner space portions of the projected corner portions N1 is covered so as to provide a better appearance.

The concrete configuration of the second invention and various dependent inventions relating to the operation thereof are listed below.

(24) ... The foldable arms for supporting the roller supporting frames F1, F1a described in the above (23) are V-shaped arms V1, V2 where the rear link 251 and the front link 252 are connected so as to be freely foldable in two, the connection portion which is foldable in two is formed of links connected through a connection rod 253, and the projected corner canvas G1 is wound and unwound around the winding rollers J1 to J3 so that the roller supporting frame F1 translates in a diagonal direction and the slider 22 of the top hem 1 of the canvas slides in either direction, to the front or rear, of the transverse guide frame K1 in the configuration (WS1c).

(25) ... The base end portion of the rear link 251 of the V-shaped arm V1 from among the V-shaped arms V1, V2 described in the above (24) is attached in the vicinity of the corner of the projected corner portion N1, the front end portion of the front link 252 thereof is attached in the vicinity of the front end of the roller supporting frame F1, the base end portion of the rear link 251 of the V-shaped arm V2 is attached to a lower portion in the vicinity of the middle of the transverse guide frame K1, and the front end portion of the front link 252 thereof is attached in the vicinity of the rear of the roller supporting frame F1 (WS1c).

(26) ... The foldable arms for supporting the roller supporting frames F1, F1a described in the above (23) are expandable arms T1, T2 in linear form which are formed in parallel at a distance from each other, and the projected corner canvas G1 is wound or unwound around the winding rollers J1 to J3 so that the roller supporting frame F1 translates in a diagonal direction, and the slider 22 of the top hem 1 of the canvas slides in either direction, to the front or rear, of the transverse guide frame K1 (WS1d).

(27) ... The base end portion of one expandable arm T1 from among the expandable arms T1, T2 described in the above (26) is attached in the vicinity of the corner of the projected corner portion N1, and the front end portion thereof is attached in the vicinity of the middle of the roller supporting frame F1 while the base end portion of the other expandable arm T2 is attached to the lower portion in the vicinity of the middle of the transverse guide frame K1, which

is at an appropriate distance from the vicinity of the above described corner, and the front end portion thereof is attached in the vicinity of the rear end of the roller supporting frame F1 (WS1d).

(28) ... When the projected corner canvas G1 described in the above (26) and (27) are interlocked and wound, the rear arm 351 and the front arm 352 of the respective expandable arms T1, T2 expand or retract relative to each other while moving backwards so as to rotate in parallel, and at the same time, the two roller supporting frame F1 translates toward the wall portion located diagonally in the rear (WS1d).

(29) ... When the winding rollers J1 to J3 described in the above (26) are interlocked and unwound, the respective expandable arms T1, T2 expand diagonally forward due to the pressure applied through elasticity while rotating in parallel so that the roller supporting frame F1 is pushed out when translating diagonally forward in the configuration (WS1d).

(30) ... The foldable arms for supporting the roller supporting frames F1, F1a described in the above (23) are I-shaped arms I1, I2, which are in linear form and formed so as to be parallel to each other at a distance from each other, and the projected corner canvas G1 is wound and unwound around the winding rollers J1 to J3 so that the roller supporting frame F1a translates in a diagonal direction while sliding on the transverse guide rail R1, and the top hem 1 of the above described projected corner canvas G1 slides in either direction, to the front or rear, of the transverse guide frame K1 in the configuration (WS3c).

(31) ... The base end portion of one I-shaped arm I1 from among the I-shaped arms I1, I2 described in the above (30) is attached in the vicinity of the corner of the projected corner portion N1, and the front end portion thereof is attached in the vicinity of the middle of the transverse guide rail R1 while the base end portion of the other I-shaped arm I2 is attached in the vicinity of the middle of the transverse guide frame K1 at an appropriate distance from the vicinity of the above described corner, and the front end portion thereof is attached in the vicinity of the rear end of the transverse guide rail R1 (WS3c).

(32) ... The foldable arms for supporting the roller supporting frames F1, F1a described in the above (23) are V-shaped arms V1, V2 where the rear link 251 and the front link 252 are linked so as to be freely foldable in two, and the projected corner canvas G1 is wound or unwound around the winding rollers J1 to J3 so that the roller supporting frame F1 slides along the transverse guide rail R1 while translating in a diagonal direction, and the top hem 1 of the above described projected corner canvas G1 slides in either direction, to the front or rear, of the transverse guide frame K1 (WS3a).

(33) ... The base end portions of the V-shaped arms

V1, V2 described in the above (32) are attached to the lower portions in the vicinity of the front end and the middle of the transverse guide frame K1, and the front end portions of these arms are attached in the vicinity of the both ends, front and rear, of the transverse guide rail R1 (WS3a).

(34) ... A bent link 254 which is bent at an appropriate angle θ is formed in the front end portion of the front link 252 of the V-shaped arm V1 from among the V-shaped arms V1, V2 described in the above (32) so as to protrude therefrom, and the front end portion of the bent link 254 and the roller supporting frame F1a in the vicinity of a recessed corner, which is abutted against the front end of the bent link 254, are connected through a joint rod 78 (WS3d).

(35) ... The angle θ of the bend described in the above (34) is approximately the same angle as the projected corner portion N1 (WS3d).

(36) ... The V-shaped arm V1 described in the above (32) is replaced with a Y-shaped arm Y1 which is formed of a main link 291 and a sub-link 292 linked in a reverse y shape, and the projected corner canvas G1 is wound or unwound around the winding rollers J1 to J3 so that the roller supporting frame F1 translates in a diagonal direction, and the top hem 1 of the above described projected corner canvas G1 transverses in either direction, to the front or rear, of the transverse guide frame K1 in the configuration.

(37) ... The base end portion of the main link 291 of the Y-shaped arm Y1 described in the above (36) is attached in the vicinity of the corner of the projected corner portion N1, the front end portion thereof is attached in the vicinity of the middle of the roller supporting frame F1a, the front end portion of the sub-link 292 of the Y arm Y1 is attached in the vicinity of the front end of the transverse guide rail R1, the base end portion of the V-shaped arm V2 is attached in the vicinity of the lower portion in the middle of the transverse guide frame K1, and the front end portion is attached in the vicinity of the rear end of the transverse guide rail R1.

The dependent inventions which depend on the above described first and second inventions are listed below.

(38) ... The slider 22 described in the above (1) to (4), (6), (10) to (14), (18), (24) or (26) is either an inner or outer slider.

(39) ... A slider 22 having small wheels 231 is incorporated in the transverse guide frame K1 described in the above (1) to (4), (6), (10) to (14), (18), (24) or (26) so as to be freely rollable, and the top hem 1 of the projected corner canvas G1 is attached to a canvas engaging trench 223 created in the slider 22.

(40) ... The projected corner canvas G1 described in the above (1) to (4), (6), (8) to (14), (16) to (18), (24), (26), (28), (30), (32) or (36) is formed in an approximate trapezoid form with right angles in a plane form, the top hem 1 of the canvas is attached

to the slider 22, and the bottom hem 2 of the canvas is attached to the winding rollers J1 to J3.

(41) ... Tense members, such as connection wires 193, 194, a belt or a rope, are stretched between the slider 22 described in the above (1 to (4), (6), (10) to (14), (18), (24) or (26) and the winding rollers J1 to J3.

(42) ... One connection wire 193 described in the above (40) is attached along a diagonal portion 3 of the projected corner canvas G1, and the other connection wire 194 is attached along a line which diagonally connects the rear end portion of the bottom hem 3 of the canvas and the front end portion of the top hem 1 of the canvas.

(43) ... The base end portions of the connection wires 193, 194 described in the above (41) and (42) are attached in the vicinity of the both ends, front and rear, of the winding rollers J1 to J3, and the terminal portions are attached in the vicinity of the front of the slider 22.

Concerning the invention which relates to complex type movable awning devices SQII1 to 5 and WSQIV1 and 2 (hereinafter referred to as the third invention) and the effects thereof

The third invention is characterized in that 44 ... an awning device for a projected corner S4a, S4b, S5a or S5b having a front winding structure for winding and unwinding projected corner canvases G1, G2 and rectangular awning devices Q1, Q2 having a rear winding structure for winding and unwinding rectangular canvases P1, P2 are combined and integrated (SQII1 to 5).

As a result, a corner space portion in the projected corner portion N1 and the outer periphery of a building, including a straight line section which continues to the corner space portion is integrally covered so as to provide a good appearance.

According to a dependent invention gained by interlocking separate components in the third invention, (45) ... two pairs of the complex awning devices SQII4 and 5 described in the above (44) are made to face each other on either side of the projected corner portion N1 and linked (WSQIV1 and 2).

As a result, the outer periphery of the building including two linear sections and the corner space portion of the projected corner portion N1 is covered, so that a better appearance is provided.

In the following, the concrete configuration of the third invention and dependent inventions relating to the operation are listed.

(46) ... The awning devices for a projected corner S4a, S4b, S5a and S5b described in the above (44) are formed of a transverse guide frame K1a for sliding and guiding the top hem 1 of the projected corner canvases G1, G2 attached to the wall side close to the corner of the projected corner portion N1, a roller supporting frame F2 provided on the front side and winding rollers J1 to J3 for the projected corner can-

vases G1, G2 supported by the supporting frame F2 through bearings, and the rectangular awning devices Q1, Q2 are formed of winding rollers 30, 31a for the rectangular canvases P1, P2 provided on the wall side and a front bar R2 for the rectangular canvases P1, P2 attached in the front end portion of the foldable arms Y1, V2, V1 and V2, and the above described roller supporting frame F2 is attached to the front bar R2 in such a manner so as to be freely slidable (SQII1 to 5).

(47) ... The front bar R2 of the rectangular canvases P1, P2 is attached to the front end portion of the foldable arms Y1, V2, V1 and V2 described in the above (46), the roller supporting frame F2 is attached to the front bar R2 in such a manner so as to be freely slidable, winding rollers J1 to J3 for winding and unwinding the projected corner canvases G1, G2 are attached to the roller supporting frame F2, a transverse guide frame K1a is attached on the wall side close to the corner of projected corner portion N1, a long or short winding roller 30 or 30a for winding and unwinding the rectangular canvases P1, P2 is attached on the wall side in an upper portion of the rear half of the guide frame K1a or in a location behind the upper portion of the front end, sliders 22, 22a are attached to the above described transverse guide frame K1a, and the top hem 1 of the projected corner canvases G1, G2 is attached to the sliders 22, 22a (SQII1 to 5).

(48) ... The rectangular canvases P1, P2 and the projected corner canvases G1, G2 described in the above (46) and (47) are wound and unwound around the respective winding rollers 30, 30a and J1 to J3, and thus, the front bar R2 of the rectangular canvases P1, P2 translates in the front-rear direction, the roller supporting frame F2 translates in a diagonal direction while being guided by the front bar R2, and the top hem 1 of the projected corner canvases G1, G2 is slidable in either direction: to the front or to the rear of the transverse guide frame K1a in the configuration (SQII1 to 5).

(49) ... The roller supporting frame F2 and the front bar R2 described in the above (46), (47) and (48) are supported by two or more foldable arms from among the straight I-shaped arms I1, I2, the V-shaped arms V1, V2 which are foldable in two, the Y-shaped arms Y1, Y2 which are in a reverse y shape, and the L-shaped arms L1, L2 which fold and extend in a two-stage operation.

(50) ... The foldable arms described in the above (46) are formed of a Y-shaped arm Y1 formed of a main link 291 and a sub-link 292 which are linked in a reverse y shape and a V-shaped arm V2 where a rear link 251 and a front link 252 are linked in such a manner so as to be freely foldable in two, and the base end portion of the main link 291 of the Y-shaped arm Y1 is attached in the vicinity of the corner of the projected corner portion N1, the front end portion

thereof is attached in the vicinity of the middle of the roller supporting frame F2, the front end portion of the sub-link 292 of the Y arm Y1 is attached in the vicinity of the front end of the front bar R2, the base end portion of the V-shaped arm V2 is attached in the vicinity of the lower portion of the rear end of the winding rollers 30, 31a, and the front end portion thereof is attached in the vicinity of the rear end of the front bar R2 (SQII1 to 3).

(51) ... The transverse guide frame K1a of the projected corner canvases G1, G2 is attached to the wall side close to the corner of the projected corner portion N1, a casing K2 for supporting the winding roller 30 of the rectangular canvas P1 through bearings is attached on the wall side in a location behind the upper portion of the rear of the guide frame K1a, the front bar R2 of the rectangular canvas P1 is supported by foldable arms in such a manner so as to be freely translatable in the front-rear direction, the bottom hem and the top hem of the rectangular canvas P1 are attached to the rear portion of the front bar R2 and the above described winding roller 30, the roller supporting frame F2 for supporting through bearings the winding rollers J1 to J3 of the above described projected corner canvases G1, G2 is incorporated in the above described front bar R2 in such a manner so as to be freely slidable, and the top hem 1 of the projected corner canvases G1, G2 is attached to the slider 22 which is incorporated in the above described transverse guide frame K1a (SQII1 to 5).

(52) ... The transverse guide frame K1a of the projected corner canvases G1, G2 is attached on the wall side close to the corner of the projected corner portion N1, a casing K2 for supporting the winding roller 30a of the rectangular canvas P2 through bearings is attached on the wall side in a location behind the upper portion in the vicinity of the front end of the guide frame K1a, the front bar R2 of the rectangular canvas P2 is supported by foldable arms in such a manner so as to be freely translatable in the front-rear direction, the bottom hem and the top hem of the rectangular canvas P2 is attached to the front bar R2 and the above described winding roller 30a, the roller supporting frame F2 for supporting through bearings the winding rollers J1 to J3 of the above described projected corner canvases G1, G2 is incorporated in the above described front bar R2 in such a manner so as to be freely slidable for lateral guiding, and the top hem 1 of the projected corner canvases G1, G2 is attached to the slider 22 which is incorporated in the above described transverse guide frame K1a (SQII1 to 5).

(53) ... A complex awning device is characterized in that two pairs of the complex awning devices SQII4 and 5 described in the above (46) to (48), (51) and (52) are made to face each other on either side of the projected corner portion N1 and attached to the

projected corner portion, and the front end portion of the two roller supporting frames F2 abut against each other and are linked (WSQIV1 and 2).

(54) ... Sliders 22, 22a having small wheels 231 are integrated in the transverse guide frame K1a described in the above (46) to (48), (51) and (52) so as to be freely rollable, and the top hem 1 of the projected corner canvases G1, G2 is attached to the canvas engaging trench 223 created in the sliders 22, 22a.

(55) ... The projected corner canvases G1, G2 described in the above (47), (51), (52), and (54) are formed either in an approximate trapezoid form with right angles or a triangular form, the top hem of the canvas is attached to the slider 22 or 22a, and the bottom hem of the canvas is attached to the winding rollers J1 to J3.

(56) ... A tense member, such as connection wires 193, 194, a belt or a rope, are stretched between the slider 22 or 22a described in the above (54) and (55) and the winding rollers J1 to J3.

(57) ... One connection wire 193 described in the above (55) and (56) is attached along the diagonal portion 3 of the projected corner canvas G1 and the other connection wire 194 is attached along a line which diagonally connects the rear end portion of the bottom hem 3 of the canvas and the front end portion of the top hem 1 of the canvas.

(58) ... A connection wire is attached along diagonal portions 3a, 3b in locations on both sides of the triangular canvas G2 described in the above (55) and (56), the base end portion of the wire is attached in the vicinity of the both ends, front and rear, of the winding rollers J1 to J3, and the terminal portion of the above described wire drawn out from the apex portion of the triangular canvas G2 is attached to the slider 22a.

(59) ... In the complex awning device described in claims 46, 47, 48, 51 and 52, wherein the roller supporting frame F2 of the winding rollers J1 to J3 is an inner frame, and the front bar R2 of the rectangular canvases P1, P2 is an outer frame.

Brief Description of the Drawings

[0019] Figs. 1 to 21 are views showing single type movable awning devices having a front winding structure and the related configurations according to the third embodiment.

[0020] In the figures, though the canvases are generally opaque, some canvases are shown in a transparent state if necessary in order to show the configuration on the rear side which is hidden. In the same manner, the slider and the winding rollers incorporated inside the casing are shown by making the casing transparent if necessary.

[0021] Here, many drawings three-dimensionally show the awning devices which are attached to a frame

in L shape, band plate form, or the like in an approximate horizontal state, but this is for the sake of seeing the drawings simply. Generally, a spread projected corner canvas or a rectangular canvas is attached so as to be fixed or freely changeable in the angle in an appropriate inclined state.

[0022] Figs. 1(A) and 1(B) are perspective views showing a single device S1a in the first group, where the components on either side of a projected corner portion face each other, where Fig. 1(B) shows a single device S1a, where the foldable arms are I-shaped arms shown through a transparent portion.

[0023] Figs. 2 (A) and 2 (B) are perspective views showing a single device S1a which is attached to a front wall in a corner portion through a transparent portion, where Fig. 2 (A) shows the state as viewed from the bottom and Fig. 2 (B) shows the state as viewed from the top.

[0024] Figs. 3 (A) and 3 (B) are longitudinal cross sectional views showing a main portion of a single device S1a, where Fig. 3(B) shows a manually operable device for a winding roller.

[0025] Fig. 4 is a lateral cross sectional plan view showing a single device S1a.

[0026] Figs. 5 (A) to 5 (E) are perspective views and exploded perspective views showing a front winding structure in which a manually operable device is incorporated, where Fig. 5 (B) shows such components as a roller supporting frame, a winding roller and a manually operable device, Fig. 5 (C) shows an enlarged roller end portion and screws for securing the base end portion of a connection wire, and Figs. 5 (D) and 5 (E) show the front end portion of the roller supporting frame from the front and from the rear.

[0027] Figs. 6 (A) to 6 (D) are perspective views and exploded perspective views showing a transverse guide structure for the top hem of a canvas, where Fig. 6 (B) shows such components as a transverse guide frame, a slider and small wheels. Fig. 6 (C) shows a state where terminals of connection wires for supporting a projected corner canvas in a tense state are attached to a transverse guide frame together, and Fig. 6 (D) shows the front end portion of the transverse guide frame.

[0028] Figs. 7 (A) to 7 (C) are exploded perspective views showing a projected corner canvas and wires therefor, where Fig. 7 (C) shows an enlarged portion of the base end portion of a connection wire in the lower right.

[0029] Figs. 8 (A) to 8 (C) are a plan view showing a projected corner canvas and enlarged cross sectional views showing a state where wires are inserted through the projected corner canvas. Among them, Fig. 8 (B) shows a cross section of the top hem and the bottom hem of the canvas, and Fig. 8 (C) shows a cross section of along line X-X in Fig. 8 (A).

[0030] Figs. 9(A) to 9(D) are perspective views and exploded perspective views showing a front winding structure in which an electric motor is incorporated, where Fig. 9 (B) shows such components as a roller sup-

porting frame, a winding roller and an electric device. Figs. 9 (C) and 9 (D) show the front end portion of the roller supporting frame front and from the rear.

[0031] Figs. 10 (A) to 10 (D) are perspective views and exploded perspective views showing a front winding structure into which a coil spring is incorporated.

[0032] Figs. 11 (A) to 11 (D) and Figs. 12 (A) to 12 (D) are perspective views and plan views showing a projected corner canvas which is stretched into a corner space portion and the process through which the canvas is rolled up and wound, and the reverse order of these views show the process through which the canvas is unwound.

[0033] Figs. 13 (A) to 13 (E) are plan views illustrating the two-stage operation of a single device S1b having foldable arms and showing a projected corner canvas stretching out into the corner space portion and the backward winding process.

[0034] Figs. 14(A) to 14(E) are plan views showing the operation of a single device S2a in the second group and the operation for sliding a winding roller for a projected corner canvas stretching out into the corner space portion and the roller supporting frame to the rear of the device, and then rolling up and storing the spread projected corner canvas.

[0035] Figs. 15 (A) to 15 (C) are plan views illustrating the movement of the roller supporting frame and the foldable arms, where Fig. 15 (B) shows the movement of the projected corner canvas as it is stretched out to the front of the device and recedes to the rear and the movement of the foldable arms as they change in posture as the roller supporting frame recedes step by step, Fig. 15 (C) shows the two as they change in posture when the canvas is wound up step by step (Figs. 15 (A) and 15 (B) show the relationship in an enlarged manner between the bracket of a foldable arm and the stopper of an end portion of a link in the top and the bottom).

[0036] Figs. 16(A) to 16(E) are perspective views showing the operation of a single device S2b.

[0037] Figs. 17 (A) to 17 (D) are plan views showing the operation of a single device S3a in the third group, a projected corner canvas which is stretched out into a corner space portion in the process of sliding backward and in the process of being wound up, and the reverse order of these views shows the projected corner canvas in the process of unwinding and spreading, as well as in the process of sliding forward into the corner space portion.

[0038] Figs. 18 (A) and 18 (B) are a longitudinal cross sectional side view showing a main portion of a single device S3a and a front view showing an engaging portion for lateral sliding.

[0039] Figs. 19 (A) to 19 (D) are plan views showing the operation of a single device S3b and a backward winding process where a roller supporting frame translates to the wall portion located diagonally backward while a projected corner canvas stretching out into a corner space portion is being wound up, and the reverse order of these view shows a process where the roller supporting frame is stretched out into a corner space

portion located diagonally forward while the projected corner canvas is unwound, in the opposite order.

[0040] Figs. 20 (A) to 20 (C) are longitudinal cross sectional side views showing a main portion of a single device S3b,

where Fig. 20 (B) shows a slide guide rail which is attached to the front end portion of a sub-link of a Y-shaped arm, and Fig. 20(C) shows a roller supporting frame which is attached to the front end portion of the main link and a winding roller.

[0041] Figs. 21(A) to 21(C) are perspective views showing a state where two single devices S1a on either side of the projected corner portion face each other and the front end position of an awning device having a conventional structure overlap in the up-down direction in the respective bottom portions on the rear half side, as well as state where the projected corner canvas and the rectangular canvas on one side are spread and the two canvases on the other side are wound up and stored.

[0042] Figs. 22 (A) and 22 (B) are perspective views, one with a transparent portion, showing an awning device WS1c where two single devices S1c on the two sides of the projected corner portion facing each other are interlocked.

[0043] Figs. 23 (A) to 23 (C) are perspective views, one with a transparent state, showing a manually interlocking structure which is incorporated in a corner cap, where Fig. 23(A) shows the manually interlocking structure through a transparent state, Fig. 23 (B) is a perspective view showing the corner portion and Fig. 23(C) shows the corner cap as viewed from the back in a state where it is cut in the vicinity of a portion which is connected with the roller supporting frame.

[0044] Figs. 24 (A) to 24 (C) are perspective views, one with a transparent portion, showing a gear interlocking structure which is incorporated in a corner cap.

[0045] Figs. 25 (A) to 25 (C) are plan views showing the operation of an awning device WS1c having an interlocking structure, where Fig. 25 (A) shows a projected corner canvas when fully spread, Fig. 25(B) shows the projected corner canvas when half spread, and Fig. 25 (C) shows the projected corner canvas when wound up and stored.

[0046] Figs. 26(A) and 26(B) are perspective views with a transparent portion showing an awning device WS1d where two single devices S1d with foldable arms which are freely expandable and retractable are interlocked, and an exploded view showing an arm which is expandable and retractable.

[0047] Figs. 27 (A) to 27 (C) are plan views showing the operation of an awning device WS1d.

[0048] Fig. 28 is a perspective view with a transparent portion showing WS3c where two single devices S3c are interlocked.

[0049] Figs. 29(A) to 29(C) are plan views showing the operation of an awning device WS3c.

[0050] Fig. 30 is a perspective view with a transparent portion showing an awning device WS3a where two sin-

gle devices S3a are interlocked.

[0051] Figs. 31(A) to 31(C) are plan views showing the operation of an awning device WS3a.

[0052] Figs. 32 (A) to 32 (C) are plan views showing the operation of an awning device WS3d.

[0053] Figs. 33 (A) and 33 (B) are a plan view showing a main portion for illustrating the operation the linking mechanism for integrated roller supporting frames which are interlocked and a view illustrating the movement thereof.

[0054] Figs. 34 to 38 show an embodiment of a complex awning device where an awning device for a projected corner and a rectangular awning device are combined.

[0055] Figs. 34 (A) and 34 (B) are perspective views showing a complex device SQII1 according to the first embodiment, where Fig. 34 (A) shows the state as viewed from the bottom, and Fig. 34 (B) shows the state as viewed from the top.

[0056] Figs. 35 (A) to 35 (C) are longitudinal cross sectional side views showing a main portion of a complex device SQII1, where Fig. 35(B) shows a roller supporting frame which is attached to the front end portion of a main link and a winding roller, and Fig. 35 (C) shows the front bar of the rectangular canvas attached to the front end portion of a sub-link.

[0057] Figs. 36 (A) to 36 (D) are plan views showing the operation of a complex device SQII1 and the process of winding a projected corner canvas stretching out to the corner space portion and the rectangular canvas spread to the front.

[0058] Figs. 37(A) and 37(B) are a perspective view with a transparent portion and a plan view showing a complex device SQII2 according to the second embodiment, where a rectangular canvas and a winding roller are extended to the vicinity of the corner of the front end portion of the device.

[0059] Figs. 38 (A) and 38 (B) are a perspective view with a transparent portion and a plan view showing a complex device SQII3 according to the third embodiment, where the projected corner canvas is in an approximate triangular form.

[0060] Fig. 39 is a plan view showing an awning device WSQIV1 where two complex devices SQII4 on the two sides of the projected corner portion which face each other are interlocked.

[0061] Fig. 40 is a plan view showing an awning device WSQIV2 where two complex devices SQII5 having a rectangular canvas and a winding roller for the canvas which extend to the vicinity of the corner of the projected corner portion and the projected corner canvas, which is a triangular canvas, are interlocked.

Best Mode for Carrying Out the Invention

[0062] In the following, the embodiments of the present invention are described in reference to the accompanying drawings, and first the embodiments of single type mov-

able awning devices S1a, S1b, S2a, S2b, S3a and S3b having a front winding structure for a projected corner canvas G1 as shown in Figs. 1 to 21 and a configuration relating to these are described.

[0063] Then, the embodiments of movable awning devices WS1c, WS1d, WS3c, WS3a and WS3d, where two single devices S1c, S1d, S3c, S3a, and S3d which face each other on the two sides of the projected corner portion N1 are interlocked as shown in Figs. 22 to 33 are described.

[0064] Thirdly, the embodiments of movable awning devices SQII1 to 3, which are formed by combining an awning device for a projected corner S4a, S4b, S5a or S5b having a front winding structure for projected corner canvases G1, G2 and rectangular awning devices Q1, Q2 having a rear winding structure for rectangular canvases P1, P2, and the embodiments of movable awning devices WSIV1 and 2, where the two awning devices are interlocked, are described.

I. Concerning Single Type Movable Awning Device

[0065] The single devices S1a, S1b, S2a, S2b, S3a and S3b of the present invention can be roughly categorized into roughly three types of embodiments with the transverse guide structure of the projected corner canvas G1 provided on the wall side and the structure for winding a canvas provided on the front side being approximately the same and the foldable arms and the transverse sliding structure of the front end portion of the arms modified in various ways. Concerning the First Group

[0066] As shown in Figs. 1 to 12, the single devices S1a and S1b in the first group are formed of a transverse guide frame K1 which is attached to a wall portion close to the corner of the projected corner portion N1, a roller supporting frame F1 which is attached to the front end portion of foldable arms I1, I2, L1 and L2, winding rollers J1 to J3 having a manually or electrically operable structure supported by the supporting frame F1 through bearings, and a projected corner canvas G1 stretched between the winding rollers J1 to J3 and the slider 22 incorporated in the above described transverse guide frame K1.

[0067] This corresponds to a case where the awning devices S1 and S2 for a corner disclosed in the first and second embodiments of Patent Document 1, which is the present applicant's prior application 1, are modified so as to have a front winding structure according to the invention.

Concerning First Embodiment

[0068] The configuration of respective portions concerning the single device S1a according to the first embodiment and the process of operation of the single device are described in reference to Figs. 1 to 12.

(1) Concerning Transverse Guide Frame

[0069] As shown in Figs. 3 (A), 4, 6(A) and 6 (B), the transverse guide frame K1 is formed in a box frame form of an upper plate portion 211 of which the top is in one-side roof form, a front plate portion 212 and a rear plate portion 213, which are vertical, and a horizontal bottom plate portion 214, and from among these, the rear plate portion 213 on the rear surface is secured to wall portion.

[0070] Reference numeral 215 is guide trenches for the slider 22 and created on the front and rear sides of the inner upper portion of the transverse guide frame K1 in the longitudinal direction. Reference numeral 216 is an opening in the lower half of the front plate portion 212 through which the front end of the slider 22 slightly protrudes to the front.

[0071] The slider 22 is formed of a steel frame main body 221 which is flat and pairs of small wheels 231 are attached to upper surface portions located in the front and rear of the frame main body in such a manner so as to be freely rotatable, laterally. From among these, small wheels 231 face axis holes 222 provided on both sides, front and rear, of the frame main body 221 and axis pins 232 inserted from above are screwed into a screw hole in the support plate 233 which is inserted through the inside portion in the front-rear direction of the frame main body 222 and secured.

[0072] Thus, the small wheels 231 of the slider 22 are fitted in the guide trenches 215 in such a manner so as to be freely slidable, so that the slider 22 slides along the transverse guide frame K1 with the wheels rotating.

[0073] Reference numeral 223 is a canvas engaging trench created in the lower portion of the front end of the frame main body 221, and reference numeral 224 is a wire attaching hole which penetrates through a portion in the vicinity of the front end of the canvas engaging trench 223 in the up-down direction. Reference numeral 241 and 242 are end caps which are fitted to the both end portions, front and rear, of the transverse guide frame K1.

(2) Concerning Foldable Arms

[0074] I1 and I2 are pairs of straight foldable arms (hereinafter referred to as I-shaped arms) which are attached in parallel at a distance from each other in the front and rear, and a casing for supporting winding rollers J1, J2 through bearings (hereinafter referred to as roller supporting frame F1) is attached to the front end portion of the foldable arms, which are pressed and supported in such a manner so that they can be pushed out in parallel diagonally forward from a wall portion or freely rotate in parallel, diagonally backwards.

[0075] Reference numerals 261 and 262 are brackets for supporting the both end portions of I-shaped arms I1, I2 around the pins, and from among these, the brackets 261 for the arm base end portion are attached directly to the corner location of the projected corner portion N1 in

the vicinity of the lower portion at the front end of the transverse guide frame K1 and on the front wall W1 in the vicinity of the middle of the transverse guide frame K1, which is placed at an appropriate distance to the rear from the corner portion, or indirectly secured via an appropriate rear supporting frame (not shown) so that the angle of inclination of the I-shaped arms I1, I2 can be freely adjusted if necessary.

[0076] In addition, the brackets 262 of the front end portion of the arm are secured in the vicinity of the middle of the roller supporting frame F1 and in a location in the lower portion of the rear surface of the rear end portion of the roller supporting frame F1 at the same distance as the above described brackets 261.

[0077] A spring (not shown) is incorporated in the axis portion in one or both of the base end portion and the front end portion of the I-shaped arms I1, I2 so that the I-shaped arms I1, I2 which are folded up in the wall portion rotate in parallel in the direction of spreading by means of the elastic force of the spring, and thus, the roller supporting frame F1 is pushed out diagonally forward in parallel.

[0078] When the projected corner canvas G1 is wound, I-shaped arms I1, I2 rotate in parallel against the elastic force of the spring and translate the roller supporting frame F1 to the wall portion diagonally backward.

(3) Concerning roller Supporting Frame

[0079] As shown in Figs. 3(A), 3(B), 4, 5(A) and 5(B), the roller supporting frame F1 is formed of a front plate portion 121 of which the front is in a gradual semi-arc form, a horizontal upper eaves portion 122 and a bottom plate portion 123 and a rear plate portion 124 which is inclined upward to the rear, and has a longitudinal cross section in an approximate wedge form, so that a portion of the upper eaves portion 122 extending from the rear end to the rear portion and an upper half portion of the rear plate portion 124 creates a space portion 131 with an opening inside which the winding roller J1 is incorporated. Reference numeral 125 has holes through which water is let out and created in the vicinity of the both sides, front and rear, of the bottom plate portion 123.

[0080] Reference numerals 141 and 142 are end caps which are fitted to both end portions, front and rear, of the roller supporting frame F1 and are secured with screws 146, and the bearing portions 143 and 144 provided with round holes protrude from the rear upper portion of the inner surface of the end caps.

(4) Concerning Winding Roller

[0081] Reference numeral 11 is a roller main body in cylindrical form which forms the winding roller J1, and a canvas engaging trench 111 is created therein, in the direction of the axis. Reference numerals 151 and 152 are end caps which are fitted to the both end portions, front and rear, of the roller main body 11, and support

axes 153 and 154 which penetrate through and are secured to the cap main body are fitted to the above described bearing portions 143 and 144 in such a manner so as to be freely rotatable.

[0082] Reference numeral 161 is a worm gear which is engaged with and secured to the support axis 153 of the end cap 151, and reference numeral 162 is a worm gear which engages with the worm gear 161 and the axis around which the worm gear rotates 163 is supported vertically in the upper and lower bearing portions 145 inside the above described end cap 141, and a hook 164 which engages with an operation rod (not shown) is formed in the lower end portion of the axis around which the worm gear rotates 163. Thus, the winding roller J1 can be operated manually and freely rotated forward and backward.

(5) Concerning Projected Corner Canvas

[0083] Here, the configuration of the projected corner canvas G1 shown in Figs. 7(A) to 7(C), 8(A) and 8(B), and the wires which are incorporated therein is described.

[0084] The projected corner canvas G1 is formed of tent cloth made of fabric or a synthetic resin in an approximate trapezoid form with right angles when spread, and made up of a canvas main body portion X1 in rectangular form and a canvas protrusion X2 in right triangle form which protrudes to one side.

[0085] As for the external form, the top hem 1 in the upper end portion of the canvas (hereinafter referred to as canvas top hem) and the bottom hem 2 in the lower end portion of the canvas (hereinafter referred to as canvas bottom hem) are parallel to each other, and a diagonal side 3 having an angle of inclination of approximately 45 degrees (hereinafter referred to as canvas diagonal side) extends between the front end portion of the canvas bottom hem 2 and the front end portion of the canvas top hem 1 in such a manner so as to spread toward the bottom, and a vertical side 4 (hereinafter referred to as canvas vertical portion) extends between the rear end portion of the canvas bottom hem 2 and the rear end portion of the canvas top hem 1.

[0086] Reference numerals 181 and 182 are through holes in a bag form created through the canvas top hem 1 and the canvas bottom hem 2, and a fixture member, such as wires 183 and 184, a tube or a rope, is inserted into these holes.

[0087] Reference numeral 191 is a through hole in a bag form created along a line which diagonally connects the front end portion of the canvas top hem 1 and the rear end portion of the canvas bottom hem 2, and reference numeral 192 is a through hole in a bag form created in the canvas diagonal side 3, and the two through holes 191 and 192 thus created diagonally form a mountain shape in a plan view.

[0088] A tense member for the projected corner canvas G1, such as connection wires 193, 194, a belt or a

rope, is inserted into the through holes 191 and 192, and from among these, engaging pieces 195 and 196 of the wire front end portions are pulled out downward from the openings at the lower end of the through holes 191 and 192, and the wire terminal portions are drawn out upward from the opening at the top of the through holes 191 and 192.

[0089] Thus, in order to attach the projected corner canvas G1 to the winding roller J1, the canvas bottom hem 2 is made to face the canvas engaging trench 111 of the winding roller J1, so that the wire 184 is inserted through the through hole 182, and thus, the canvas bottom hem 2 is secured in such a manner so that it cannot be pulled out.

[0090] Next, as shown in Figs. 3(A), 4 and 5(C), screws 101 are screwed in the front and rear of the canvas engaging trench 111, and in addition, the engaging pieces 195 and 196 of the connection wires 193, 194 which are pulled out through the opening in the lower end portion are fitted to the above described engaging trench 111, and screws 102 are screwed in from the outside, so that the engaging pieces 195 and 196 are sandwiched and secured.

[0091] Meanwhile, the top hem 1 of the projected corner canvas G1 is made to face the canvas engaging trench 223 of the slider 22 and the wire 183 is inserted through the through hole 181 of the canvas top hem 1, and thus, the top hem 1 is secured in such a manner so that it cannot be pulled out.

[0092] Next, the terminal portions of the connection wires 193, 194 drawn out from the opening at the top are inserted through the attachment holes 224 of the slider 22 shown in Figs. 4 and 6(C) from the bottom to the top, and in addition, screws 103 are screwed in from the front end portion of the canvas engaging trench 223, and thus, the two wire terminal portions are secured in the attachment holes 224 through pressure.

[0093] As a result, the projected corner canvas G1 is spread and supported between the winding roller J1 and the slider 22 in an appropriate tense state.

(6) Concerning Winding Roller Having Electrical Structure

[0094] The winding roller J2 in the second example shown in Figs. 9(A) to 9(D) rotates forwards and backwards by means of an electrical motor M1 in cylindrical form which is built-in inside the roller main body 11.

[0095] The electrical motor M1 is inserted in the front portion of the roller main body 11, and a motor output axis 371 and a securing axis portion 372 are provided in the rear and front end portions of the electrical motor M1, respectively.

[0096] Reference numeral 381 is a movement conveying socket having a trench which engages with the roller main body 11, and the motor output axis 371 is fitted to the axis hole 382 of the socket. Reference numeral 155 is a through hole of the end cap 151, and the front end

portion of the electrical motor M1 is supported in the through hole 155 through bearings.

[0097] Thus, the movement conveying socket 381 is engaged with and secured to the motor output axis 371, and in addition, the electrical motor M1 is inserted in the front portion of the roller main body 11 and the end cap 151 is inserted into the front end portion of the electrical motor M1, and then fitted to the front end portion of the roller main body 11 on the left side, so that the axis portion 372 of the electrical motor M1 is engaged with and secured to a flat hole (square hole also possible) in the bearing portion 145 of the end cap 141.

[0098] As a result, the electrical motor M1 is incorporated inside the roller main body 11.

[0099] Accordingly, when the electrical motor M1 is driven, the output axis 371, the movement conveying socket 381 and the roller main body 11 integrally rotate forward and backward, so that the winding and unwinding operation of the projected corner canvas G1 is automated and energy can be saved.

Concerning Winding and Storing Process of Projected Corner Canvas

[0100] As shown in Figs. 2 to 5, 11(A) and 12(A), when the projected corner canvas G1 stretched out in the corner space portion is wound up and stored, an operation rod (not shown) is engaged with the hook 164 of the manually operable device and rotated in the case of the winding roller J1 shown in Figs. 3 to 5. In addition, in the case of the winding roller J2 shown in Fig. 9, the electrical motor M1 is driven for winding.

[0101] Thus, the projected corner canvas G1 is wound around the winding rollers J1, J2 from above with the rear surface of the canvas bottom hem 2 on the inside and the front surface on the outside in the process shown in Figs. 11 (B) to 11(D) and 12(B) to 12(D).

[0102] At this time, the I-shaped arms I1, I2 rotate in parallel to the rear against the elastic force of the spring incorporated in the base end portion and folded while translating the roller supporting frame F1 toward the wall portion diagonally backward.

[0103] At the same time, the tensile force of the projected corner canvas G1 generated as the canvas is wound, is applied to the slider 22 of the canvas top hem 1, and in addition, the tensile force resulting from the connection wires 193, 194 is applied to the front end portion of the slider 22, and as a result, the slider 22 of the canvas top hem 1 moves backward while slid and guided along the transverse guide frame K1.

[0104] Accordingly, as shown in Figs. 11(D) and 12 (D), the projected corner canvas G1 is wound around the winding rollers J1, J2 and the I-shaped arms I1, I2 are folded up and collapsed in a wall portion, and overlap with the roller supporting frame F1 when stored in a wall in a compact manner.

[0105] In the case of the above, the connection wires 193, 194 are pulled back, so that the slider 22 of the

canvas top hem 1 slides along the transverse guide frame K1, and in addition, prevent the canvas from changing in form in a plane when the projected corner canvas G1 is wound up, and thus, make it possible to smoothly and regularly wind the projected corner canvas G1.

[0106] Here, when the projected corner canvas G1 is wound around the winding rollers J1, J2, the canvas bottom hem 2 having a great width for winding is on the inner surface side, and the width for winding becomes gradually shorter, and in the end, the canvas top hem 1 having a short width is wound up.

[0107] Thus, there is an advantage, such that it is unnecessary to take into consideration any measures for preventing the canvas protrusion X2 from being tightly wound up or increased in the diameter of the winding roller, unlike in the prior art shown in Figs. 22 to 27 and 47 to 51 of Patent Document 1 (Prior Application 1).

Concerning Process for Unwinding and Spreading Projected Corner Canvas

[0108] Next, in the case where the projected corner canvas G1 wound around the winding rollers J1, J2 is stretched out into the corner space portion of the projected corner portion N1, the operation rod engaged with the hook 164 of the manually operable device is rotated in the direction opposite to the above or the electrical motor M1 is driven backward.

[0109] Then, the projected corner canvas G1 wound up around the winding rollers J1, J2 is unwound, and the elastic force applied to the I-shaped arms I1, I2 folded in the inner wall portion is released so that the pressing force rotates the I-shaped arms I1, I2 in such a direction that they open and spread, and as shown in Figs. 11 (D) to 11(A) and 12(D) to 12(A), the winding rollers J1, J2 and the roller supporting frame F1 are pushed out so as to translate toward the corner space portion diagonally forward.

[0110] At this time, the elastic pressing force of the I-shaped arms I1, I2 applied to the roller supporting frame F1, the tensile force of the projected corner canvas G1, and the tensile force of the unwound connection wires 193, 194 make the tensile force applied to the slider 22 in the forward direction so that the slider 22 slides along the transverse guide frame K1 so as to move forward.

[0111] In other words, the pushing out of the roller supporting frame F1 diagonally forward by means of an elastic pressing force through the I-shaped arms I1, I2, the unwinding rotation of the winding rollers J1, J2, and the forward movement of the slider 22 make the projected corner canvas G1 spread and stretch out into the corner space portion.

[0112] Accordingly, as shown in Figs. 1(A) and 1(B), two single devices S1a are abutted against each other at a right angle (obtuse angle or acute angle also possible depending on the angle of the projected corner portion) and attached to locations in the corner between the front wall W1 and the side wall W2, and in addition, when the

projected corner canvases G1 wound up around the respective winding rollers J1, J2 are unwound, the two projected corner canvases G1 are spread and stretched out in such a state that they face each other in a direction diagonally forward, and thus, the peripheral appearance of the building, including the corner space portion in the projected corner portion N1, is covered so as to provide a good appearance.

(7) Winding Roller Having Following Structure

[0113] Though a case is described in the above where the winding rollers J1, J2 are rotated forward and backward manually or by means of an electrical device, the winding roller J3 in the third example shown in Fig. 10 is incorporated in the case where it functions as a following roller.

[0114] The winding roller J3 is adopted in the case where, for example, the I-shaped arms I1, I2 of the single apparatus S1a are provided on the drive side shown in Figs. 42 to 44 of the present applicant's prior application 1 (see Patent Document 1), or in the case where winding rollers 30, 31a of the rectangular awning devices Q1, Q2 in the complex devices SQ11 to 5 shown in Figs. 34 to 40, which are described in the following, are provided on the drive side.

[0115] In Fig. 10, reference numeral 47 is a coil spring of the roller main body 11, reference numeral 49 is a fixed axis for supporting the coil spring 47 around it, and reference numeral 48 is a bearing socket for the fixed axis 49 and the coil spring 47.

[0116] Thus, the rear end portion 492 of the fixed axis 49 is fitted to the center through hole 481 of the bearing socket 48, and in addition, the rear end portion 472 of the coil spring 47 mounted around the fixed axis 49 is fitted to the through hole 482 in a decentralized location of the bearing socket 48.

[0117] Meanwhile, the front end portion 491 of the fixed axis 49 penetrates through the center through hole 156 of the end cap 151 and is fitted into a square hole of the bearing portion 145 of the end cap 141, and in addition, the front end portion 471 of the coil spring 47 is inserted and fitted to the through hole 157 of the end cap 151.

[0118] As a result, the coil spring 47 is incorporated into the front portion of the roller main body 11.

[0119] Accordingly, when the winding roller J3 rotates, the coil spring 47 is gradually compressed by means of the end cap 151 of the roller main body 11 so that the elastic energy is stored in the coil spring 47 or the stored elastic energy is released.

[0120] Concretely, at the point in time when winding up the projected corner canvas G1 around the winding roller J3 is completed, the elastic energy is released with slight spare pressure remaining.

[0121] Meanwhile, elastic energy is gradually stored in the coil spring 47 as the projected corner canvas G1 spreads, and the maximum elastic pressing force is stored when the projected corner canvas G1 is complete-

ly spread.

Concerning Second Embodiment

[0122] Next, the single device S1b in the second embodiment shown in Figs. 13 (A) to 13(E) is described. This is a case where a pair of foldable arms in a reverse L shape L1 and L2 (hereinafter referred to as arms in L shape), front and rear, which rotate in parallel through bending and stretching movements in two stages are provided in place of the I-shaped arms I1, I2 in the first embodiment.

[0123] The L-shaped arms L1, L2 are formed of a rear link 271 and a front link 272 which are connected so as to be freely foldable, and the connection portion which is foldable in two is connected through a connection rod 273 which crosses the two links.

[0124] A spring having a relatively weak elasticity is incorporated into the bracket 261 portion in the base end portion of the L-shaped arms L1, L2, that is to say, into the base end portion of the rear link 271, and in addition, a spring having a relatively strong elasticity is incorporated into the foldable connection portion between the rear link 271 and the front link 272.

[0125] Thus, as shown in Fig. 13(A), when the projected corner canvas G1 stretched out into the corner space portion is wound around the winding rollers J1, J2, first, the pair of rear links 271 which are pressed by a spring having a weaker elasticity rotate in parallel to the rear against the elastic pressing force so that the roller supporting frame F1 translates diagonally backward, and at the same time, the slider 22 of the top hem 1 of the canvas slides backwards along the transverse guide frame K1 in the vicinity of the middle of the guide frame K1, and thus, the rear links 271 are folded up into a wall portion through the fluctuating process shown in Figs. 13(A) to 13(C).

[0126] Furthermore, when the winding rollers J1, J2 are rotated so as to wind up the canvas, the pair of front links 272 which are pressed with a spring having a stronger elasticity make the roller supporting frame F1 translate diagonally backward against the elastic pressing force, and the slider 22 of the top hem 1 of the canvas slides backward to the rear half portion of the guide frame along the transverse guide frame K1, and thus, the front links 272 are folded up into a wall portion through the fluctuating process shown in Figs. 13(C) to 13(E).

[0127] As a result, the projected corner canvas G1 is wound up around the winding rollers J1, J2 as shown in Fig. 13(E), and in addition, the L-shaped arms L1, L2 are folded in such a state so as to be pressed and spread against a wall portion and stored in a wall in a compact manner in such a state so as to overlap with the roller supporting frame F1.

[0128] Meanwhile, when the projected corner canvas G1 is unwound, the pair of front links 272 pressed by a spring having a stronger elasticity first rotate in parallel diagonally forward due to the elastic pressing force, and

the roller supporting frame F1 is pushed out so as to translate diagonally forward, and in addition, the slider 22 of the top hem 1 of the canvas is transversely slid along the transverse guide frame K1 so as to move forward in the vicinity of the middle of the guide frame.

[0129] When the front links 272 move to spread at the angle shown in Fig. 13 (C), the pair of rear links 271 pressed by the weaker elasticity of the spring rotate in parallel diagonally forward and move to spread at the angle shown in Fig. 13 (A), and thus, the roller supporting frame F1 is further pushed out so as to translate diagonally forward, and in addition, the slider 22 of the top hem 1 of the canvas is slid forward to the front half portion along the transverse guide frame K1.

[0130] As a result, the front of the area in the vicinity of the corner, including the corner space portion of the projected corner portion N1, is covered.

[0131] In this manner, in the case of the second embodiment, the link mechanism formed of L-shaped arms L1, L2 and the connection rod 273 makes the roller supporting frame F1 in the front end portion of the arm translate toward the corner space portion diagonally forward through the bending and stretching movement in two stages, and therefore, it becomes possible to further push out the roller supporting frame F1 diagonally forward in comparison with the case where I-shaped arms I1, I2 are incorporated into the single device S1a in the first embodiment.

Concerning Second Group

[0132] As shown in Figs. 14 to 16, single devices S2a and S2b in the second group are formed of a transverse guide frame K1 attached to a wall portion in the projected corner portion N1, a roller supporting frame F1 attached to the front end portions of the foldable arms V1, V2, winding rollers J1, J2 supported by the supporting frame F1 through bearings, and a projected corner canvas G1 attached to the winding rollers J1, J2 and a slider 22.

[0133] This corresponds to a case where the movable awning devices S1a, S2a and the like in the first and second embodiments disclosed in the present applicant's prior application 6 are modified to a new invention relating to the front winding structure.

Concerning Third Embodiment

[0134] The single device S2a in the third embodiment shown in Figs. 14 (A) to 14(E) and 15(A) to 15(C) is described below.

[0135] This is formed by replacing the I-shaped arms I1, I2 in the first embodiment with a pair of foldable arms in lateral V shape V1 and V2 (hereinafter referred to as V-shaped arms), front and rear, and in addition, providing an engaging portion for a transverse operation 28 (engagement hole also possible) shown in Fig. 18 (B) which protrudes in a portion at the bottom of the roller supporting frame F1.

[0136] A bracket 261 in the base end portion of the V-shaped arm V1 is attached in the corner end portion of the projected corner portion N1, and a bracket 262 in the front end portion is attached in the vicinity of the front end of the roller supporting frame F1. A bracket 261 in the base end portion of the V-shaped arm V2 is attached to a location in the lower rear portion of the transverse guide frame K1 located at a point approximately 3/4 of the entire length from one end, that is to say, a location in the lower rear portion located at a point approximately 1/4 of the entire length from the rear end of the transverse guide frame K1, and likewise, a bracket 262 in the front end portion is attached to a location at a point approximately 1/4 from the rear end portion of the roller supporting frame K1.

[0137] Incidentally, in the views showing an enlarged portion in the upper and lower portions of Figs. 15(A) and 15(B), reference numeral 201 is a stopper formed so as to protrude from one side of the rear end portion of the rear link 251, reference numeral 202 is a stopper protruding from one side of the front end portion of the front link 252, and at the stage shown in Fig. 15 (A), the rear link 251 of the V-shaped arm V1 in the front of the device abuts against the bracket 261 at a fluctuation angle α_1 in the figure so that the rotation is restricted, and likewise, the front link 252 of the V-shaped arm V2 in the rear of the device abuts against the bracket 262 at the fluctuation angle α_1 so that the rotation is restricted.

[0138] In addition, at the stage shown in Fig. 15 (B), the front link 252 of the V-shaped arm V2 in the front of the device abuts against the bracket 262 at a fluctuation angle β_2 in the figure so that the rotation is restricted, and likewise, the rear link 251 of the V-shaped arm V2 in the rear of the device abuts against the bracket 261 at the fluctuation angle β_2 so that the rotation is restricted.

[0139] In the case of a state shown in Fig. 15(A), for example, the rotation of the respective links 251 and 252 is restricted by the stoppers 201 and 202 where the angle α_1 at which the rear link 251 of the V-shaped arm V1 and the horizontal line of the front wall W1 cross in a plane and the angle α_1 at which the front link 252 of the V-shaped arm V2 and the roller supporting frame F1 cross in a plane are both approximately "75 degrees," and at this time, the angle θ_1 at which the V-shaped arms V1, V2 are folded in two, is approximately "130 degrees."

[0140] As a result, the state of the projected corner canvas G1 which is spread and stretched out to the outside of the building, including the corner space portion in the projected corner portion N1, is stably maintained.

[0141] In addition, in the case of the state shown in Fig. 15 (B), the rotation of the respective links 252 and 251 is restricted by the stoppers 202 and 201, where the angle β_2 at which the front link 252 of the V-shaped arm V1 and the roller supporting frame F1 cross in a plane and the angle β_2 at which the rear link 251 of the V-shaped arm V2 and the front wall W1 cross in a plane are both approximately "45 degrees," and at this time, the angle θ_2 at which the V-shaped arms V1, V2 are

folded in two, is approximately "85 degrees."

[0142] As a result, the projected corner canvas G1 that spreads to the front is positioned when wound around the winding rollers J1, J2, and the V-shaped arms V1, V2 are folded in two, maintaining symmetry between the front and the rear, and thus, the winding rollers J1, J2 and the roller supporting frame F1 translate linearly in the front and rear directions.

Concerning Process of Backward Transverse of Projected Corner Canvas and Process of Winding and Containing Projected Corner Canvas

[0143] As shown in Figs. 14(A) and 15(A), when the projected corner canvas G1 stretched out into the corner space portion is wound up around the winding rollers J1, J2, first, the front end hook portion of an operation rod (not shown) is engaged with the engagement portion 28 of the roller supporting frame F1 from beneath, and after that, the rod is pulled backwards.

[0144] At this time, in the case where the engagement portion 28 is at a level that can be reached from beneath by hand, the engagement portion 28 is grasped and pulled backwards.

[0145] Then, the projected corner canvas G1 is pulled backwards while maintaining its spread state, and following this, the slider 22 of the top hem 1 of the canvas also moves backwards along the transverse guide frame K1. At the same time, as shown in Fig. 15 (A), the V-shaped arms V1, V2, which are pressed so as to open at an angle θ_1 , are slightly folded inwards against the pressing force for opening and spreading the arms, and as shown by a number of imaginary lines in Fig. 15 (B), the connection portion at which the V-shaped arm V1 is folded in two at the front of the device is pulled up slightly diagonally backward so that the arm rotates and swings, and in addition, the connection portion at which the V-shaped arm V2 is folded in two in the rear of the device is slightly pulled downwards diagonally to the bottom so that the arm rotates and swings, and thus, the arms change their form as shown by the solid lines in Fig. 15 (B) when folded into a V shape, maintaining symmetry between front and rear.

[0146] As a result, the roller supporting frame F1 of the winding rollers J1, J2 slides in parallel to the rear of the device as shown in Figs. 14 (B), 14(C) and 15(B) so that the slider 22 of the top hem 1 of the canvas is pulled down to the rear half of the transverse guide frame K1.

[0147] Next, in the case of the winding roller J1 in the first example, the operation rod (not shown) is engaged with the hook 164 of the manually operable device and rotated. In addition, in the case of the winding roller J2 in the second example, the electrical motor M1 is driven for winding the canvas.

[0148] Then, the projected corner canvas G1 is wound up around the winding rollers J1, J2 with the front surface of the bottom hem 2 of the canvas facing the outside and the rear surface facing inside as shown by a number of

imaginary lines in Figs. 14 (C) to 14(E) and 15(C). At this time, the V-shaped arms V1, V2 are folded against the elastic pressing force due to a spring or the like incorporated in the connection portion that is folded in two so that the winding rollers J1, J2 and the roller supporting frame F1 translate linearly toward the rear and toward a wall portion, and the entirety of the device is folded into a wall portion in a compact manner so as to be contained.

[0149] Concerning Process for Unwinding and Spreading Projected Corner Canvas

[0150] Next, in the case where the projected corner canvas G1 wound around the winding rollers J1, J2 is spread toward the front of the building, the operation rod which is engaged with the hook 164 of the manually operable device is rotated in the direction opposite to that above through the operation, or the electric motor M1 is driven so as to rotate in the direction of unwinding.

[0151] Then, the projected corner canvas G1 that has been wound around the winding rollers J1, J2 is unwound, and the elastic resilience of the V-shaped arms V1, V2 that have been folded in a wall portion is released, so that the V-shaped arms V1, V2 are rotated by means of the pressing resilience in such a direction as to spread, and the winding rollers J1, J2 and the roller support frame F1 are pushed out linearly to the front while moving in parallel.

[0152] As a result, the projected corner canvas G1 is unwound to the front of the front wall W1 so as to spread and be supported in a tense state.

[0153] At this time, as shown in Fig. 15(B), the stopper 202 of the front link 25 of the V-shaped arm V1 prevents the V-shaped arm V1 from spreading further, and the stopper 201 of the rear link 251 of the V-shaped arm V2 prevents the V-shaped arm V2 from spreading further.

[0154] Therefore, at a stage where the V-shaped arms V1, V2 are in a half-spread state and spread at an angle θ_2 of approximately "85 degrees," the spread projected corner canvas G1 is prevented from spreading further to the front.

[0155] At this stage, the projected corner canvas G1 is prevented from moving to the rear of the device by the above described stoppers 202 and 201 while in a freely and transversely slidable state to the corner space portion in the front of the device.

[0156] Therefore, the front end hook portion of an operation rod (not shown) is engaged with the engagement portion 28 of the roller supporting frame F1 from beneath, and then, the roller supporting frame F1 is slid toward the corner space portion of the projected corner portion N1 or laterally pushed out toward the corner space portion while grasping the engagement portion 28.

[0157] Thus, the spread projected corner canvas G1 and the roller supporting frame F1 slide toward the corner space portion in the front of the device, and at this time, the slider 22 of the top hem 1 of the canvas slides forward when moving along the transverse guide frame K1.

[0158] As a result, the projected corner canvas G1 moves forward, as shown in Figs. 14(B), 14(A), 15(B)

and 15(A), so that the canvas spreading portion X2 is pushed out toward the corner space portion of the projected corner portion N1.

[0159] At this time, the front link 252 of the V-shaped arm V1 is gradually drawn out to the front of the device from the crossing angle $\beta 2$ in Fig. 15 (B), and thus changes so as to have a gradual inclination at the crossing angle $\beta 1$ in Fig. 15 (A), and in addition, the angle at which the front link 252 and the rear link 251 are folded in two gradually spreads from a state where the angle $\theta 2$ at which the front link 252 and the rear link 251 are folded in two is approximately "less than 90 degrees," while the rear link 251 is raised so that the angle $\theta 1$ at which the link is folded in two as shown in Fig. 15 (A) becomes approximately "130 degrees" and further rotation is thereby prevented.

[0160] Meanwhile, the front link 252 of the V-shaped arm V2 is drawn out gradually to the front of the device from the crossing angle $\alpha 2$ in Fig. 15 (B), and thus changes so as to have a steep inclination of the crossing angle $\alpha 1$ in Fig. 15(A), and in addition, the angle $\theta 2$ at which the front link 252 and the rear link 251 are folded in two gradually spreads from approximately "less than 90 degrees," and at a stage where the angle $\theta 1$ at which the link is folded in two as shown in Fig. 15 (A) becomes approximately "130 degrees," further rotation is prevented.

[0161] As a result, the projected corner canvas G1 which spreads into the corner space portion and the roller supporting frame F1 change in state while the angle at which the V-shaped arms V1, V2 are folded in two spreads to " $\theta 1$ from $\theta 2$," and at the stage of the crossing angle $\alpha 1$, the V-shaped arms V1, V2 are prevented from rotating further, and thus, a stable state where the canvas is spread and stretched out can be achieved.

[0162] Here, in the case of the above, the width to which the projected corner canvas G1 is unwound to the front and the length of the connection wires 193, 194 are limited, and thus, the angle at which the V-shaped arms V1, V2 half spread can be appropriately adjusted. In this case, it is not necessary to restrict the angle of the rear link 251 or the front link 252 using the stoppers 201 and 202.

[0163] In addition, the base end portion and the front end portion of the V-shaped arm V2 in the rear of the device can be attached in the vicinity of the rear end of the transverse guide frame K1 and the roller supporting frame F1.

Concerning Fourth Embodiment

[0164] The single device S2b shown in Figs. 16(A) to 16(E) is provided in the case where the length of the links, including the rear links 251 and the front links 252 of the V-shaped arms V1, V2, is relatively long in comparison with the case of the third embodiment, the location in which the V-shaped arm V1 is attached in the front of the device is the same, and the location in which the V-

shaped arm V2 is attached in the rear of the device is different, and the bracket 261 in the base end portion of the V-shaped arm V2 is attached in a lower portion at the rear end of the transverse guide frame K1 while the bracket 262 in the front end portion is attached to the rear end portion of the roller supporting frame F1.

[0165] Therefore, as shown in Fig. 16(A), the V-shaped arm V1 is folded into a reverse L shape at a stage where the projected corner canvas G1 stretches out into the corner space portion, and thus, the front link 252 overlaps with the front half lower portion of the roller supporting frame F1, and the rear link 251 is placed in a vertical state as viewed in a plan view.

[0166] Meanwhile, the V-shaped arm V2 in the rear of the device is folded in an upside-down L shape, and thus, the rear link 251 overlaps with the rear half lower portion of the transverse guide frame K1, and the front link 252 becomes vertical as viewed in a plan view showing the configuration of the links.

[0167] In other words, a case is provided where the angle $\alpha 1$ as shown in Fig. 15 (A) is "90 degrees," $\theta 1$ is "90 degrees" and $\beta 1$ is "0 degrees."

[0168] In addition, when the roller supporting frame F1 pushed out in parallel to the front slide, the V-shaped arms V1, V2 are half open with the angle $\theta 2$ at which the V-shaped arms V1, V2 are folded in two at approximately "60 degrees" in the case of Fig. 16 (C).

[0169] Thus, as shown in Fig. 16 (A), when the roller supporting frame F1 of the projected corner canvas G1 which is stretched out into the corner space portion slides to the rear of the device, the V-shaped arms V1, V2 are folded in two, as shown in Fig. 16(C), with the state shown in Fig. 16(B) in between, and a half-open state where the angle at which the arms are folded in two is approximately "60 degrees" is maintained.

[0170] Other configurations and the process of operation are the same as in the case of the third embodiment, and therefore, the descriptions thereof are omitted.

Concerning Third Group

[0171] As shown in Figs. 17 to 20, the single devices S3a and S3b in the third group are formed of a transverse guide frame K1 attached to a wall portion of the projected corner portion N1, a transverse guide rail R1 attached to the front end portion of the foldable arms V1, V2, a roller supporting frame F1 which is engaged and inserted along the guide rail R1, winding rollers J1, J2 which are supported by the supporting frame F1 through bearings, and the projected corner canvas G1 attached to the winding rollers J1, J2 and the slider 22.

Concerning Fifth Embodiment

[0172] The single device S3a according to the fifth embodiment shown in Figs. 17 (A) to 17(E) and 18(A) is described below.

[0173] This corresponds to a case where the single

device S1a in the first and fourth embodiments disclosed in the present applicant's prior applications 3 and 4 is modified to an invention having a front winding structure.

[0174] In the roller supporting frame F1a shown in Fig. 18, guide protrusions 126 and 127 are provided on the rear surface of the front plate portion 121 at a distance in the up-down direction, and guide trenches are created in upper and lower locations on the inside of the rear end.

[0175] R1 is a transverse guide rail for the roller supporting frame F1a which is formed of a rail portion 331 in an approximately vertical plate form, a horizontal arm portion 332 which is bent into an L shape to the rear from the center portion on the back surface and a vertical arm portion 333, and from among these, the vertical arm portion 333 is secured to the bracket 262 of the V-shaped arms V1, V2.

[0176] Accordingly, guide protrusions 126 and 127 for the roller supporting frame F1a are engaged in the both end portions, upper and lower, of the rail portion 331 of the transverse guide rail R1, so that the roller supporting frame F1a slides along the transverse guide rail R1.

[0177] Other configurations are the same as in the case shown in Fig. 3(A), and the same symbols are attached, and the description thereof is omitted.

Concerning Process for Moving Projected Corner Canvas Backward and Winding and Containing Projected corner canvas

[0178] As shown in Fig. 17(A), in order to wind up the projected corner canvas G1 stretched out in the corner space portion, first the front end hook portion of an operation rod (not shown) is engaged with the engagement portion 28 of the roller supporting frame F1a from beneath, and then the roller supporting frame F1a slides to the rear of the device.

[0179] Then, the roller supporting frame F1a of the bottom hem 2 of the canvas slides backward along the transverse guide rail R1, and following this, the slider 22 of the top hem 1 of the canvas also slides backward along the transverse guide frame K1. As a result, the projected corner canvas G1 is pulled down in parallel to the rear of the device while maintaining its spread state, as shown in Fig. 17 (B) .

[0180] Next, in the case of the winding roller J1 in the first example, an operation rod (not shown) is engaged with the hook 164 of the manually operable device and rotated. In addition, in the case of the winding roller J2 in the second example, the electrical motor M1 is driven to wind up the canvas.

[0181] Then, the projected corner canvas G1 is wound up around the winding rollers J1, J2 with the front surface of the bottom hem 2 of the canvas facing outward and the rear surface facing inward, as shown in Figs. 17(B) to 17(D).

[0182] At this time, the V-shaped arms V1, V2 are folded against the elastic pressing resilience by means of a spring or the like incorporated in the connection portions

at which the arms are folded in two, and contained while the transverse guide rail R1 and the roller supporting frame F1a are linearly translated toward a wall portion.

5 Concerning Process for Unwinding and Spreading Projected Corner Canvas

[0183] Next, in the case where the projected corner canvas G1 wound around the winding rollers J1, J2 is spread toward the front of the building, the operation rod which is engaged with the hook 164 of the manually operable device is rotated in the direction opposite to that above through the operation, or the electric motor M1 is driven so as to rotate in the direction of unwinding.

[0184] Then, the projected corner canvas G1 that has been wound around the winding rollers J1, J2 is unwound, and the elastic resilience of the V-shaped arms V1, V2 that have been folded in a wall portion is released, so that the V-shaped arms V1, V2 are rotated by means of the pressing resilience in such a direction as to spread, and as shown in Figs. 17(D) to 17(B), the roller support frame F1a is pushed out linearly to the front while moving in parallel.

[0185] As a result, the projected corner canvas G1 is unwound to the front of the front wall W1 so as to spread and be supported in a tense state.

[0186] Next, the front end hook portion of the operation rod (not shown) is engaged from beneath with the engaging portion 28 of the roller support frame F1a, and after that, the front end hook is slid toward a corner space portion through operation.

[0187] Then, the roller supporting frame F1a of the bottom hem 2 of the canvas moves forward along the transverse guide rail R1, and following this, the slider 22 of the top hem 1 of the canvas also slides along the transverse guide frame K1.

[0188] As a result, the projected corner canvas G1 moves forward while maintaining its spread state, as shown in Figs. 17(B) and 17(A), so that the canvas spreading portion X2 is stretched out into the corner space portion, and the outside of the building including the corner space portion of the projected corner portion N1 is covered.

[0189] In the case of the above, the connection wires 193 and 194 prevent the projected corner canvas G1 from changing in a plane when the spread projected corner canvas G1 slides, so that the slider 22 and the projected corner canvas G1 slide smoothly without fail.

50 Concerning Sixth Embodiment

[0190] The single device S3b according to the sixth embodiment shown in Figs. 19 (A) to 19(D) and 20(A) to 20 (C) is described below.

[0191] This is a combination of the above described first embodiment and the fifth embodiment, and a case where the V-shaped arm V1 in the front end portion of the device in the fifth embodiment is replaced with a fold-

able arm Y1 which is in a reverse y shape in a plan view and supported by means of a pressing force in such a manner so as to be freely spreadable (hereinafter referred to as arm in Y shape).

[0192] The Y-shaped arm Y1 is formed of a main link 291 and a sub-link 292 having approximately half the length of the main link 291, of which the rear end portion is supported around a pin in the vicinity of the middle portion of the main link.

[0193] From among these, the axis pin 263 in the front end portion of the main link 291 protrudes in the vicinity of the middle of the bottom plate portion 123 of the roller supporting frame F1a. In addition, the bracket 262, which is supported around a pin in the front end portion of the sub-link 292, secures the front end portion of the transverse guide rail R1.

[0194] In addition, a spring having an appropriate elasticity (not shown) is incorporated in an axial portion in the base end portion of the main link 291, and the elastic force presses the main link 291 in such a direction that it swings in the opening direction. In addition, a spring, a tensile wire (not shown) or the like is incorporated in the connection portion, where the middle portion of the main link 291 and the sub-link 292 are folded in two, so that the connection portion is pressed in such a direction that the link opens.

[0195] Other configurations are the same as in the case of the fifth embodiment, and therefore the same symbols are attached in the drawings, and the description thereof is omitted.

Concerning Process of Winding and Containing Projected Corner Canvas

[0196] As shown in Fig. 19(A), when the projected corner canvas G1 which is stretched out into the corner space portion is wound up, a link portion made up of a link rear half portion of the main link 291 and a sub-link 292 in the Y-shaped arm Y1 and the V-shaped arm V2 in the rear of the device are folded against the elastic pressing force due to a spring or the like which is incorporated in the connection portion which is foldable in two, as shown in Figs. 19(B) to 19(D), and from among these, the front end portion of the main link 291 rotates to the rear against the elastic pressing force, due to a spring or the like incorporated in the base end portion, and thus, the canvas is pushed and spread.

[0197] Then, the roller supporting frame F1a is guided and slid to the rear along the transverse guide rail R1 while the entire device translates toward a wall portion diagonally backward, and at the same time, the tensile force of the projected corner canvas G1 generated when the canvas is wound up is applied to the slider 22 of the top hem 1 of the canvas, and in addition, the tensile force of the connection wires 193, 194 is applied to the front end portion of the slider 22, and as a result, the slider 22 moves backward along the transverse guide frame K1.

[0198] As a result, as shown in Fig. 19(D), the projected

corner canvas G1 is wound around the winding rollers J1, J2 of the roller supporting frame F1a so as to be stored in a wall.

Concerning Process of Unwinding and Spreading Projected Corner Canvas

[0199] Next, in the case where the projected corner canvas G1 wound around the winding rollers J1, J2 is stretched out toward the corner space portion, an operation rod engaged with the hook 194 of the manually operable device is rotated in the direction opposite to the above, or the electric motor M1 is driven for reverse rotation.

[0200] Then, the projected corner canvas G1 wound up around the winding rollers J1, J2 is unwound and the elastic pressing force of the Y-shaped arm Y1 and the V-shaped arm V2, which are folded up in a wall portion, is released, so that the both Y1 and V2 are pressed by means of the pressing force in the direction in which the canvas opens, and as shown in Figs. 19(D) to 19(A), the roller supporting frame F1a slides and moves forward along the transverse guide rail R1 and translates diagonally forward so as to linearly push out the canvas.

[0201] At this time, the elastic pressing force to the front of the main link 291 of the Y-shaped arm Y1 which is applied to the roller supporting frame F1a, the tensile force of the projected corner canvas G1 and the tensile force of the connection wires 193, 194 to be unwound apply a tensile force to the slider 22 of the top hem 1 of the canvas in the direction toward the front and make the slider 22 slide and move forward along the transverse guide frame K1.

[0202] As a result, the projected corner canvas G1 is stretched out around the outside of the building including the corner space portion of the projected corner portion N1, as shown in Fig. 19(A).

[0203] Accordingly, in the case where the foldable arms are a combination of the above described Y-shaped arm Y1 and V-shaped arm V2, winding and unwinding of the projected corner canvas G1 and translation of the roller supporting frame F1a are carried out efficiently and in synchronization, as compared with the case where the V-shaped arms V1, V2 shown in the fifth embodiment are combined.

Concerning Combination with Conventional Movable Awning Device

[0204] The linear section in the rear half portion of the above described single devices S1a, S1b, S2a, S2b, S3a and S3b can be combined with conventional structures for spreading and winding a rectangular canvas P1, that is to say, a movable awning device Q having a rear winding structure (hereinafter referred to as conventional device), as shown in Figs. 21(A) to 21(C).

[0205] In the figures, K2 is a casing for winding and storing a rectangular canvas P1 and a winding roller 30

which rotates forward and backward through manual operation or electric power operation is incorporated inside the casing, where the top hem of the rectangular canvas P1 is attached.

[0206] Reference numeral 31 is a front bar for securing the bottom hem of the rectangular canvas P1, and it is desirable for it to have approximately the same form as the above described roller supporting frames F1, F1a, or the same form as the front bar R2 shown in Figs. 35(A) to 35(C). V3 and V4 are a pair of V-shaped arms which are freely foldable in two, where a spring or a wire or the like presses the V-shaped arms V3 and V4 in such a direction that the arms are pushed and spread, in the same manner as in the case of the V-shaped arms V1, V2 in the fifth embodiment.

[0207] Then, the front half portion close to the front end of the casing K2 is attached to the rear half bottom portion of the transverse guide frame K1 of the above single devices S1a, S1b, S2a, S2b, S3a, and S3b in such a manner as to approximately overlap. In addition, the V-shaped arms V3 and V4 are secured to the front and the rear of the linear section of the front wall W1 at an appropriate distance from each other at the base end portion.

[0208] Accordingly, when the winding roller 30 of the conventional device Q is wound and rolled by means of a manually operable handle or an electric motor (not shown), the winding roller 30 winds the rectangular canvas P1 with the rear surface facing inward and the front surface facing outward, and thus, the canvas is wound from above, while the V-shaped arms V3 and V4 are folded inward against the elastic resilience of the arms, so that the front bar 31 moves in parallel and is stored in the wall.

[0209] As described above, any of the single devices S1a, S1b, S2a, S2b, S3a and S3b and the conventional device Q can be combined, and thus, the outside of various types of buildings including a corner space portion can be covered as if it were an integrated portion so as to provide a good appearance.

Concerning other Embodiments of Transverse Guide Frame

[0210] The above described single devices S1a, S1b, S2a, S2b, S3a and S3b have an inner slider structure where a slider 22 is incorporated inside a transverse guide frame K1 which is attached to wall portion of the projected corner portion N1 in such a manner so as to be freely rollable, and the top hem 1 of the projected corner canvas G1 is fitted into the canvas engaging trench 223 of the slider 22, but may have an outer slider structure.

[0211] For example, though not shown, the transverse guide frame K1 may be in a pipe form or a rod form and the front and rear portion thereof secured to the both ends of a wall portion, a slider may be engaged and inserted on the outside of the guide frame in such a manner so as to be freely slidable, a canvas engaging trench may

be created in the outer slider in the direction of the axis, and thus the top hem 1 of the projected corner canvas G1 engaged in the trench. Thus, the outer slider slides in either direction, to the front and to the rear, of the transverse guide frame, when the roller supporting frames F1, F1a slide laterally or transversely.

II. Concerning Movable Awning Device Having Interlocking Structure

[0212] Though a case is described in the above where the single device S1a, S1b, S2a, S2b, S3a or S3b in the first to sixth embodiments is attached to one corner portion of the projected corner portion N1 or two of these are attached to the two corner portions of the projected corner portion N1 so as to face each other so that these are individually and manually operated or driven by a motor, the following seven to eleven embodiments are embodiments relating to a case where two of the single devices S1c, S1d, S3c, S3a and S3d belonging to the first and third groups are made to face each other in two portions of the projected corner portion N1 so as to provide a interlocking structure.

Concerning Seventh Embodiment

[0213] First, the movable awning device WS1c according to the seventh embodiment shown in Figs. 22 (A), 22 (B), 25(A) to 25(C) is described below.

[0214] This awning device WS1c corresponds to a case where two single devices S1c on the two sides of the projected corner portion N1 face each other, and the front end portions of the roller supporting frames F1 attached to the front end portions of the V-shaped arms V1, V2 are abutted against each other at a right angle so that the end portions at which they are abutted against each other are connected and integrated through the manually operable interlocking structure shown in Fig. 23 (A) or the corner cap 341 in which the gear interlocking structure shown in Fig. 24 (A) is incorporated. As a result, the two roller supporting frames F1 are connected and integrated in L shape, as viewed in a plane.

[0215] The V-shaped arms V1, V2 are respectively formed of a rear link 251 and a front link 252 which are connected so as to be freely foldable in two to the rear and a connection rod 253 inserted to the connection portion which is foldable in two between the V-shaped arms V1, V2 so that a link is formed.

[0216] From among these, the base end portion of one V-shaped arm V1 is attached to a lower portion at the front end of the transverse guide frame K1 in the vicinity of the corner of the projected corner portion N1, and the front end portion thereof is attached to the lower portion at the front end of the roller supporting frame F1 while the base end portion of the other V-shaped arm V2 is attached to the lower portion in the vicinity of the middle of the transverse guide frame K1, and the front end portion thereof is attached in the vicinity of the lower portion

in the middle of the roller supporting frame F1.

[0217] In addition, a spring (not shown) for pressing the base end portion of the V-shaped arms V1, V2, that is to say, in the base end portion of the rear link 251, in such a direction that the arms open is incorporated in the base end portion of the V-shaped arms V1, V2, and in addition, a spring (not shown), for pressing the two links 251 and 252 in such a direction that the arms open, is incorporated in the connection portion which is foldable in two between the rear link 251 and the front link 252.

Concerning Linked Structure

[0218] Here, the manually operable device shown in Figs. 23(A) to 23(C) is described. This corresponds to a case where the winding roller J1, incorporated in the two roller supporting frames F1, is manually operated.

[0219] Reference numeral 343 is a bearing portion formed inside the corner cap 341, a worm gear 162 is fitted into an upper portion, and a rotational axis 163, where a hook 164 is formed, is supported vertically by the lower end portion.

[0220] Reference numeral 342 is a bearing portion which is horizontally formed inside the cap where axis holes provided on two sides forming a right angle support two winding rollers J1 in which a worm gear 161 which engages with the above described worm gear 162 is fitted, respectively, through bearings.

[0221] As a result, the two winding rollers J1 interlock through gears so as to be freely rotatable forwards and backwards when manually operated.

[0222] In addition, in the case of the gear interlocking device shown in Figs. 24(A) to 24(C), diagonal gears 165 (bevel gears also possible) which are fitted into the front end portions of the winding rollers J2 can be directly engaged with each other, and thus, the two winding rollers J2 interlock through bearings. In particular, in the case where the winding rollers J2 are of an electrical type, the two electrical motors M1 can be driven in synchronization so that the gears interlock.

[0223] Thus, as shown in Figs. 22(A), 22(B) and 25(A), when the winding rollers J1, J2 for winding the canvas are interlocked and rotated by manually operating the winding roller J1 or driving the electrical motors M1 in the two winding rollers J1 in synchronization in order to wind up the projected corner canvas G1 which is stretched out in the corner space portion, the V-shaped arms V1, V2 on the two sides in the projected corner portion N1 rotate diagonally backward against the pressing force for spreading the arms through a bending and stretching operation in a leapfrogging manner, and thus, are folded in a wall portion.

[0224] At the same time, the roller supporting frames F1 which are connected and integrated move backwards linearly to the rear parallel to the center line which equally divides the projected corner portion N1 into two while the roller supporting frames F1 translate towards the corresponding front wall W1 and side wall W2 so as to be

retracted to the respective sides of the projected corner portion N1 and contained in wall portions. In contrast, when the winding rollers J1 are interlocked and rotated so as to unwind the canvas, the respective V-shaped arms V1, V2 stretch to the front due to the elastic pressing force so that the connected and integrated roller supporting frames F1 translate diagonally forward and are linearly pushed out, and thus, the projected corner canvas G1 is stretched out into the corner space portion.

[0225] In the case of the above, though the pair of V-shaped arms, front and rear, are connected through a connection rod 253, and therefore, when the V-shaped arms V1, V2 are folded in two to the rear of the device and bent and stretched in a leapfrogging manner, it is possible for the arms V1, V2 to move smoothly, maintaining a good balance without deviating in an unexpected direction.

Concerning Eighth Embodiment

[0226] Next, the movable awning device WS1d according to the eighth embodiment shown in Figs. 26(A) and 27(A) to 27(C) is described.

[0227] This awning device WS1d corresponds to a case where the link mechanism made up of the V-shaped arms V1, V2 and the connection rod 253 in the first embodiment is replaced with a pair of foldable arms T1, T2 which are parallel to each other and of which the length of the arms is variable (hereinafter, referred to as expanding and contracting arms), two single devices S1d on two sides of the projected corner portion N1 face each other, and a gear interlocking device as shown in Figs. 23(A) and 24(A) is incorporated in the end portions of the roller supporting frames F1, which are abutted against each other.

[0228] As shown in Fig. 26 (B), the expanding and contracting arms T1, T2 are formed by inserting and supporting an inner pipe 252 on the front side into an outer pipe 351 on the rear side so as to freely expand or contract by means of a coil spring 353 or an elastic body made of rubber or the like, which is incorporated inside. A spring (not shown) for pressing the expanding and contracting arms T1, T2, in such a direction that the arms open, is incorporated in the base end portion of the expanding and contracting arms T1, T2.

[0229] Thus, as shown in Figs. 26(A) and 27(A), when the projected corner canvas G1 which is stretched out around the building including the corner space portion of the projected corner portion N1 is wound up by linking the corresponding manually operable or electrically operable winding rollers J1, J2, the respective expanding and contracting arms T1, T2 rotate to the rear against the pressing force so as to translate towards the corresponding front wall W1 and side wall W2 while moving the roller supporting frames F1 backwards.

[0230] However, the two roller supporting frames F1 are connected and secured to each other at the front end portions through the corner cap 341, and therefore, the

two expanding and contracting arms T1, T2 rotate to the rear in arc form at the same time that the outer pipe 351 and the inner pipe 352 rotate to the rear while expanding or contracting relative to each other so as to eventually be folded into a wall portion as shown in Fig. 27(C). At the same time, the two roller supporting frames F1 are pulled towards the corner portion of the projected corner portion N1 and stored in the wall.

[0231] To the contrary, as shown in Fig. 27 (C), when the two winding rollers J1, J2 are interlocked and rotated for unwinding the canvas, the respective expanding and contracting arms T1, T2 rotate while expanding in such a direction that the arms open diagonally forward due to the elastic pressing force so as to linearly push out the connected roller supporting frames F1 diagonally forward, and thus, the projected corner canvas G1 is spread in the corner space portion.

Concerning Ninth Embodiment

[0232] Next, the movable awning device WS3c according to the ninth embodiment shown in Figs. 28 and 29(A) to 29(C) is described.

[0233] This corresponds to a case where two single devices S3c, which belong to the third group, are incorporated in the two sides of the projected corner portion N1, and unlike the case of the expanding and contracting arms T1, T2 in the eighth embodiment, the transverse guide rail R1 of the roller supporting frame F1a is attached to the front end portions of the I-shaped arms I1, I2 having a constant length. A spring (not shown) for pressing the arms in such a direction that the arms open is incorporated in the base end portion of the I-shaped arms I1, I2.

[0234] Then, as shown in Figs. 28 and 29(A), when the projected corner canvases G1 which spread in two directions are wound up by interlocking the respective winding rollers J1, J2, the respective I-shaped arms I1, I2 rotate to the rear against the pressing force for spreading the canvases, and at the same time, move the two roller supporting frames F1a backwards so that the roller supporting frames translate towards the corresponding front wall W1 and side wall W2.

[0235] However, the two roller supporting frames F1a are linked and secured through the front end portions thereof, and therefore, the two I-shaped arms I1, I2 rotate to the rear and slide the transverse guide rail R1 to the rear along the roller supporting frames F1a as shown in Fig. 29(B), and then slide the rail forward so as to rotate to the rear and eventually be folded in a wall portion, and at the same time, the integrated roller supporting frames F1a are pulled towards the corner portion so as to be stored in the wall.

[0236] To the contrary, when the two winding rollers J1, J2 are interlocked and rotated for unwinding, the respective I-shaped arms I1, I2 rotate in such a direction that the arms open diagonally forward due to the elastic pressing force, and the integrated roller supporting frames F1a are linearly pushed out while translating to-

wards the corner space portion diagonally forward so that the projected corner canvases G1 are stretched out around the two sides of the projected corner portion N1 including the corner space portion.

Concerning Tenth Embodiment

[0237] Next, the movable awning device WS3a according to the tenth embodiment shown in Figs. 30 and 31(A) to 31(C) is described.

[0238] This is formed, as shown in Figs. 23 and 24, in such a manner so that the two single devices S3a in the third group shown in Fig. 17 are incorporated in the two sides of the projected corner portion N1, and the front end portions of the respective roller supporting frames F1a are abutted against each other at a right angle where the corner portions thereof are connected and secured through a corner cap 341.

[0239] Then, as shown in Figs. 30 and 31(A), when the projected corner canvases G1 which spread in two directions are wound up by interlocking the respective winding rollers J1, J2, the respective V-shaped arms V1, V2 are folded in two against the elastic pressing force, and at the same time, the two roller supporting frames F1a are slid to the rear along the transverse guide rail R1 so as to translate towards the corresponding front wall W1 and side wall W2, and thus, the connected roller supporting frames F1a are pulled towards the corner portions of the projected corner portion N1 and stored in the walls.

[0240] To the contrary, when the two winding rollers J1, J2 are interlocked and rotated for unwinding, the respective V-shaped arms V1, V2 are pushed and spread to the front due to the elastic pressing force at the same time the connected and integrated roller supporting frames F1a are pushed out linearly to the front while translating, and thus, the projected corner canvases G1 are stretched out around the outside of the two sides including the corner space portion of the projected corner portion N1.

Concerning Eleventh Embodiment

[0241] Next, the movable awning device WS3d according to the eleventh embodiment shown in Figs. 32 (A) to (C) and Figs. 33 (A) and (B) is described.

[0242] This is provided with a foldable link mechanism which makes it possible for one V-shaped arm V1 according to the above described tenth embodiment to laterally slide along the roller supporting frame F1a without fail.

[0243] In Figs. 32(A) to 32(C) and in Figs. 33(A) and 33(B) which illustrate the movement of the main portion, reference numeral 254 is a bent link which is formed so as to protrude from the front end portion of the front link 252 in the V-shaped arm V1 and be bent at approximately a right angle to the outside, and the portion thereof in the vicinity of the bent portion is supported around a pin by

the bracket 263 attached to the front end portion of the front bar F1a.

[0244] Reference numeral 78 is a connection rod which is connected to the front end portion of the bent link 254, and the front end portion is connected to the corner plate 77 which is secured to the recessed corner portion of the two roller supporting frames F1a. In addition, the same configuration as the above is incorporated in the other roller supporting frame F1a, thereby providing symmetry.

[0245] Then, when the projected corner canvases G1 which are spread in two directions in the projected corner portion N1 are wound up, the complex device WS3d changes its form as shown in Figs. 32(A) to 32(C), and at the same time, is drawn into the two wall portions so as to be contained in a compact manner.

[0246] When the main portion operates, as shown in Fig. 33(B), the rear link 251 and the front link 252 of the V-shaped arm V1 are folded in two against the elastic pressing force, and together with this, the bent link 254 which is integrated with the front link 252 rotates to the rear around the bracket 262, which works as a fulcrum, so that the bent link 254 and the connection rod 78 are gradually folded in two toward the rear.

[0247] As a result, the rear link 251 and the front link 252 are folded and stored in the corner end portion on the front side W1 of the projected corner portion N1, and the bent link 254 and the connection rod 78 enter into the corner end portion on the side wall W2 side of the projected corner portion N1 so as to be folded and stored in such a state so as to being folded in a reverse manner.

[0248] In this link mechanism, the roller supporting frame F1a mechanically links with two front bars F2a, which linearly translate towards wall portions, while linearly moving in a diagonal direction by which the corner space portion is divided equally.

[0249] Here, though the angle θ at which the front link 252 and the bent link 254 are bent is an approximate right angle in the case of the above, the angle θ is approximately the same angle of the projected corner portion N1 in the case where the angle in the projected corner portion N1 is an acute angle or an obtuse angle.

[0250] Here, in the case of the above, though the two roller supporting frames F2 move forwards and backwards along the transverse guide rail R1 in the foldable link mechanism made up of a bent link 254, which is integrated with the front link 252 of the V-shaped arm V1, and a connection rod 78 in the case of the above, this can be replaced with a Y-shaped arm Y1 which is formed of a main link 291 {the front half portion of the main link is added in Fig. 33 (B) with imaginary lines} and a sub-link 292 in a reverse y shape in the same manner as in the single device S3b in the sixth embodiment so that the rear end portion of the transverse guide rail R1 can be supported by the V-shaped arm V2, which is foldable in two.

III. Concerning Complex Type Movable Awning Device

[0251] In the complex devices SQII1 to 3 according to the present invention, as shown in Figs. 34 to 38, the awning devices S4a and S4b having a front winding structure for the projected corner canvases G1, G2 (hereinafter referred to as awning devices for projected corner) and awning devices Q1, Q2 having a rear winding structure for the rectangular canvases P1, P2 which are either long or short (hereinafter referred to as rectangular awning devices) are organically combined and connected so as to be integrated.

[0252] This corresponds to a case where the projected corner awning device in the complex device SQII1 in the tenth embodiment, which is disclosed in the present applicant's prior application 2, is modified to an invention having a front winding structure.

Concerning First Embodiment

[0253] The complex device SQII1 in the first embodiment is described in reference to Figs. 34 (A), 34(B), 35 (A) to 35(C) and 36(A) to 36(D).

[0254] First, a transverse guide frame K1a is attached to a wall portion close to the corner of the projected corner portion N1, so that the transverse guide frame becomes upside down, as compared to the case of the above described single devices S1a, S1b, S3a and S3b, a slider 22 having small wheels 231 is incorporated inside the frame in such a manner so as to be freely slidable, and the top hem 1 of the projected corner canvas G1 is fitted in the canvas engaging trench 223 in the slider 22.

[0255] A winding roller J1 to J3 for winding and unwinding the projected corner canvas G1 and the roller supporting frame F2 for this roller are formed on the front side.

[0256] The details of other parts of the awning device S4a for a projected corner are the same as in the case of the above described single devices S1a, S1b, S3a and S3b, and therefore, the same symbols are attached in the drawings, and the description thereof is omitted.

[0257] K2 is a casing for winding up and containing a rectangular canvas P1, and a winding roller 30 for the rectangular canvas P1 is supported inside through bearings.

[0258] The casing K2 is either attached in such a manner so that the front half portion of the casing K2 overlaps with the outer wall W1 in the linear section of the transverse guide frame K1a spanning from an upper portion in the rear half portion, or indirectly secured by means of an appropriate supporting bracket (not shown) in such a manner so that the angle of inclination to the front can be freely changed and adjusted if necessary.

[0259] A canvas engaging trench 301 is created in the winding roller 30 in the direction of the axial line, and the top portion of the canvas faces the engaging trench 301 and is secured by means of a wire 302 in such a manner that it cannot come out.

[0260] Reference numeral 132 is an outlet opening in a lower portion on the front of the casing K2 through which the rectangular canvas P1 is drawn out.

[0261] R2 is a front bar for the rectangular canvas P1 which is formed so as to have a slightly larger outer form than the roller supporting frame F2, so that the roller supporting frame F2 for the projected corner canvas G1 is fitted in such a manner so as to be freely slidable laterally, and formed of a front plate portion 421 of which the front is in arc form, an upper eave portion 422, a horizontal bottom plate portion 423 and a rear plate portion 424 which rises in such a state as to incline backward.

[0262] A canvas engaging trench 420 is created in the rear end portion of the upper eave portion 422, and the bottom hem of the rectangular canvas P1 faces a portion in the rear and is secured by a wire 303 in such a manner so that it cannot come off.

[0263] As a result, the front bar R2 on the outer side functions as a transverse guide rail for the roller supporting frame F2 on the inner side, and in addition, in order for this function to be stable, the front bar R2 extends from the rear end portion of the device to the vicinity of the corner end portion of the projected corner portion N1 in the front end portion of the device.

[0264] A Y-shaped arm Y1 formed of a main link 291 and a sub-link 292 which are linked in a reverse y shape and a V-shaped arm formed of a rear link 251 and a front link 252 which are formed so as to be freely foldable in two are attached to both end portions, front and rear, of the front bar R2.

[0265] Reference numeral 36 is a bracket which protrudes to the rear from the vicinity of the middle of the roller supporting frame F2, and an axis pin 263 which protrudes from the front end portion of the main link 291 is loosely engaged in an engagement hole 361 created in the rear end portion of the bracket. In addition, the bracket 262, which is supported by the front end portion of the sub-link 292 around a pin, is pressed against the bottom plate portion 423 and the rear plate portion 424 in the vicinity of the front end of the front bar R2 and secured with a bolt and nut.

[0266] Here, the front end portion and the rear end portion of the spread rectangular canvas P1 form vertical portions 7 and 8 of the canvas, as shown in Figs. 31(A) and 31(B).

[0267] In addition, a manually operable device which is similar to the winding roller J1 shown in Fig. 5, an electrical device similar to the winding roller J2 shown in Fig. 9, or in some cases, a coil spring similar to the winding roller J3 shown in Fig. 10 is incorporated in one axis end portion, front or rear, of the winding roller 30. Concerning Process for Winding and Containing Projected Corner Canvas and Rectangular Canvas

[0268] As shown in Figs. 34 (A) to 36(A), an electrical motor M1 incorporated in the winding roller J2 of the awning device S4a for a projected corner and an electrical motor (not shown) incorporated in the winding roller 30 of the rectangular awning device Q1 are in synchroniza-

tion when driven for winding and also contains the rectangular canvas P1, which spreads to the front.

[0269] Then, the rectangular canvas P1 and the projected corner canvas G1 are wound around the winding roller 30 on the wall side and the winding roller J2 on the front side, respectively, and at the same time, the Y-shaped arm Y1 in the front end portion of the device and the V-shaped arm V2 in the rear end portion of the device are folded in two against the opening and pressing force, for example of a spring or the like incorporated in the connection portion which is foldable in two, and thus, the front bar R2 and the roller supporting frame F2 translate toward the wall portion.

[0270] At this time, the rear half portion of the sub-link 292 and the main link 291 of the Y-shaped arms Y1 in the front end portion of the device are folded in two, and in addition, the main link 291 swings and rotates to the rear, so that the axis pin 263 in the front end portion pushes the bracket 36 of the roller supporting frame F2 to the rear.

[0271] Then, the roller supporting frame F2 slides laterally to the rear along the front bar R2 which translates to the wall side, and thus translates diagonally backward, so that the projected corner canvas G1 is wound up around the winding roller J2, and at the same time, the slider 22 of the top hem 1 of the canvas slides to the rear along the transverse guide frame K1a and is drawn downward.

[0272] As a result, the rectangular canvas P1 and the projected corner canvas G1 can be contained in a wall portion in a compact manner, through the process shown in Figs. 36 (A) to 36(D).

[0273] In this case, the projected corner canvas G1 is wound around the winding roller J2 from above with the front surface of the bottom hem 2 of the canvas facing outward and the rear surface facing inward, while the rectangular canvas P1 is wound around the winding roller 30 from beneath with the front surface of the top hem of the canvas facing inward and the rear surface facing outward, and thus, the gap between the two canvases G1 and P1 is prevented from being enlarged.

Concerning Process for Unwinding and Spreading Projected Corner Canvas and Rectangular Canvas

[0274] Next, in the case where the projected corner canvas G1 and the rectangular canvas P1 wound around the winding rollers J2 and 30, respectively, are spread to the front of the building including the corner space portion, the electrical motor M1 of the winding roller J2 and the electrical motor of the winding roller 30 are driven so as to rotate in the direction opposite to that above.

[0275] Then, the projected corner canvas G1 wound up around the winding roller J2 and the rectangular canvas P1 wound up around the winding roller 30 are unwound respectively, and in addition, the elastic pressing force of the Y-shaped arm Y1 and the V-shaped arm V2 folded up in a wall portion is released, so that the pressing

force rotates the two arms Y1 and V2 in such a direction that the arms open, and the front bar R2 is linearly pushed out so as to translate to the front.

[0276] At this time, the main link 291 in the Y-shaped arm Y1 in the front end portion of the device rotates to the front, which is opposite to the above, and thus, the bracket 36 of the roller supporting frame F2 is pushed out by the axial pin 263 in the front end portion toward the front end on the left side.

[0277] Then, the roller supporting frame F2 slides laterally along the front bar R2 which translates to the front, and thus, translates diagonally forward so as to unwind and spread the projected corner canvas G1, and at the same time, the slider 22 of the top hem 1 of the canvas slides forward along the transverse guide frame K1a and is drawn out toward the front end.

[0278] As a result, the rectangular canvas P1 and the projected corner canvas G1 are spread through the process shown in Figs. 36(D) to 36(A), and eventually the projected corner canvas G1 is stretched out to the outside of the building including the corner space portion, and the rectangular canvas P1 is spread to the front of the front wall W1 in such a state so that the rear end portion of the projected corner canvas G1 and the front end portion of the rectangular canvas P1 overlap in an appropriate manner.

[0279] Here, though in the above, a case where the awning device S4a for a projected corner and a rectangular awning device Q1 are interlocked with respective electrical motors which work in synchronization is described, one of the winding roller J2 and the winding roller 30 can be used as a following roller in which a coil spring 47 is incorporated, as shown in Fig. 10, and the other can be combined as a roller for electrical or manual drive.

Concerning Second Embodiment

[0280] In the case of the complex device SQII2 in the second embodiment shown in Figs. 37 (A) and 37 (B), a long winding roller 30a which extends from the rear end portion of the device to the front end portion of the device and a casing K2 for this are formed on the wall side, and the top hem of the rectangular canvas P2 having approximately the same length as the winding roller 30a and the bottom hem are attached to the winding roller 30a and the front bar F2 on the front side, respectively.

[0281] Accordingly, the rectangular awning device Q2 is gained by combining the winding roller 30a, the rectangular canvas P2 and the front bar R2 for the canvas, which are all long, and other parts of the configuration and the operation are the same as in the case of the first embodiment, and therefore, the same symbols are attached, and the description thereof is omitted.

[0282] In the case of this rectangular awning device Q2, the rectangular canvas P2 can be wound and unwound with good balance.

Concerning Third Embodiment

[0283] The complex device SQII3 in the third embodiment shown in Figs. 38(A) and 38(B) is gained by replacing the projected corner canvas G1 in trapezoid form with right angles in the complex device SQII2 in the second embodiment with a projected corner canvas G2 having an approximate triangular form when spread (hereinafter referred to as triangular canvas), and used as an awning device S4b for a projected corner for a triangular canvas G2.

[0284] Through holes 531 and 532 in a bag form are created along the two diagonal portions 3a, 3b of the triangular canvas G2 and connection wires (not shown) penetrate through these through hole, and an engaging piece in the front end portion of the wires is attached to the both end portions, front and rear, of the winding rollers J1 to J3 for the triangular canvas G2, as in the case shown in Fig. 4.

[0285] A transverse guide frame K1a which is relatively short is attached in a portion of the projected corner portion N1 close to an end portion of the corner, and a short slider 12a is incorporated in this guide frame K1a in such a manner so as to be freely rollable. In addition, the terminal portion of the two wires drawn out from the apex of the triangular canvas G2 also penetrates through the wire attachment hole 224 in the slider 22a and is secured by means of a screw 103 in such a manner so that it cannot come off, as shown in Fig. 4.

[0286] In this case, the spread triangular canvas G2 is supported with tension by means of connection wires which penetrate through the diagonal portions 3a, 3b of the canvas, and therefore, the canvas can be prevented from changing in shape in a plane when wound or sliding laterally, and the smooth lateral movement of the slider 22a can be secured.

[0287] Here, when the triangular canvas G2 is wound around the winding rollers J1 to J3, the canvas bottom hem having a great width for winding is on the inner surface side, and the width for winding becomes gradually shorter, and in the end, the apex having a short width is wound up.

[0288] Therefore, it is not necessary to take into consideration bulking up the diameter of the winding roller and the like as shown in Figs. 41 and 42 in the applicant's prior application 4 and Figs. 16 and 17 in the applicant's prior application 5.

[0289] Other configurations and the operation are the same as in the case of the first and second embodiments, and therefore, the same symbols are attached, and the description thereof is omitted.

Concerning Fourth Embodiment

[0290] In the complex device WSQIV1 shown in Fig. 39, two complex devices SQII4 where an awning device S5a for a projected corner and a rectangular awning device Q1 are connected and integrated are secured on

the two sides of the projected corner portion N1 in such a manner as to face each other, and connected and secured in such a manner that they interlock.

[0291] Thus, two roller supporting frames F2 on the front side are abutted against each other at an approximate right angle which is the same angle as in the projected corner portion N1, and the end portions which are pressed against each other are connected through a corner cap 341, as in the case shown in Figs. 23 and 24, or through a corner plate 77, as shown in Fig. 33.

[0292] In addition, the front bar F2 is supported by the V-shaped arms V1, V2, which are made up of a rear link 251 and a front link 251 which are attached in the vicinity of the both ends, front and rear, of the front bar, in such a manner so as to be freely translatable.

[0293] In the case of the above described complex devices SQII1 to 3 in the first to third embodiments, a portion close to the front end of the front bar R2 is supported by the Y-shaped arm Y1, and thus, it is necessary to slide the roller supporting frame F2 laterally, while in the case of the fourth embodiment, the two roller supporting frames F2 are connected and integrated. Therefore, it is sufficient to support both end portions of the front bar R2, front and rear, with V-shaped arms V1, V2.

[0294] Other configurations are the same as in the case of the first embodiment, and therefore, the description thereof is omitted.

Concerning Fifth Embodiment

[0295] The complex device WSQIV2 shown in Fig. 40 is gained by providing two complex devices SQII5 where an awning device S5b for a projected corner and a rectangular awning device Q2 are connected and integrated on the two sides of the projected corner portion N1 in such a manner so that they face each other and are connected and secure.

[0296] In this case, the projected corner canvas G2 in the awning device S5b for a projected corner is replaced with a triangular canvas G2, as in the above described third embodiment and unlike in the case of the fourth embodiment, and together with this, the winding roller 30a and the rectangular canvas P2 in the rectangular awning device Q2 have a long structure. Other configurations are the same as in the fourth embodiment.

Industrial Applicability

[0297] The present invention provides a single type movable awning device having a novel and original front winding structure for projected corner canvases G1, G2 which is technically interesting and useful, as described above, as well as a complex awning device where this awning device and a rectangular awning device having a rear winding structure are combined, and therefore, the appearance of the corner space portion in the projected corner portion of various types of buildings or the outside of buildings including a space portion is greatly improved,

and thus, the invention greatly contributes to progress and development in the art.

5 Claims

1. A movable awning device, **characterized in that** a roller supporting frame F1 is attached to the front end portion of foldable arms I1, I2, L1, L2, V1 and V2, winding rollers J1 to J3 for winding and unwinding a projected corner canvas G1 are supported by the roller supporting frame F1 through bearings, a slider 22 is attached to a transverse guide frame K1 provided on the wall side, and a top hem 1 of the projected corner canvas G1 is attached to the slider 22.
2. The movable awning device, according to Claim 1, wherein the foldable arms are straight I-shaped arms I1, I2 which are formed so as to be parallel to each other at a distance from each other, the projected corner canvas G1 is wound and unwound around the winding rollers J1 to J3 so that the roller supporting frame F1 translates diagonally, and the slider 22 of the canvas top hem 1 slides in both directions, to the front and to the rear, of the transverse guide frame K1 in the configuration (S1a).
3. The movable awning device, according to Claim 1 or 2, wherein the projected corner canvas G1 wound around the winding rollers J1 to J3 is unwound so as to be spread while the winding rollers J1 to J3 and the roller supporting frame F1 are pushed out in parallel toward the diagonally front corner space portion, and the slider 22 of the canvas top hem 1 slides forward to the front end portion of the transverse guide frame K1 (S1a).
4. The movable awning device, according to Claim 1 or 2, wherein a projected corner canvas G1 which protrudes in the corner space portion is wound around the winding rollers J1, J2 while the winding rollers J1, J2 and the rollers supporting frame F1 thereof are drawn diagonally backward in parallel so as to be stored, and the slider 22 of the canvas top hem 1 slides backward to the rear of the transverse guide frame K1 in the configuration (S1a).
5. The movable awning device, according to Claim 2, wherein a base end portion of one I-shaped arm I1 from among the I-shaped arms I1, I2 is attached in the vicinity of the corner of the projected corner portion N1 and the front end portion of the I-shaped arm I1

is attached in the vicinity of the middle of the roller supporting frame F1, and
the base end portion of the other I-shaped arm I2 is attached in the middle of the vicinity of the of the transverse guide frame K1 and the front end portion of the I-shaped arm I2 is attached in the vicinity of the rear end of the roller supporting frame F1 (S1a).

6. The movable awning device, according to Claim 1, wherein
the foldable arms are a pair of L-shaped arms L1, L2 which rotate in parallel through an operation having two stages, and the L-shaped arms L1, L2 are formed of a rear link 271 and a front link 272 which are connected so as to be freely foldable, where the connection portion which is foldable in two is formed of the links connected through a connection rod 273,
the protruded corner canvas G1 can be wound and unwound around the winding rollers J1, J2, and thus, the L-shaped arms L1, L2 are bent and extended through an operation having two stages, and thereby, the roller supporting frame F1 translates in a diagonal direction and the slider 22 of the top hem 1 of the canvas slides in either direction, to the front or rear, of the transverse guide frame K1 in the configuration (S1b).
7. The movable awning device, according to Claim 6, wherein
the base end portion of the rear link 271 of the L-shaped arm L1, from among the L-shaped arms L1, L2 is attached in the vicinity of the corner of the projected corner portion N1,
the front end portion of the front link 272 is attached in the vicinity of the middle of the roller supporting frame F1,
the base end portion of the rear link 271 of the L-shaped arm L2 is attached to a location at an appropriate distance from the rotation of the corner,
the front end portion of the front link 272 is attached in the vicinity of the rear end of the roller supporting frame F1,
a spring having a relatively weak elasticity is incorporated in the base end portion of the rear link 271, and
a spring having a relatively strong elasticity is incorporated in the connection portion which is foldable in two between the rear link 271 and the front link 272 (S1b).
8. The movable awning device, according to Claim 6 or 7, wherein
when the spread projected corner canvas G1 is wound around the winding rollers J1, J2, first, the pair of rear links 271, which are pressed by a spring having a somewhat weaker elasticity, rotate in parallel to the rear against the pressure of the elasticity,

and thus, the roller supporting frame F1 is translated diagonally to the rear so as to be folded, and then, the pair of front links 272, which are pressed by a spring having a somewhat stronger elasticity, rotate in parallel to the rear against the pressure of this elasticity, and thus, the roller supporting frame F1 is translated further diagonally backward, and the L-shaped arms L1, L2 are stretched to an approximate linear form and folded in the configuration (S1b).

9. The movable awning device, according to Claim 6 or 7, wherein
when the projected corner canvas G1 wound around the winding rollers J1, J2 is unwound, first, the pair of front links 272 which are pressed by a spring having a somewhat stronger elasticity are rotated in parallel to the front so as to spread at a predetermined angle by means of the spring having this elasticity, and thus, the roller supporting frame F1 is pushed out while being translated diagonally to the front, and then, the pair of rear links 271 which are pressed by a spring having a somewhat weaker elasticity are rotated in parallel so as to spread at a predetermined angle, and thus, the roller supporting frame F1 is pushed out further in parallel diagonally forward in the configuration (S1b).
10. The movable awning device, according to Claim 1, wherein
the foldable arms are V-shaped arms V1, V2 where the rear link 251 and the front link 252 are connected so as to be freely foldable in two, and
the projected corner canvas G1 is wound or unwound around the winding rollers J1, J2 so that the roller supporting frame F1 translates in the front and rear directions, and
the roller supporting frame F1 of the projected corner canvas G1 that has been spread to the front transverses, and thus,
the slider 22 of the top hem 1 of the canvas slides in either direction front or rear of the transverse guide frame K1 in the configuration (S2a, S2b).
11. The movable awning device, according to Claim 1 or 10, wherein
the projected corner canvas G1 wound around the winding rollers J1, J2 is unwound and spread, and in addition,
the roller supporting frame F1 of the winding rollers J1, J2 transverses toward the corner space portion so that the slider 22 of the top hem 1 of the canvas slides forward along the transverse guide frame K1, and thus,
the projected corner canvas G1 stretches out to the outer periphery of the building including the corner space portion (S2a, S2b).

12. The movable awning device, according to Claim 10, wherein
the projected corner canvas G1 that has stretched out into the corner space portion is maintained in a spread state while the winding rollers J1, J2 and the roller supporting frame F1 thereof transverse to the rear of the device, and thus,
the slider 22 of the top hem 1 of the canvas slides to the rear of the transverse guide frame K1, and in addition, the spread projected corner canvas G1 is wound around the winding rollers J1, J2 (S2a, S2b).
13. A movable awning device, **characterized in that** a transverse guide rail R1 is attached to the front end portion of the foldable arms V1, V2, Y1 and Y2, a roller supporting frame F1a is attached to the guide rail R1 so as to be freely slidable, winding rollers J1 to J3 for winding or unwinding the projected corner canvas G1 are supported by the roller supporting frame F1a through bearings, a slider 22 is attached to the transverse guide frame K1 provided on the wall side, and the top hem 1 of the projected corner canvas G1 is attached to the slider 22 (S3a, S3b).
14. The movable awning device, according to Claim 13, wherein
the foldable arms are V-shaped arms V1, V2 where the rear link 251 and the front link 252 are connected so as to be freely foldable in two,
the projected corner canvas G1 is wound and unwound around the winding rollers J1 to J3 so that the roller supporting frame F1a translates in the front and rear directions, and
the roller supporting frame F1a of the spread projected corner canvas G1 is operated so as to slide along the transverse guide rail R1, and thus,
the slider 22 of the top hem 1 of the canvas slides in either direction, to the front or rear, of the transverse guide frame K1 in the configuration (S3a).
15. The movable awning device, according to Claim 14, wherein
the base end portions of the V-shaped arms V1, V2 are attached to the lower portions in the vicinity of the front end and the middle of the transverse guide frame K1, and the front end portions of the arms are attached in the vicinity of the both ends, front and rear, of the transverse guide rail R1 (S3a).
16. The movable awning device, according to Claim 13 or 14, wherein
the projected corner canvas G1 wound around the winding rollers J1 to J3 is unwound and spread, and in addition, slid forward along the transverse guide frame K1 and the transverse guide rail R1 so as to stretch out into the corner space portion (S3a).
17. The movable awning device, according to Claim 14, wherein
the projected corner canvas G1 that has stretched out into the corner space portion is slid backwards along the transverse guide frame K1 and the transverse guide rail R1 while maintaining its spread state, and in addition, wound around the winding rollers J1 to J3 in the configuration (S3a).
18. The movable awning device, according to Claim 13, wherein
the foldable arms are formed of an arm Y1 in Y shape, which is formed of a main link 291 and a sub-link 292 connected in a reverse Y shape, and an V-shaped arm V2 where a rear link 251 and a front link 252 are connected so as to be freely foldable in two,
the projected corner canvas G1 is wound or unwound around the winding rollers J1 to J3 so that the roller supporting frame F1a translates in a diagonal direction, and
the slider 22 of the top hem 1 of the canvas slides in either direction, front or rear, of the transverse guide frame K1 in the configuration (S3b).
19. The movable awning device, according to Claim 18, wherein
the base end portion of the main link 291 of the Y-shaped arm Y1 is attached in the vicinity of the corner of a projected corner portion N1, the front end portion is attached in the vicinity of the middle of the roller supporting frame F1a,
the front end portion of the sub-link 292 of the Y arm Y1 is attached in the vicinity of the front end of the transverse guide rail R1,
the base end portion of the V-shaped arm V2 is attached in the vicinity of the middle lower portion of the transverse guide frame K1, and
the front end portion is attached in the vicinity of the rear end of the transverse guide rail R1 (S3b).
20. A movable awning device, which is gained by combining a movable awning device Q having a rear winding structure which is provided with a rectangular canvas P1, the winding roller 30 and front bar 31 for the rectangular canvas P1, and foldable arms V3 and V4 for supporting the front bar 31 with the movable awning device S1a, S1b, S2a, S2b, S3a or S3b having the front winding structure according to Claim 1 or 13,
a portion of the winding roller 30 of the rectangular canvas P1 close to the front end is approximately overlapped on and attached to the lower portion or the upper portion of the rear half of the transverse guide frame K1.
21. A movable awning device, wherein
the rectangular canvas P1 which is wound around the winding roller 30 according to Claim 20 is wound

from below, and the projected corner canvas which is wound around the winding rollers J1 to J3 is wound from above.

- 22.** A movable awning device, wherein the rectangular canvas P1 which is wound around the winding roller 30 according to Claim 20 is wound from below, and the projected corner canvas which is wound around the winding rollers J1 to J3 is wound from above.
- 23.** A movable awning device, wherein two from among the movable awning devices S1c, S1d, S3c, S3a, S3b and S3d having the front winding structure according to Claim 1 or 13 are attached in projected corner portions N1 so as to face each other, and the front end portions of the two roller supporting frames F1, F1a are made to face each other and linked together, and thus, the two are integrated.
- 24.** The movable awning device, according to Claim 23, wherein the foldable arms for supporting the roller supporting frames F1, F1a are V-shaped arms V1, V2 where the rear link 251 and the front link 252 are connected so as to be freely foldable in two, the connection portion which is foldable in two is formed of links connected through a connection rod 253, and the projected corner canvas G1 is wound and unwound around the winding rollers J1 to J3 so that the roller supporting frame F1 translates in a diagonal direction and the slider 22 of the top hem 1 of the canvas slides in either direction, to the front or rear, of the transverse guide frame K1 in the configuration (WS1c).
- 25.** The movable awning device, according to Claim 24, wherein the base end portion of the rear link 251 of the V-shaped arm V1 from among the V-shaped arms V1, V2 is attached in the vicinity of the corner of the projected corner portion N1, the front end portion of the front link 252 is attached in the vicinity of the end of the roller supporting frame F1, the base end portion of the rear link 251 of the V-shaped arm V2 is attached to the lower portion in the vicinity of the middle of the transverse guide frame K1, and the front end portion of the front link 252 is attached in the vicinity of the rear of the roller supporting frame F1 (WS1c).
- 26.** The movable awning device, according to Claim 23, wherein the foldable arms for supporting the roller supporting

frames F1, F1a are expandable arms T1, T2 in linear form which are formed in parallel at a distance from each other,

the projected corner canvas G1 is wound or unwound around the winding rollers J1 to J3 so that the roller supporting frame F1 translates in a diagonal direction, and the slider 22 of the top hem 1 of the canvas slides in either direction, to the front or rear, of the transverse guide frame K1 in the configuration (WS1d).

- 27.** The movable awning device, according to Claim 26, wherein the base end portion of one expandable arm T1 from among the expandable arms T1, T2 is attached in the vicinity of the corner of the projected corner portion N1, and the front end portion thereof is attached in the vicinity of the middle of the roller supporting frame F1, the base end portion of the other expandable arm T2 is attached to the lower portion in the vicinity of the middle of the transverse guide frame K1, which is at an appropriate distance from the vicinity of the corner, and the front end portion thereof is attached in the vicinity of the rear end of the roller supporting frame F1 (WS1d).
- 28.** The movable awning device, according to Claim 26 or 27, wherein when the projected corner canvases G1 are interlocked and wound, the rear arm 351 and the front arm 352 of the respective expandable arms T1, T2 expand or retract relative to each other while moving backwards so as to rotate in parallel, and at the same time, the two roller supporting frame F1 translates toward the wall portion located diagonally in the rear (WS1d).
- 29.** The movable awning device, according to Claim 26, wherein when the winding rollers J1 to J3 are interlocked and unwound, the respective expandable arms T1, T2 expand and contract diagonally forward due to the pressure applied through elasticity while rotating in parallel, and the roller supporting frame F1 is pushed out when translating diagonally forward in the configuration (WS1d).
- 30.** The movable awning device, according to Claim 23, wherein the foldable arms for supporting the roller supporting frames F1, F1a are I-shaped arms I1, I2, which are in linear form, formed so as to be parallel to each other at a distance from each other, and the projected corner canvas G1 is wound and unwound around the winding rollers J1 to J3 so that

the roller supporting frame F1a translates in a diagonal direction while sliding on the transverse guide rail R1, and

the top hem 1 of the projected corner canvas G1 slides in either direction, to the front or rear, of the transverse guide frame K1 in the configuration (WS3c).

- 31.** The movable awning device, according to Claim 30, wherein
the base end portion of one I-shaped arm I1 from among the I-shaped arms I1, I2 is attached in the vicinity of the corner of the projected corner portion N1,
the front end portion is attached in the vicinity of the middle of the transverse guide rail R1,
the base end portion of the other I-shaped arm I2 is attached in the vicinity of the middle of the transverse guide frame K1 at an appropriate distance from the vicinity of the corner, and
the front end portion thereof is attached in the vicinity of the rear end of the transverse guide rail R1 (WS3c).
- 32.** The movable awning device, according to Claim 23, wherein
the foldable arms for supporting the roller supporting frames F1, F1a are V-shaped arms V1, V2 where the rear link 251 and the front link 252 are linked so as to be freely foldable in two,
the projected corner canvas G1 is wound or unwound around the winding rollers J1 to J3 so that the roller supporting frame F1 slides along the transverse guide rail R1 while translating in a diagonal direction, and
the top hem 1 of the projected corner canvas G1 slides in either direction, to the front or rear, of the transverse guide frame K1 in the configuration (WS3a).
- 33.** The movable awning device, according to Claim 32, wherein
the base end portions of the V-shaped arms V1, V2 are attached to the lower portions in the vicinity of the front end and the middle of the transverse guide frame K1, and the front end portions of these arms are attached in the vicinity of the both ends, front and rear, of the transverse guide rail R1 (WS3a).
- 34.** A movable awning device, wherein
a bent link 254 which is bent at an appropriate angle θ is formed in the front end portion of the front link 252 of the V-shaped arm V1 from among the V-shaped arms V1, V2 according to Claim 32 so as to protrude, and
the front end portion of the bent link 254 and the roller supporting frame F1a in the vicinity of a recessed corner, which is pushed against the front end of the

bent link 254, are connected through a joint rod 78 (WS3d).

- 35.** The movable awning device, according to Claim 34, wherein
the angle θ of the bend is approximately the same as the angle of the projected corner portion N1 (WS3d).
- 36.** The movable awning device according to Claim 32, wherein
the V-shaped arm V1 according to Claim 32 is replaced with a Y-shaped arm Y1 which is formed of a main link 291 and a sub-link 292 linked in a reverse y shape, and
the projected corner canvas G1 is wound or unwound around the winding rollers J1 to J3 so that the roller supporting frame F1 translates in a diagonal direction, and the top hem 1 of the projected corner canvas G1 transverses in either direction, to the front or rear, of the transverse guide frame K1 in the configuration.
- 37.** The movable awning device, according to Claim 36, wherein
the base end portion of the main link 291 of the Y-shaped arm Y1 is attached in the vicinity of the corner of the projected corner portion N1,
the front end portion thereof is attached in the vicinity of the middle of the roller supporting frame F1a,
the front end portion of the sub-link 292 of the Y arm Y1 is attached in the vicinity of the front end of the transverse guide rail R1,
the base end portion of the V-shaped arm V2 is attached in the vicinity of the lower portion in the middle of the transverse guide frame K1, and
the front end portion thereof is attached in the vicinity of the rear end of the transverse guide rail R1.
- 38.** The movable awning device, according to Claims 1 to 4, 6, 10 to 14, 18, 24 or 26, wherein the slider 22 is either an inner or outer slider.
- 39.** The movable awning device, according to Claims 1 to 4, 6, 10 to 14, 18, 24 or 26, wherein a slider 22 having small wheels 231 is incorporated in the transverse guide frame K1 so as to be freely rollable, and the top hem 1 of the projected corner canvas G1 is attached to a canvas engaging trench 223 formed in the slider 22.
- 40.** The movable awning device, according to Claims 1 to 4, 6, 8 to 14, 16 to 18, 24, 26, 28, 30, 32 or 36, wherein
the projected corner canvas G1 is formed in an approximate trapezoid form with right angles in a plane, the top hem 1 of the canvas is attached to the slider 22, and

the bottom hem 2 of the canvas is attached to the winding rollers J1 to J3.

41. The movable awning device, according to Claims 1 to 4, 6, 10 to 14, 18, 24 or 26, wherein tense members, such as connection wires 193, 194, a belt or a rope, are made to cross between the slider 22 and the winding rollers J1 to J3. 5
42. The movable awning device, according to Claim 40, wherein 10
one connection wire 193 is attached along a diagonal portion 3 of the projected corner canvas G1, and the other connection wire 194 is attached along a line which diagonally connects the rear end portion of the bottom hem 3 of the canvas and the front end portion of the top hem 1 of the canvas. 15
43. The movable awning device, according to Claim 41 or 42, wherein 20
the base end portions of the connection wires 193, 194 are attached in the vicinity of the both ends, front and rear, of the winding rollers J1 to J3, and the terminal portions are attached in the vicinity of the front end of the slider 22. 25
44. A complex awning device, **characterized in that** an awning device for a projected corner S4a, S4b, S5a or S5b having a front winding structure for winding and unwinding projected corner canvases G1, G2 and rectangular awning devices Q1, Q2 having a rear winding structure for winding and unwinding rectangular canvases P1, P2 are combined and integrated (SQII1 to 5). 30
45. A complex awning device, wherein the two pairs of the complex awning devices SQII4 and 5 according to Claim 44 are made to face each other on either side of the projected corner portion N1 and linked (WSQIV1 and 2). 35 40
46. The complex awning device, according to Claim 44, wherein 45
the awning devices for a projected corner S4a, S4b, S5a and S5b are formed of:
a transverse guide frame K1a for sliding and guiding the top hem 1 of the projected corner canvases G1, G2 attached to the wall side close to the corner of the projected corner portion N1; 50
a roller supporting frame F2 provided on the front side; and
winding rollers J1 to J3 for the projected corner canvases G1, G2 supported by the supporting frame F2 through bearings, and 55
the rectangular awning devices Q1, Q2 are formed of:

winding rollers 30, 31a for the rectangular canvases P1, P2 provided on the wall side; and

a front bar R2 for the rectangular canvases P1, P2 attached in the front end portion of the foldable arms Y1, V2, V1 and V2, and the roller supporting frame F2 is attached to the front bar R2 in such a manner so as to be freely slidable for transverse guiding (SQII1 to 5).

47. The complex awning device, according to Claim 44 or 46, wherein 35
the front bar R2 of the rectangular canvases P1, P2 is attached to the front end portion of the foldable arms Y1, V2, V1 and V2,
the roller supporting frame F2 is attached to the front bar R2 in such a manner so as to be freely slidable, winding rollers J1 to J3 for winding and unwinding the projected corner canvases G1, G2 are attached to the roller supporting frame F2,
a transverse guide frame K1a is attached on the wall side close to the corner of projected corner portion N1,
a long or short winding roller 30 or 30a for winding and unwinding the rectangular canvases P1, P2 is attached on the wall side in an upper portion of the rear half of the guide frame K1a or in a location behind the upper portion of the front end,
sliders 22, 22a are attached to the transverse guide frame K1a, and
the top hem 1 of the projected corner canvases G1, G2 is attached to the sliders 22, 22a (SQII1 to 5). 40
48. The complex awning device, according to Claim 46 or 47, wherein 45
the rectangular canvases P1, P2 and the projected corner canvases G1, G2 are wound and unwound around the respective winding rollers 30, 30a and J1 to J3, and thus,
the front bar R2 of the rectangular canvases P1, P2 translates in the front-rear direction,
the roller supporting frame F2 translates in a diagonal direction while being guided by the front bar R2, and
the top hem 1 of the projected corner canvases G1, G2 is slidable in either direction, to the front or to the rear, of the transverse guide frame K1a in the configuration (SQII1 to 5). 50

49. The complex awning device, according to Claim 46, 47 or 48, wherein 55
the roller supporting frame F2 and the front bar R2 are supported by two or more foldable arms from among the straight I-shaped arms I1, I2, the V-shaped arms V1 and V2 which are foldable in two, the Y-shaped arms Y1, Y2 which are in a reverse y shape, and the L-shaped arms L1, L2 which fold and

extend in a two-stage operation.

50. The complex awning device, according to Claim 46 or 47, wherein

the foldable arms are formed of a Y-shaped arm Y1 formed of a main link 291 and a sub-link 292 which are linked in a reverse y shape and an V-shaped arm V2 where a rear link 251 and a front link 252 are linked in such a manner so as to be freely foldable in two, and

the base end portion of the main link 291 of the Y-shaped arm Y1 is attached in the vicinity of the corner of the projected corner portion N1, the front end portion thereof is attached in the vicinity of the middle of the roller supporting frame F2, the front end portion of the sub-link 292 of the Y arm Y1 is attached in the vicinity of the front end of the front bar R2,

the base end portion of the V-shaped arm V2 is attached in the vicinity of the lower portion of the rear end of the winding rollers 30, 31a, and the front end portion thereof is attached in the vicinity of the rear end of the front bar R2 (SQII1 to 3) .

51. The complex awning device, according to Claim 46, 47 or 48, wherein

the transverse guide frame K1a of the projected corner canvases G1, G2 is attached to the wall side close to the corner of the projected corner portion N1, a casing K2 for supporting the winding roller 30 of the rectangular canvas P1 through bearings is attached on the wall side in a location behind the upper portion of the rear of the guide frame K1a, the front bar R2 of the rectangular canvas P1 is supported by the foldable arms in such a manner so as to be freely translatable in the front-rear direction, the bottom hem and the top hem of the rectangular canvas P1 are attached to the rear portion of the front bar R2 and the winding roller 30, the roller supporting frame F2 for supporting the winding rollers J1 to J3 of the projected corner canvases G1, G2 through bearings is incorporated in the front bar R2 in such a manner so as to be freely slidable for transverse guiding, and the top hem 1 of the projected corner canvases G1, G2 is attached to the slider 22 which is incorporated in the transverse guide frame K1a (SQII1 to 5).

52. The complex awning device, according to Claim 46, 47 or 48, wherein

the transverse guide frame K1a of the projected corner canvases G1, G2 is attached on the wall side close to the corner of the projected corner portion N1, a casing K2 for supporting the winding roller 30a of the rectangular canvas P2 through bearings is attached on the wall side in a location behind the upper portion in the vicinity of the front end of the guide frame K1a,

the front bar R2 of the rectangular canvas P2 is supported by the foldable arms in such a manner so as to be freely translatable in the front-rear direction, the bottom hem and the top hem of the rectangular canvas P2 are attached to the front bar R2 and the winding roller 30a,

the roller supporting frame F2 for supporting the winding rollers J1 to J3 of the projected corner canvases G1, G2 through bearings is incorporated in the front bar R2 in such a manner so as to be freely slidable for transverse guiding, and the top hem 1 of the projected corner canvases G1, G2 is attached to the slider 22 which is incorporated in the transverse guide frame K1a (SQII1 to 5).

53. A complex awning device, **characterized in that** two pairs of the complex awning devices SQII4 and 5 according to Claims 46 to 48, 51 and 52 are made to face each other on either side of the projected corner portion N1 and attached to both ends of the projected corner portion, and the front end portions of the two roller supporting frames F2 push against each other and are linked (WSQIV1 and 2).

54. The complex awning device according to Claims 46 to 48, 51 or 52, wherein

sliders 22, 22a having small wheels 231 are rollably integrated in the transverse guide frame K1a, and the top hem 1 of the projected corner canvases G1, G2 is attached to the canvas engaging trench 223 created in the sliders 22, 22a.

55. The complex awning device according to Claims 47, 51, 52 or 54, wherein

the projected corner canvases G1, G2 are formed either in an approximately trapezoid form with right angles or a triangular form, the top hem of the canvas is attached to the slider 22 or 22a, and the bottom hem of the canvas is attached to the winding rollers J1 to J3.

56. The complex awning device according to Claim 54 or 55,

wherein a tense member, such as connection wires 193, 194, a belt or a rope, crosses between the slider 22 or 22a and the winding rollers J1 to J3.

57. The complex awning device according to Claim 55 or 56, wherein

one connection wire 193 is attached along the diagonal portion 3 of the projected corner canvas G1 and the other connection wire 194 is attached along a line which diagonally connects the rear end portion of the bottom hem 3 of the canvas and the front end portion of the top hem 1 of the canvas.

58. The complex awning device according to Claim 55

or 56, wherein
a connection wire is attached along diagonal portions
3a, 3b in locations on both sides of the triangular
canvas G2,
the base end portion of the wire is attached in the 5
vicinity of the both ends, front and rear, of the winding
rollers J1 to J3, and
the terminal portion of the wire drawn out from the
apex portion of the triangular canvas G2 is attached
to the slider 22a. 10

59. The complex awning device according to Claims 46
to 48, 51 or 52, wherein
the roller supporting frame F2 of the winding rollers
J1 to J3 is an inner frame, and 15
the front bar R2 of the rectangular canvases P1, P2
is an outer frame.

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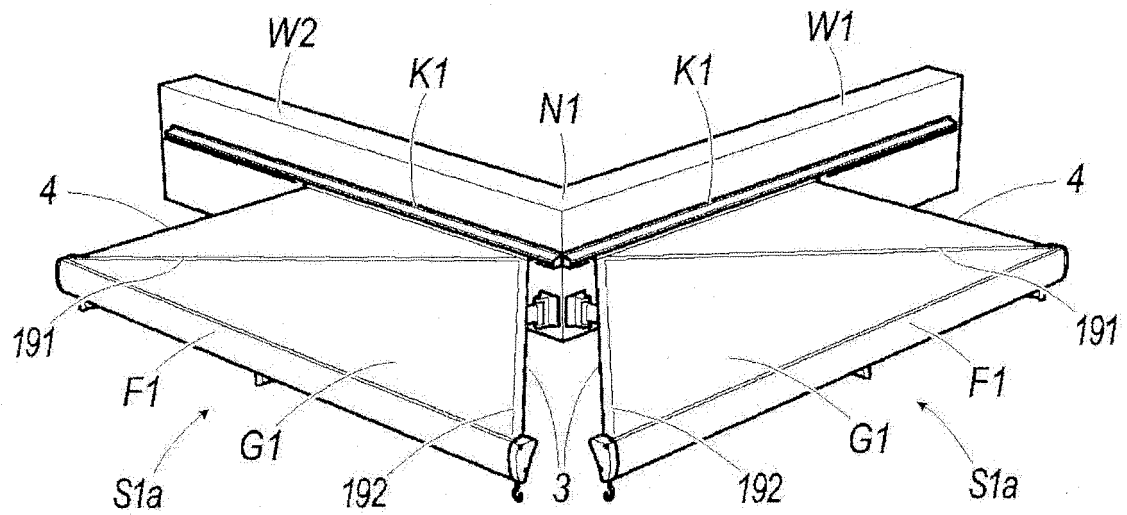
45

50

55

Fig.1

(A)



(B)

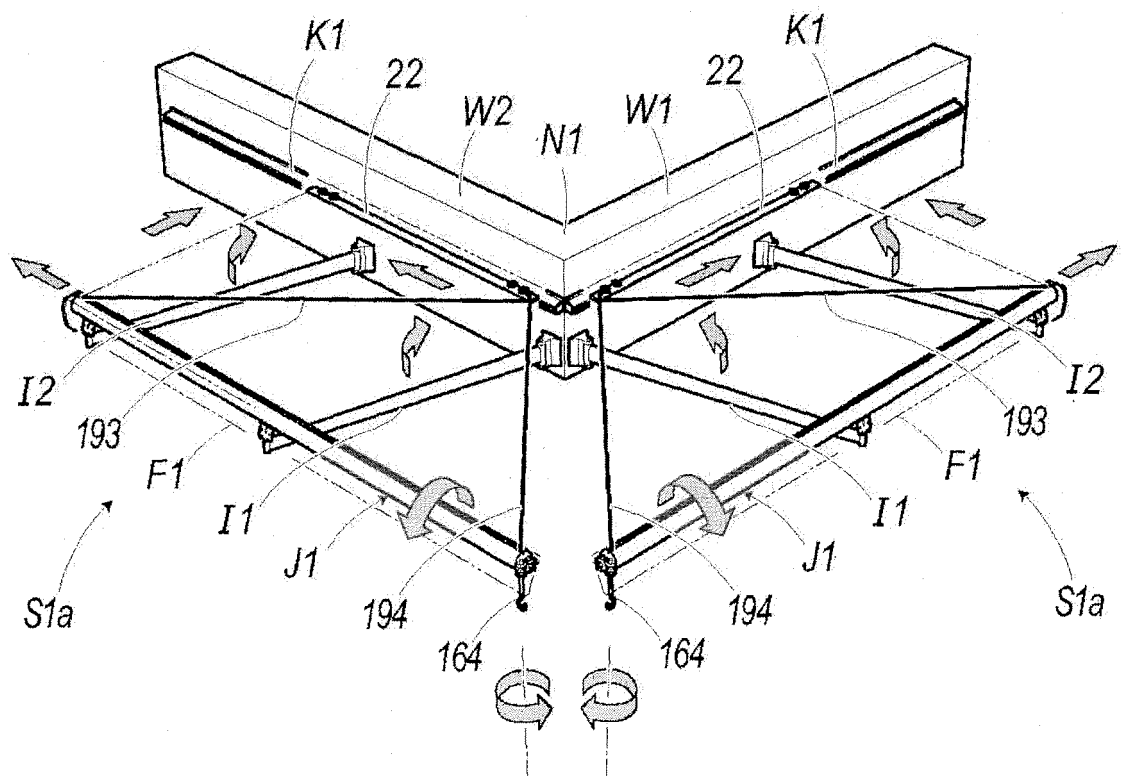


Fig.2

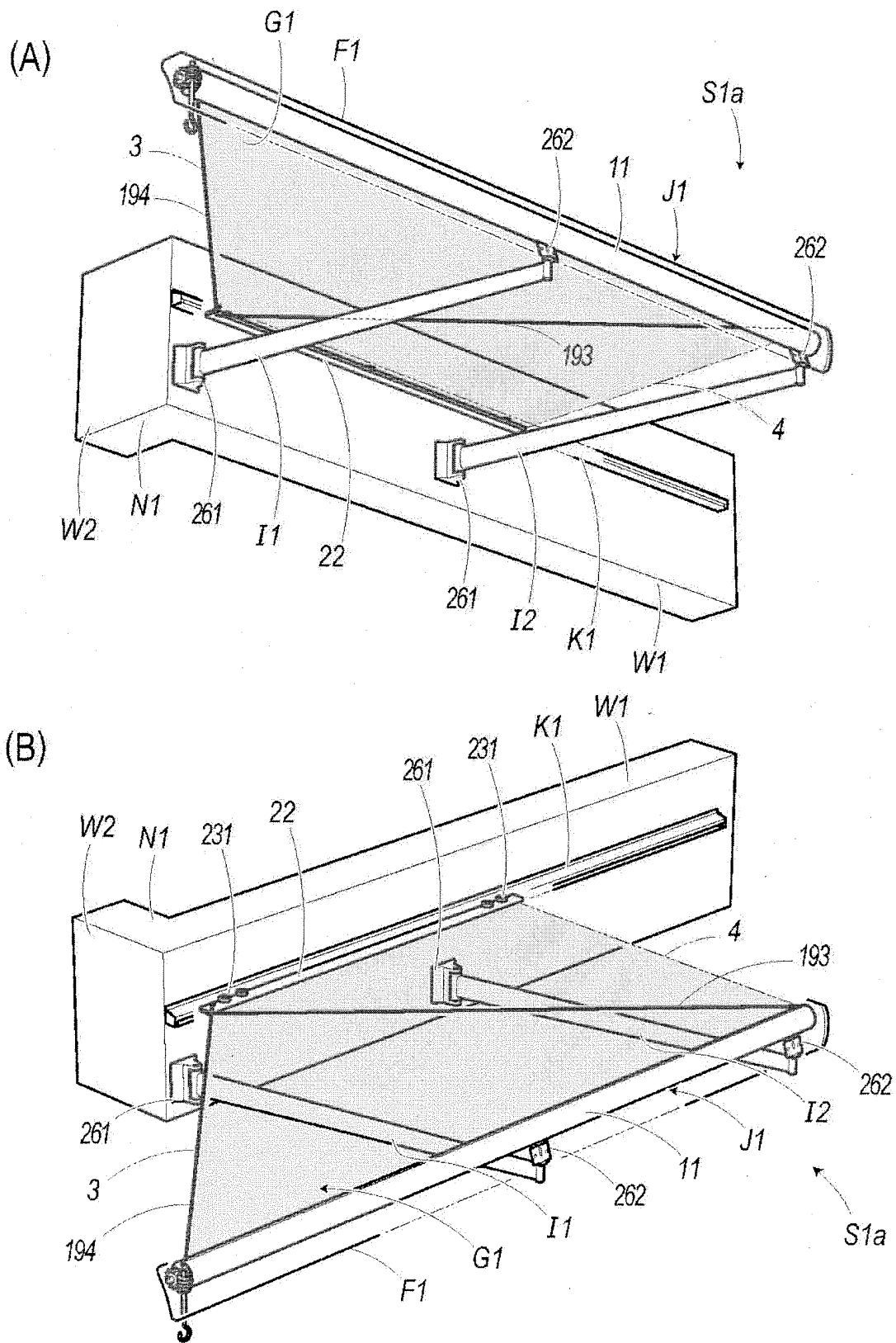


Fig.3

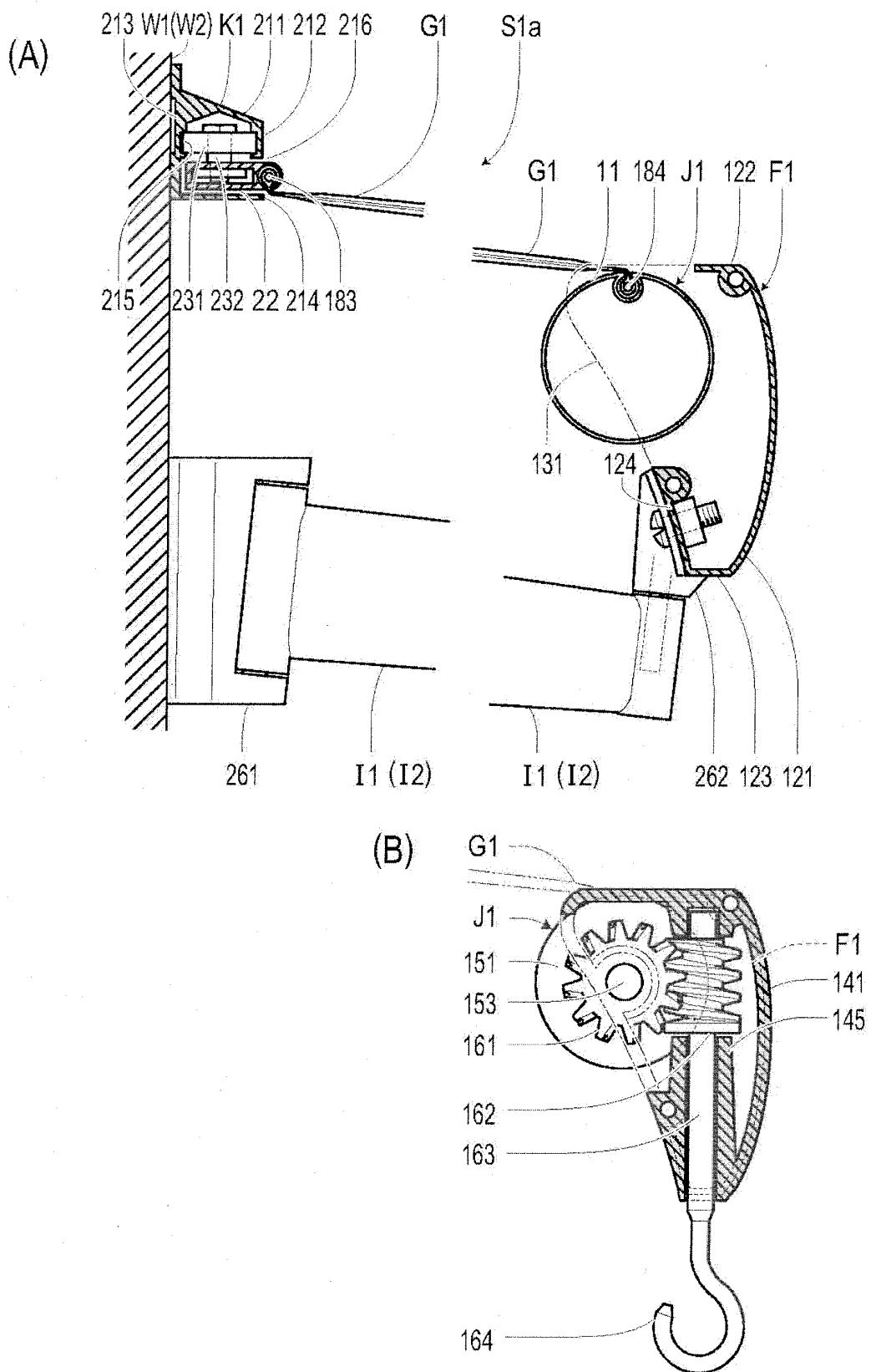
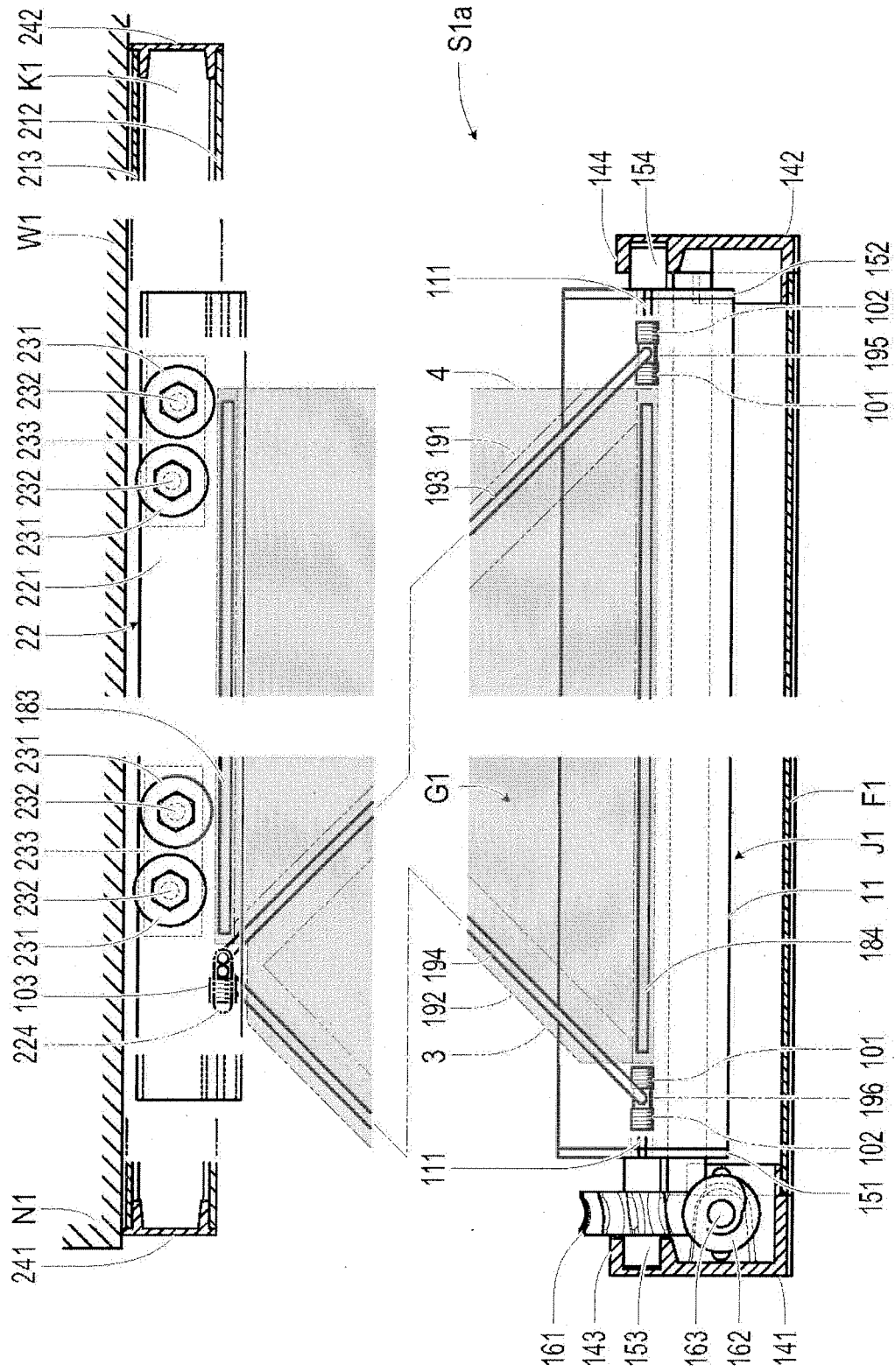
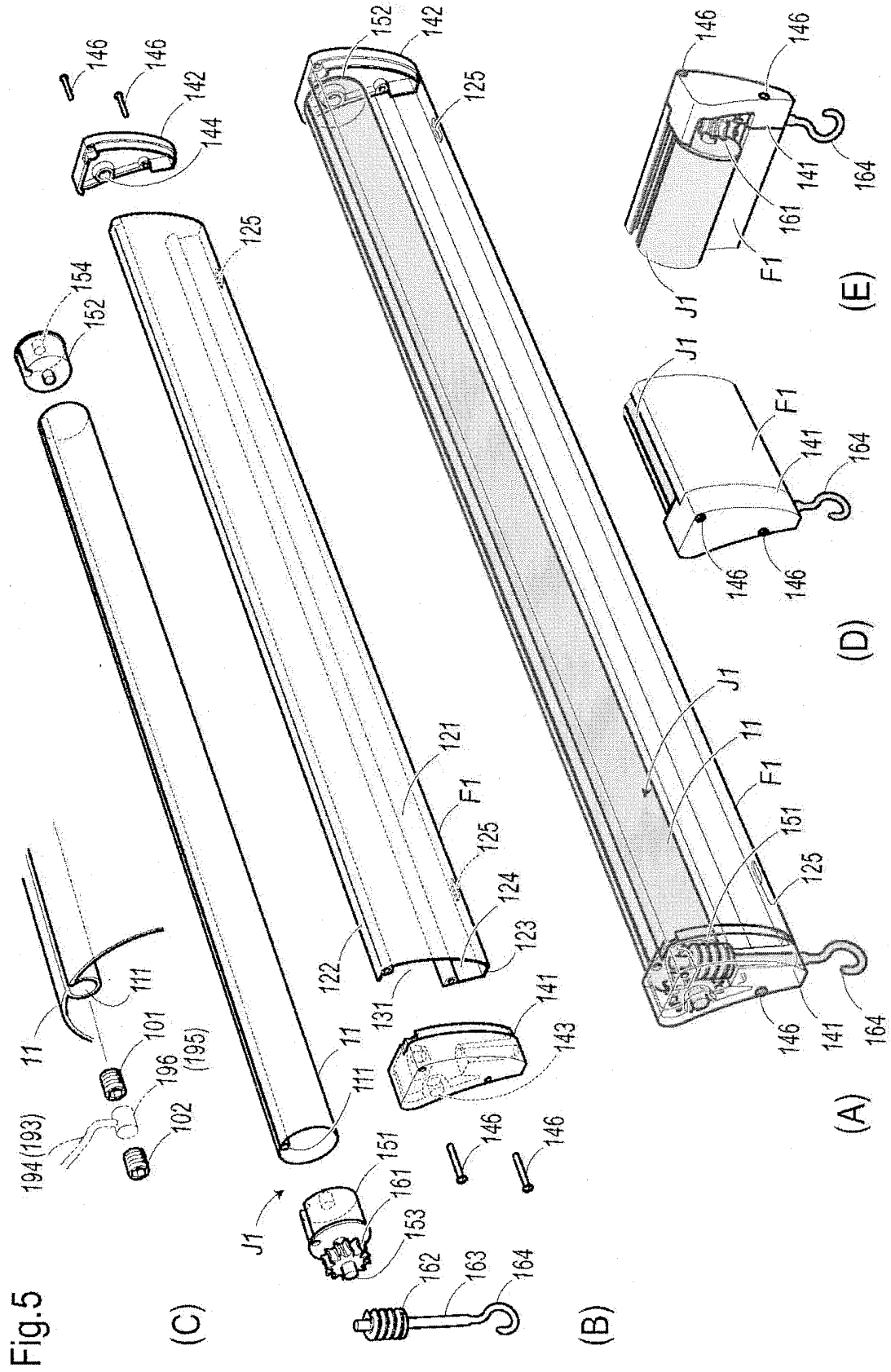


Fig.4





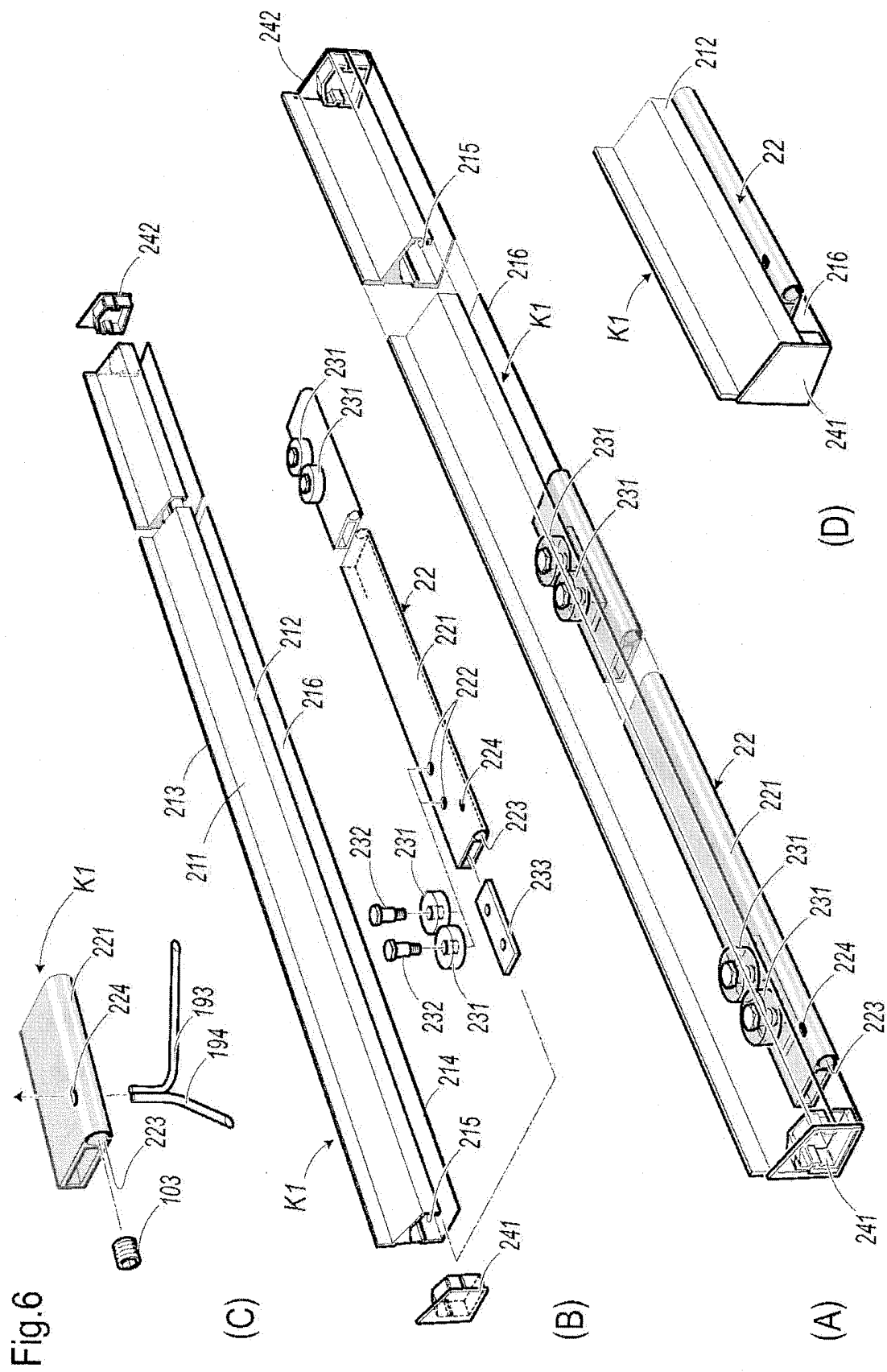


Fig.7

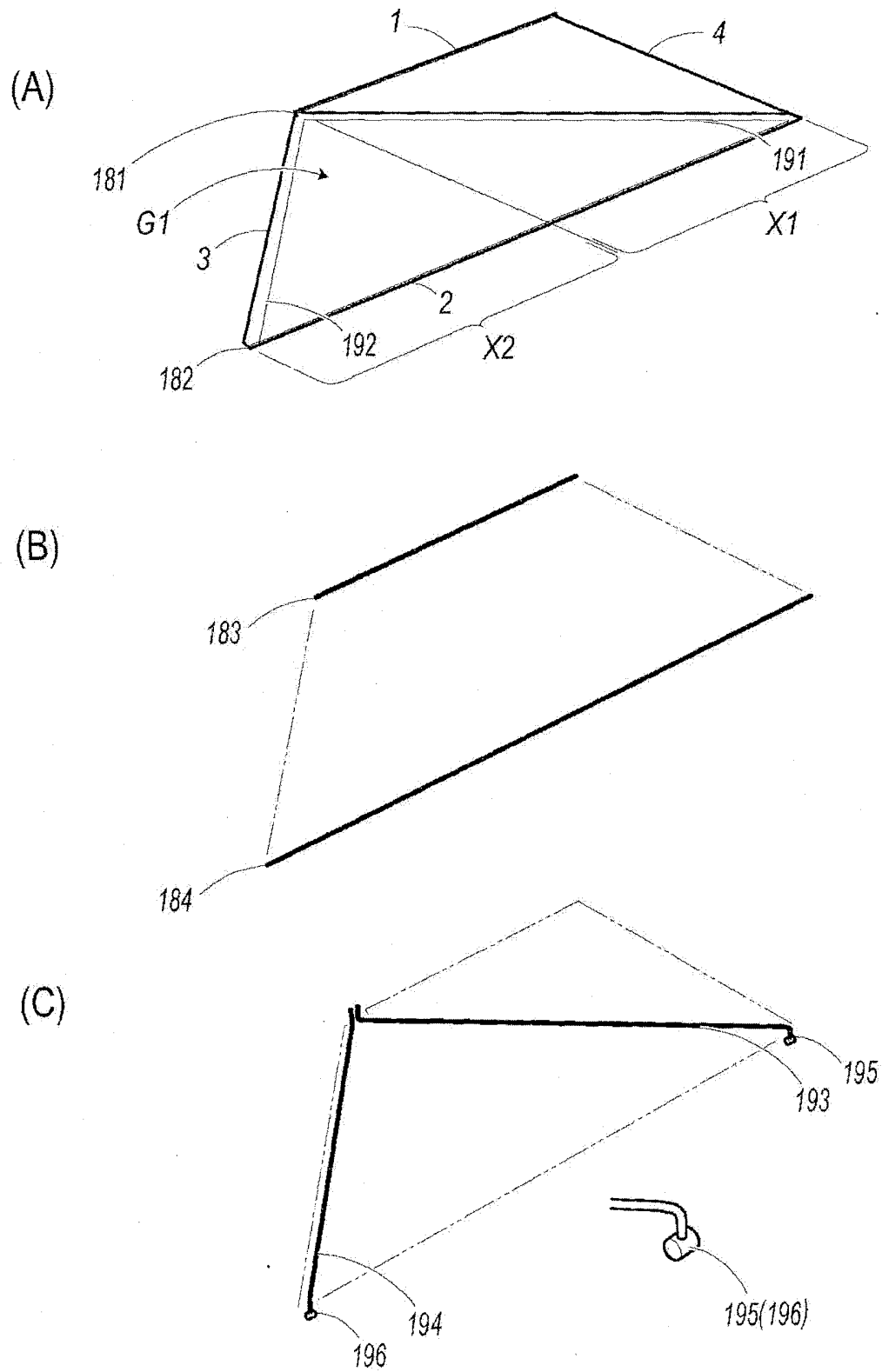


Fig.8

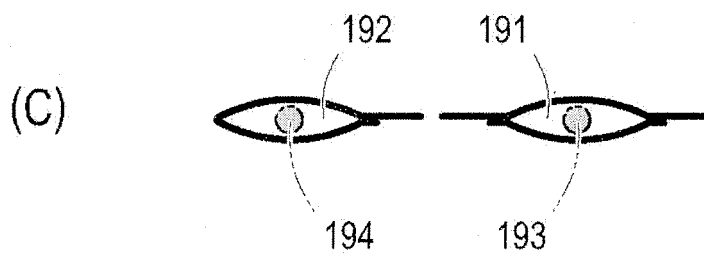
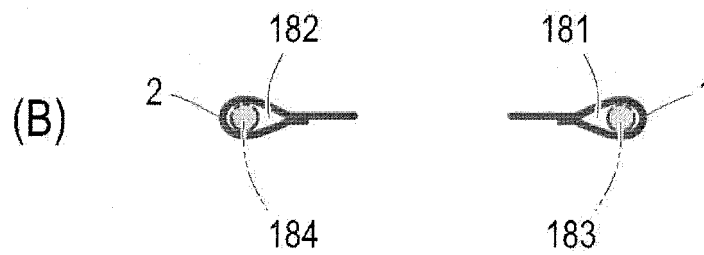
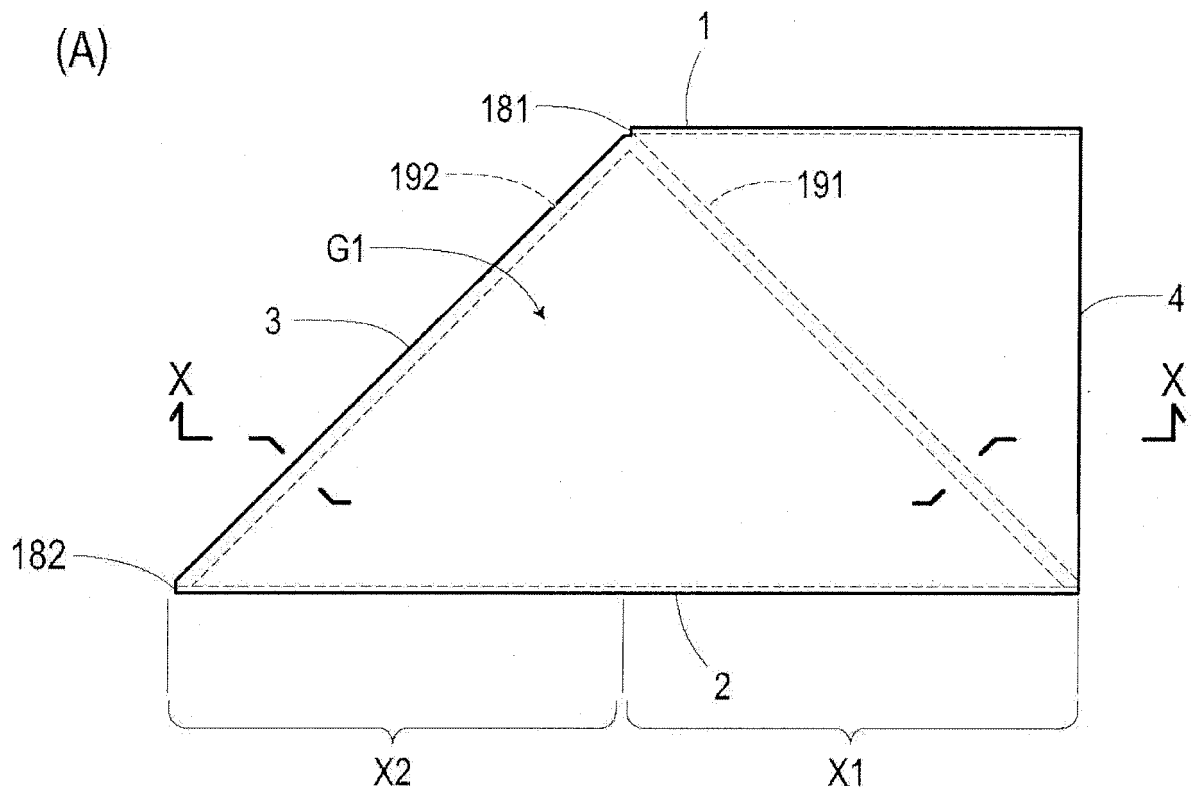


Fig.9

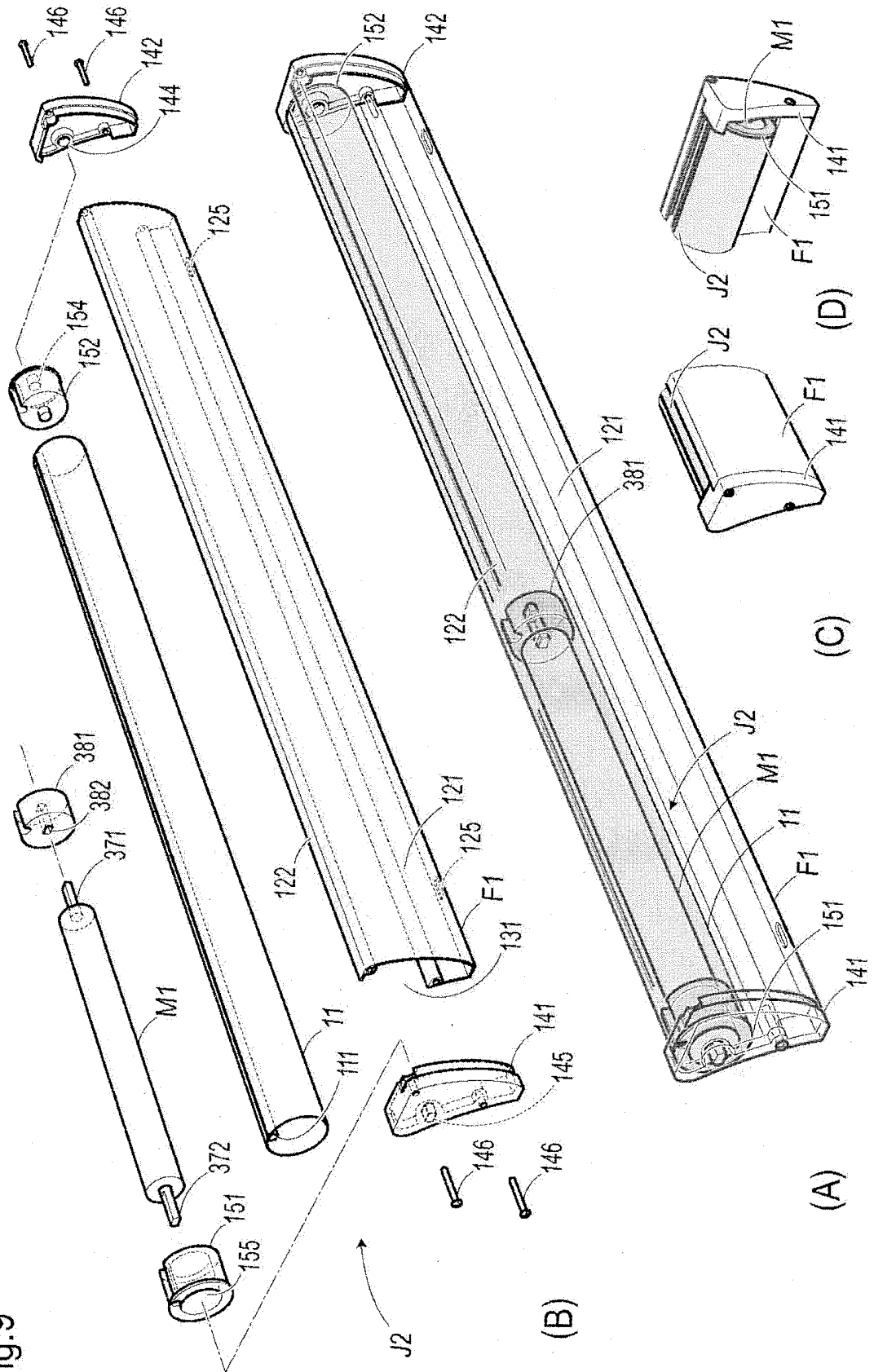


Fig.10

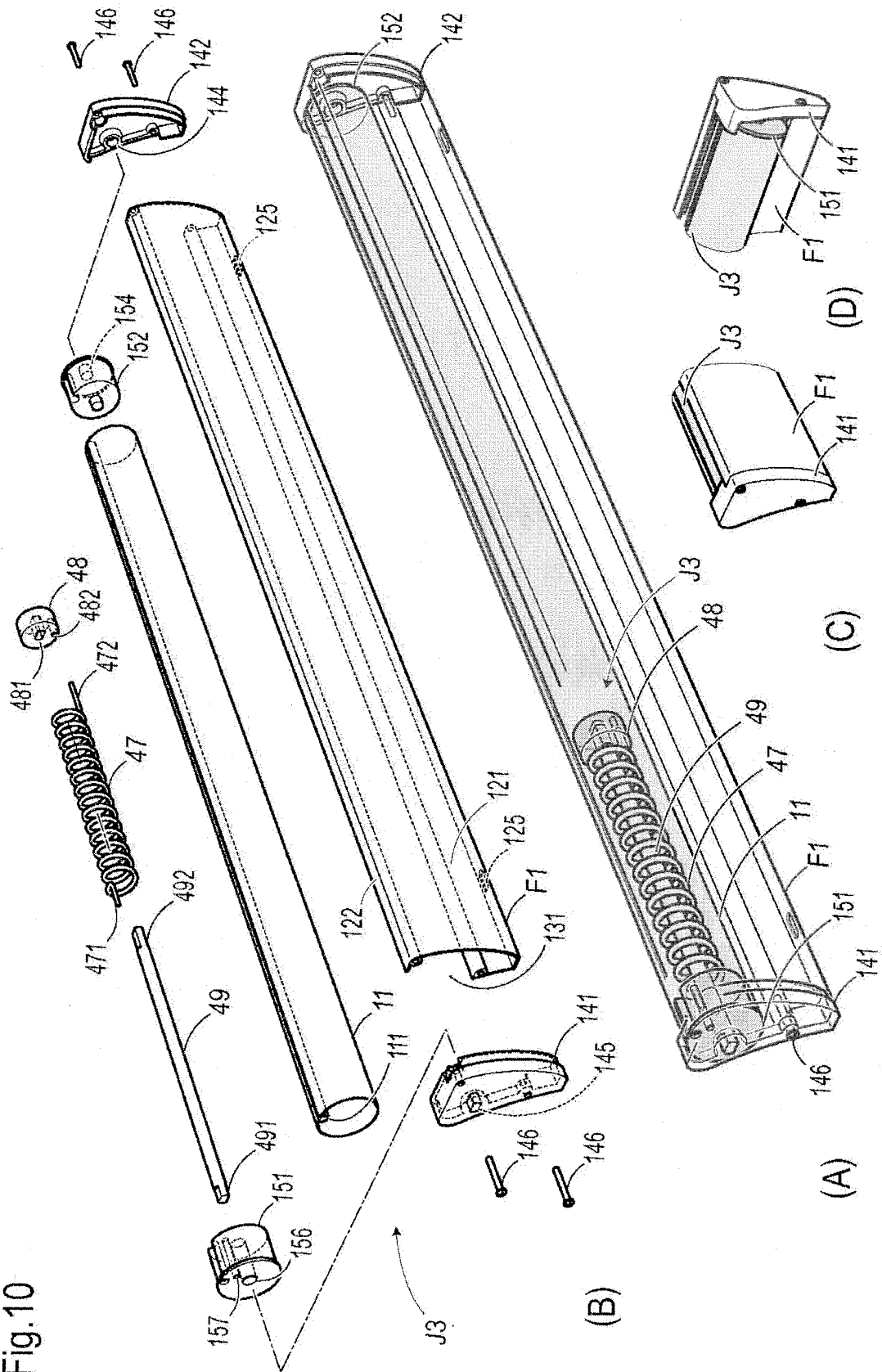


Fig.11

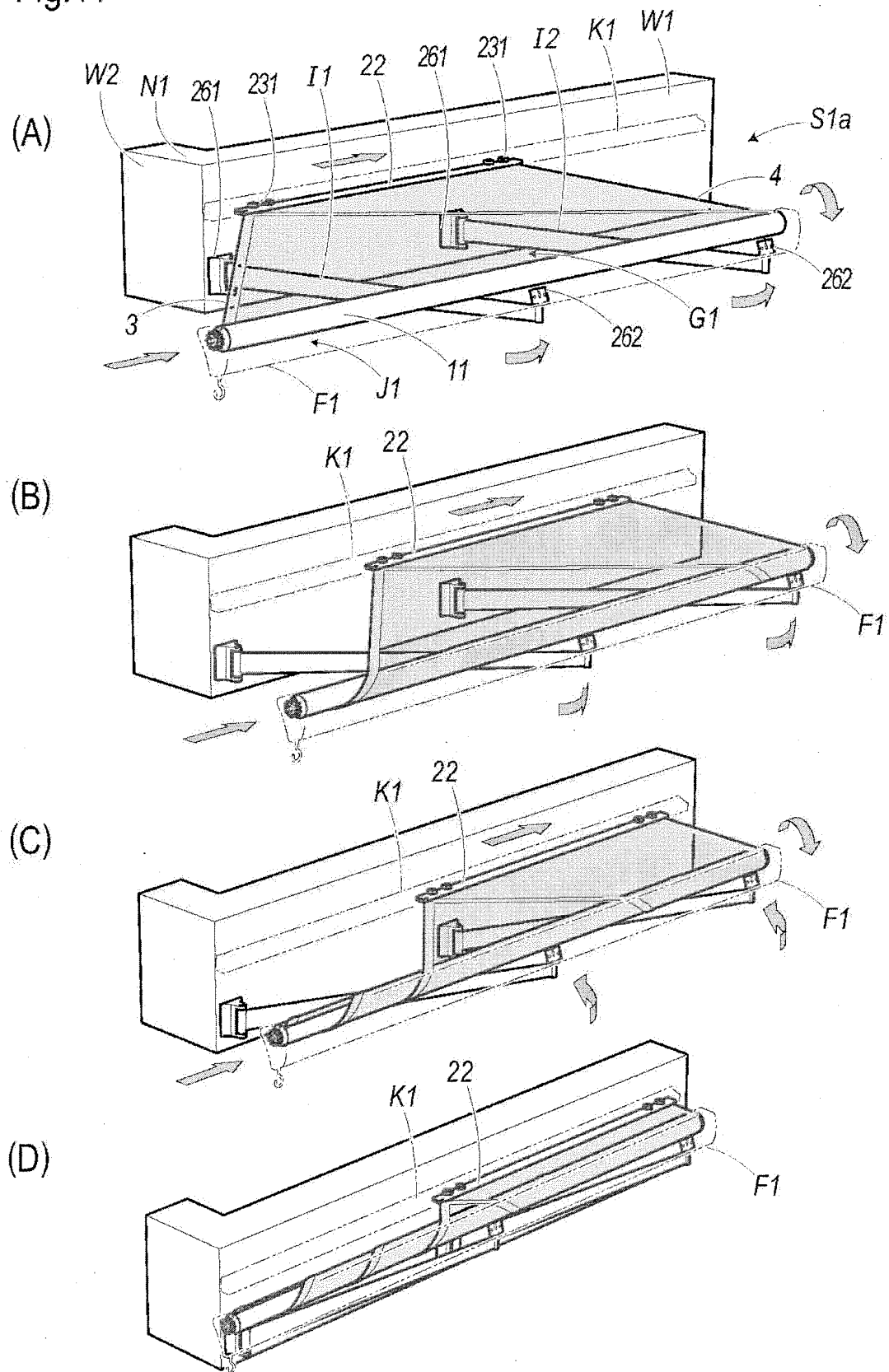


Fig.12

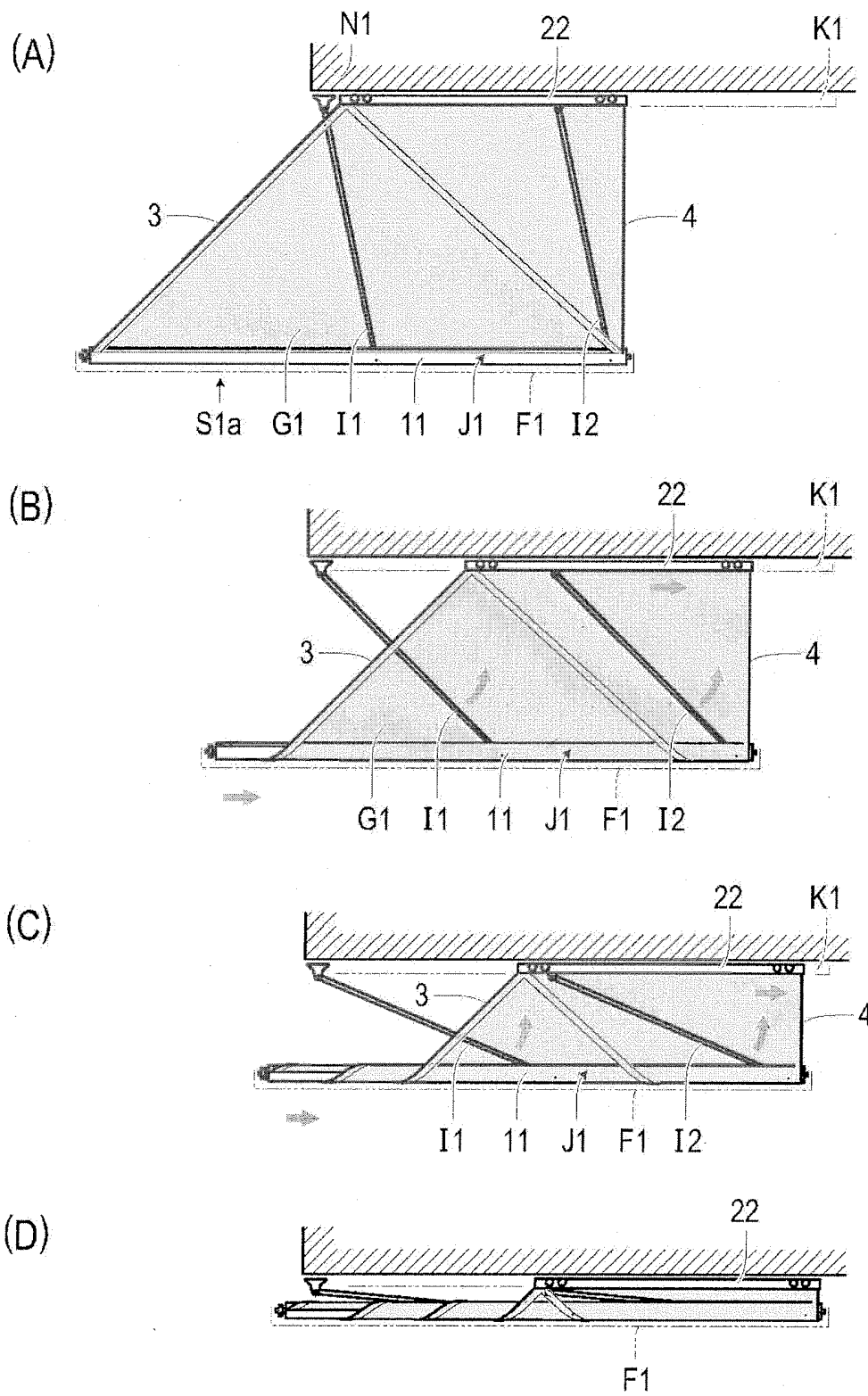


Fig.13

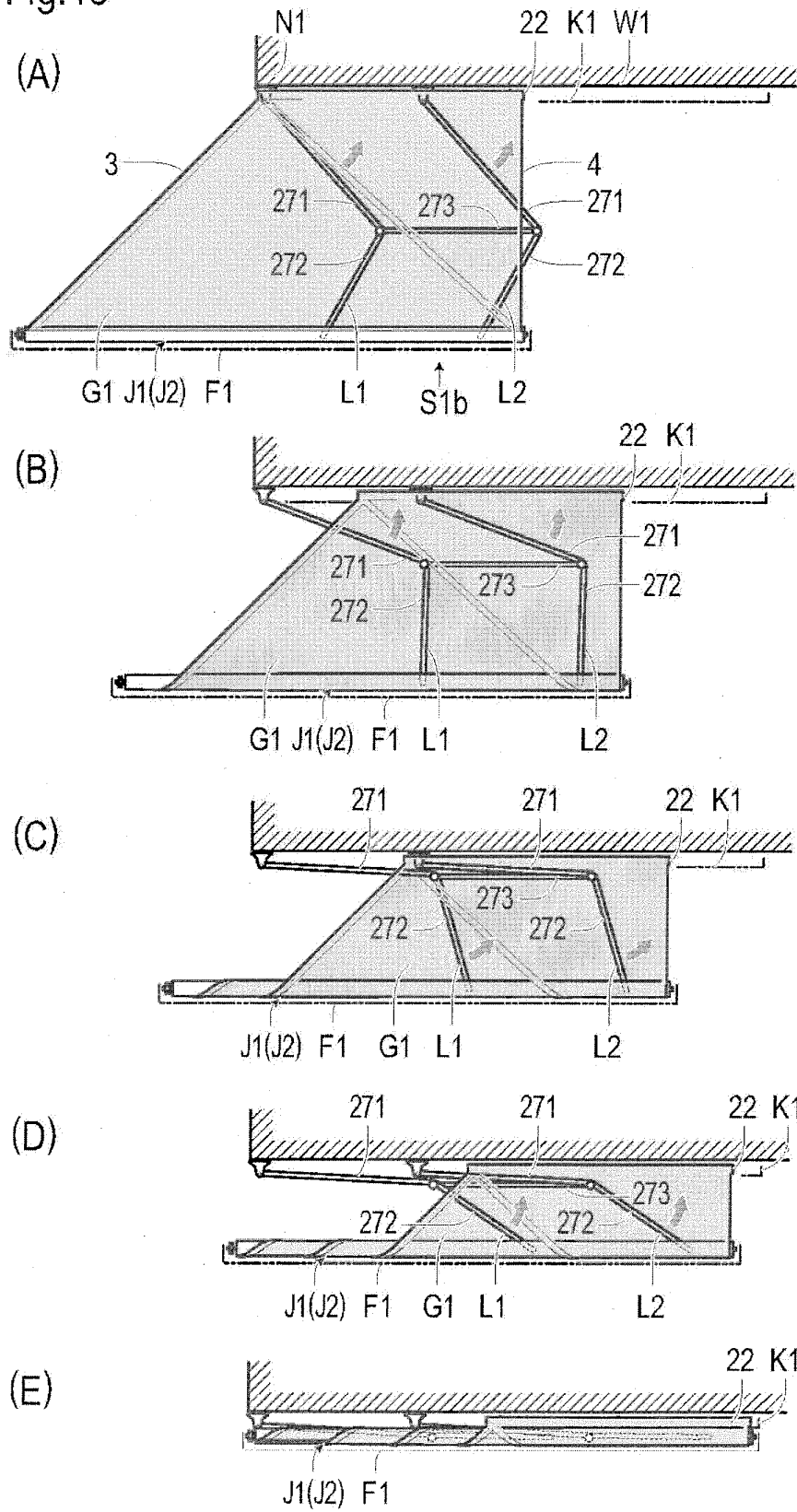
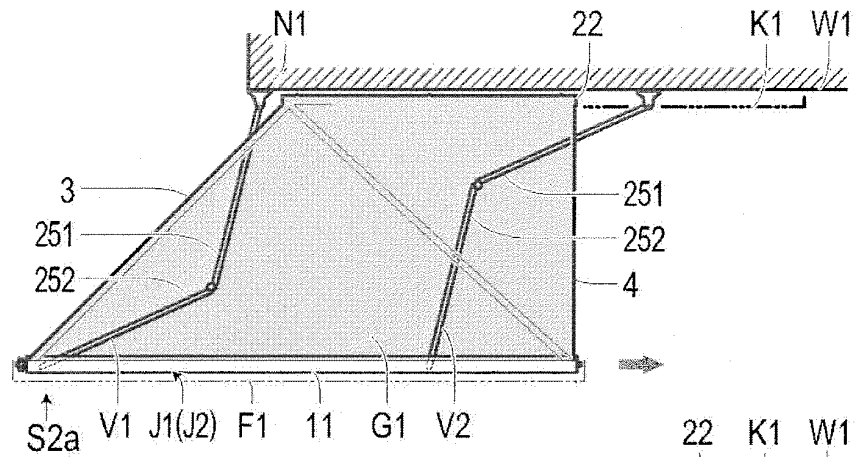
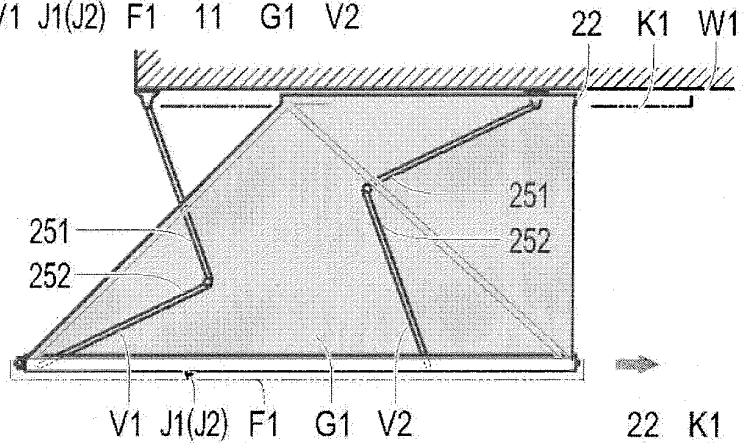


Fig.14

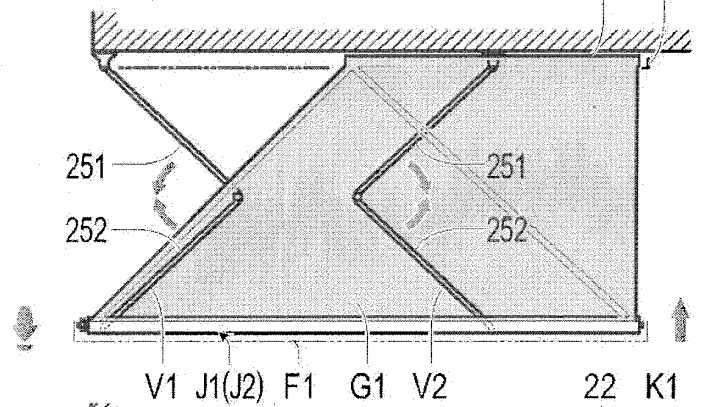
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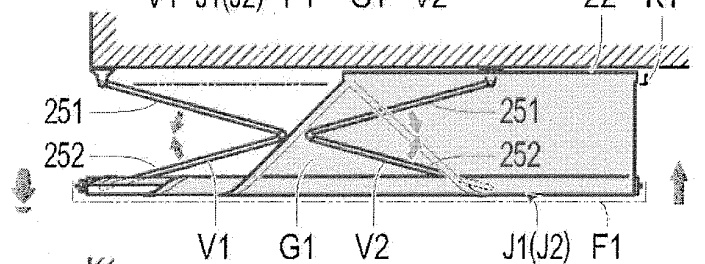
(B)



(C)



(D)



(E)

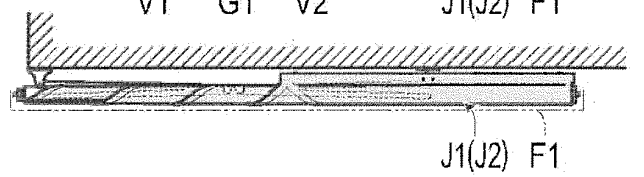


Fig.15

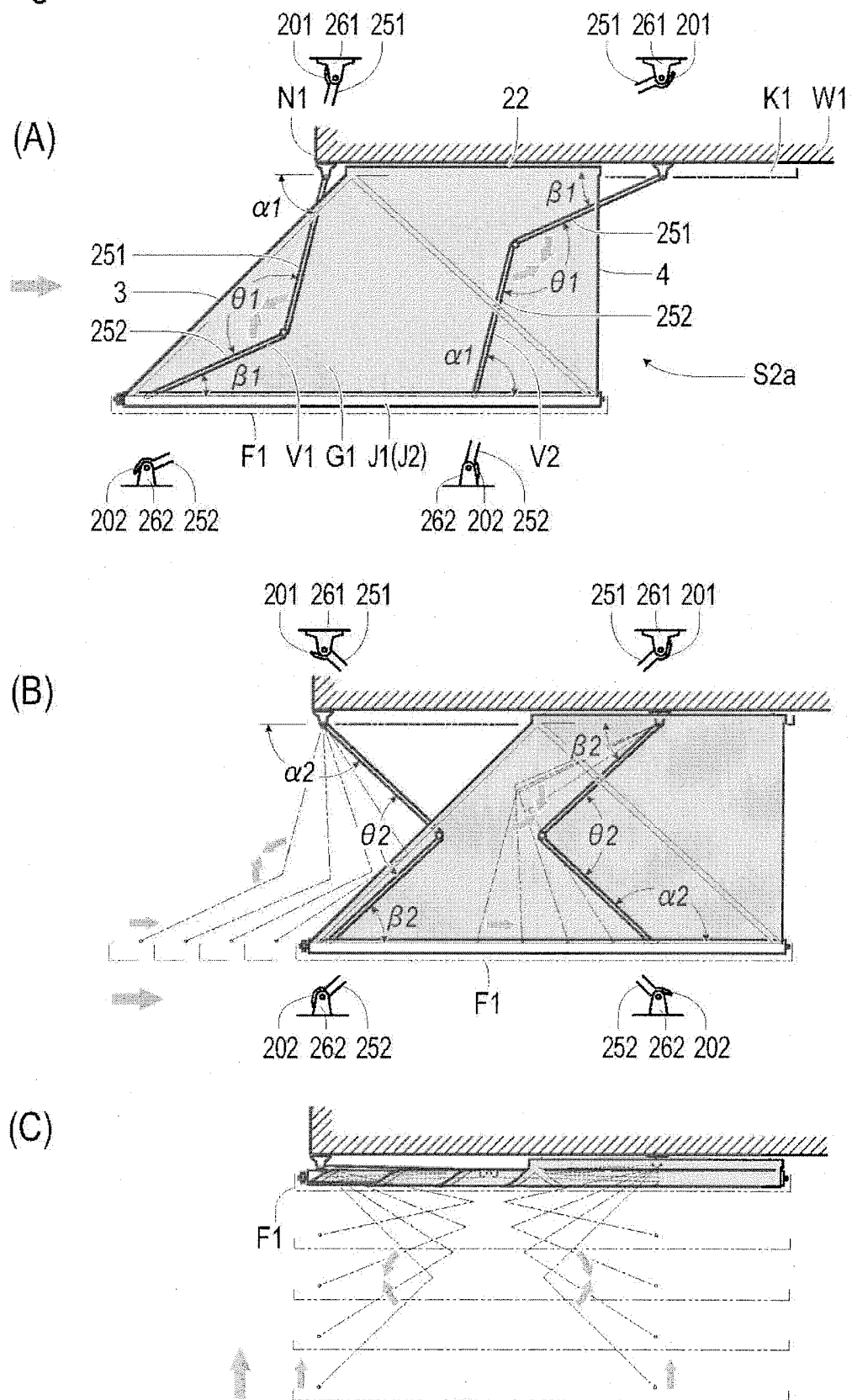
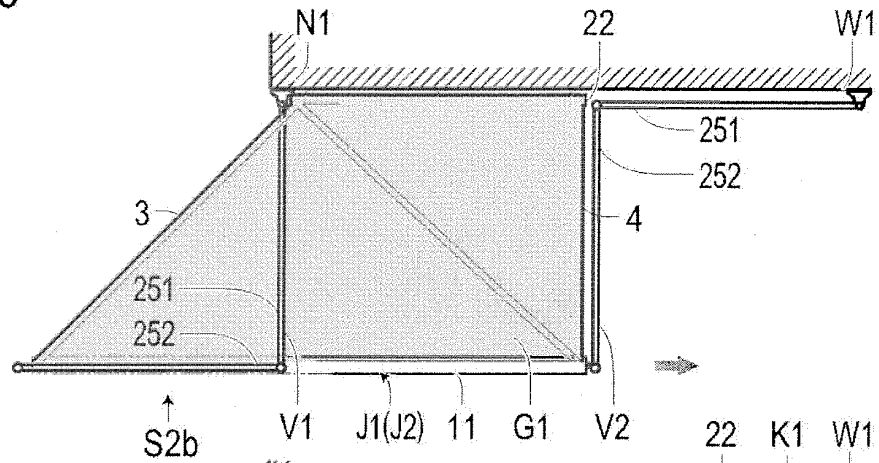
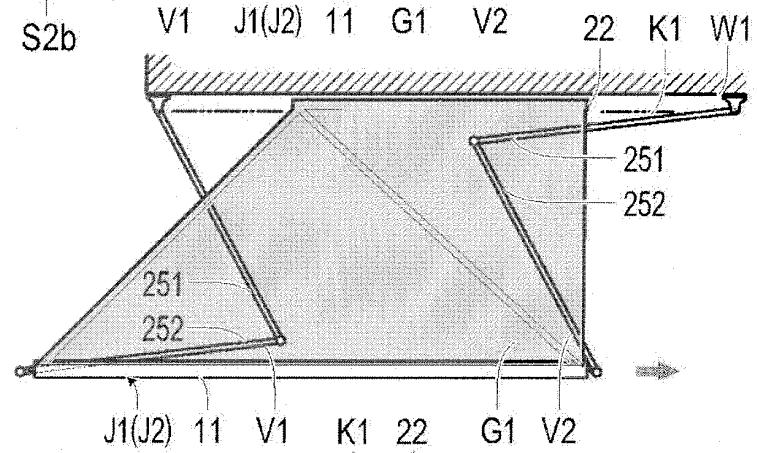


Fig.16

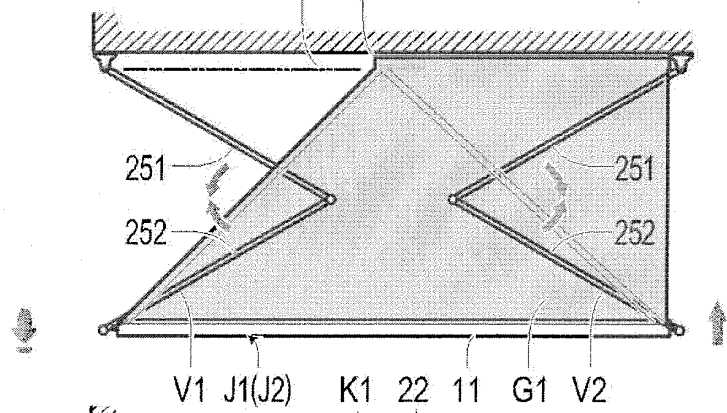
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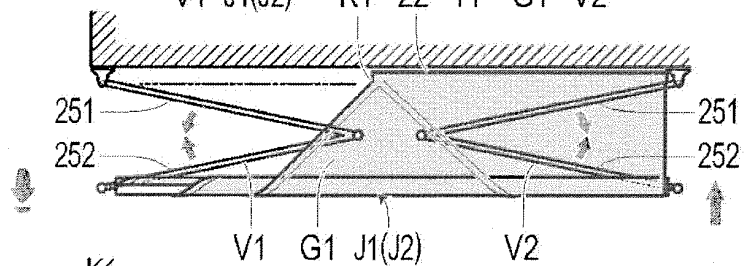
(B)



(C)



(D)



(E)

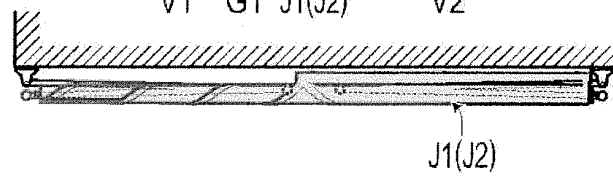


Fig.17

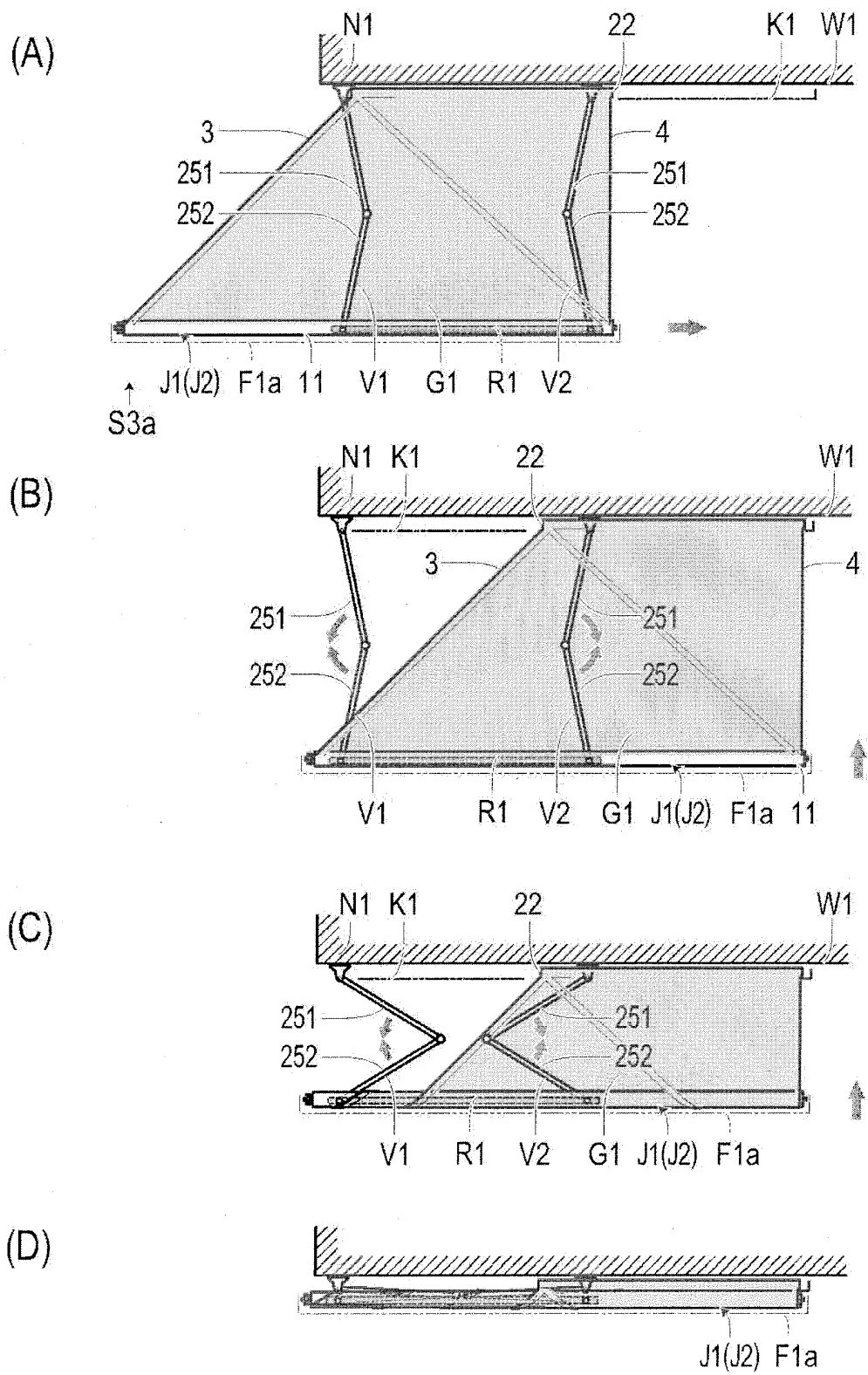
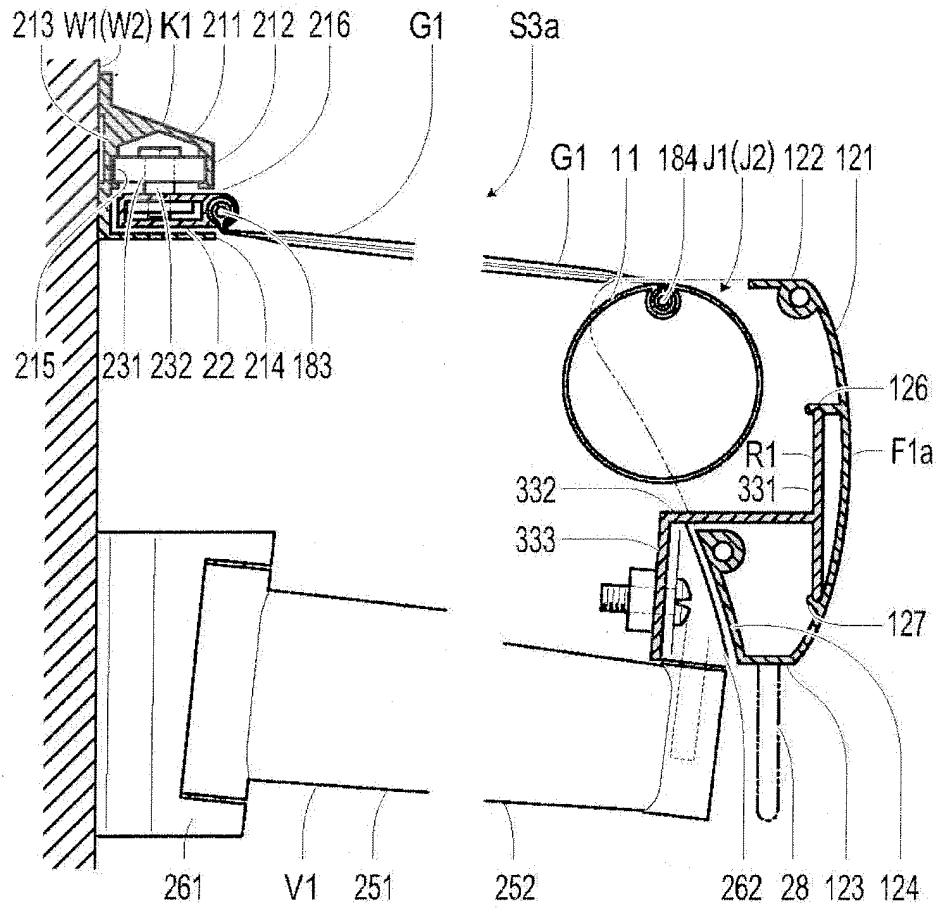


Fig.18

(A)



(B)

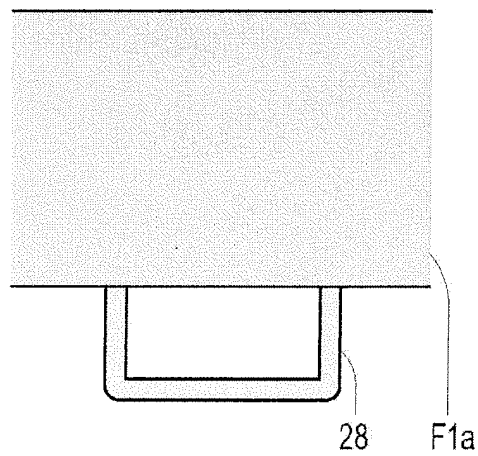


Fig.19

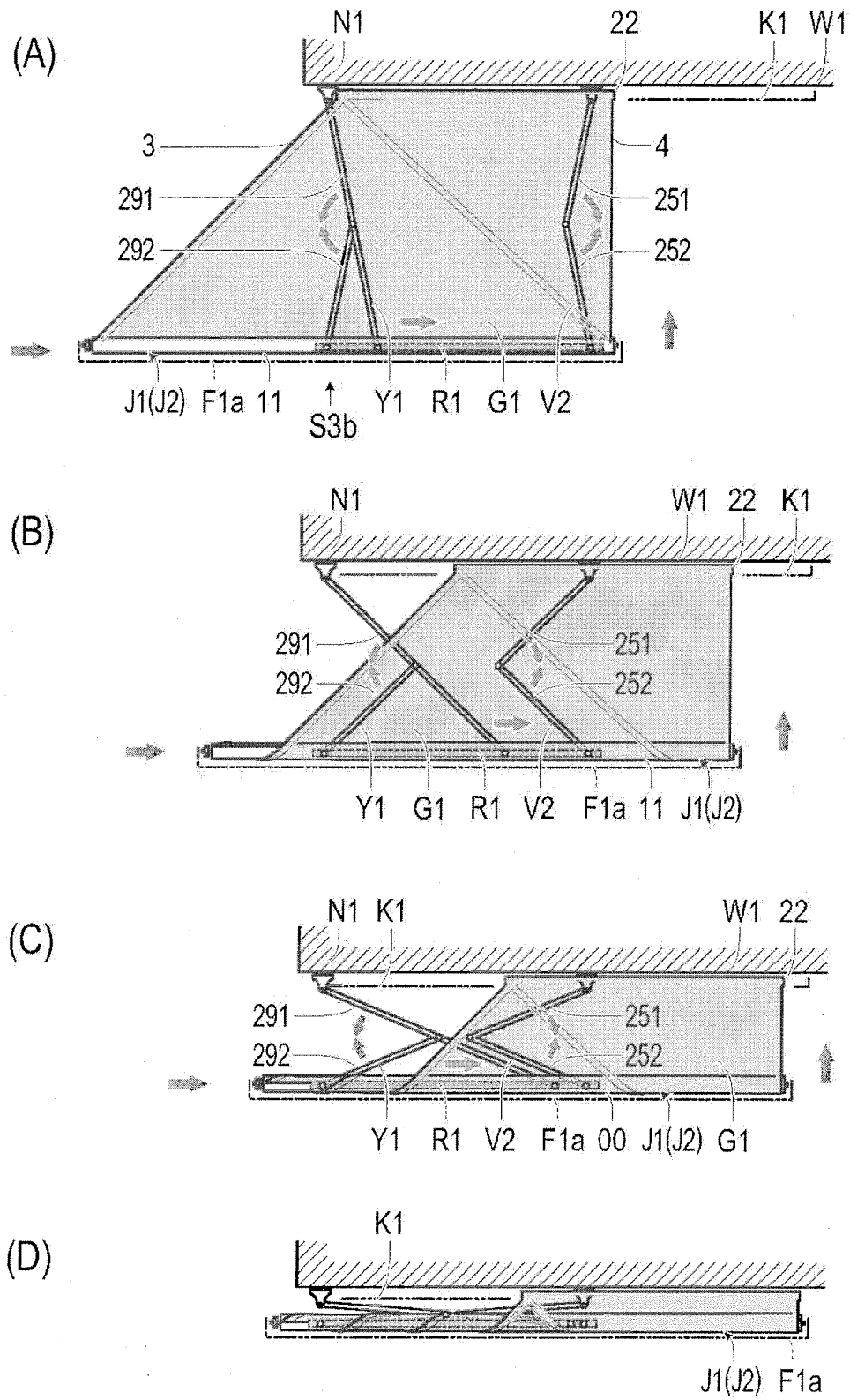


Fig.20

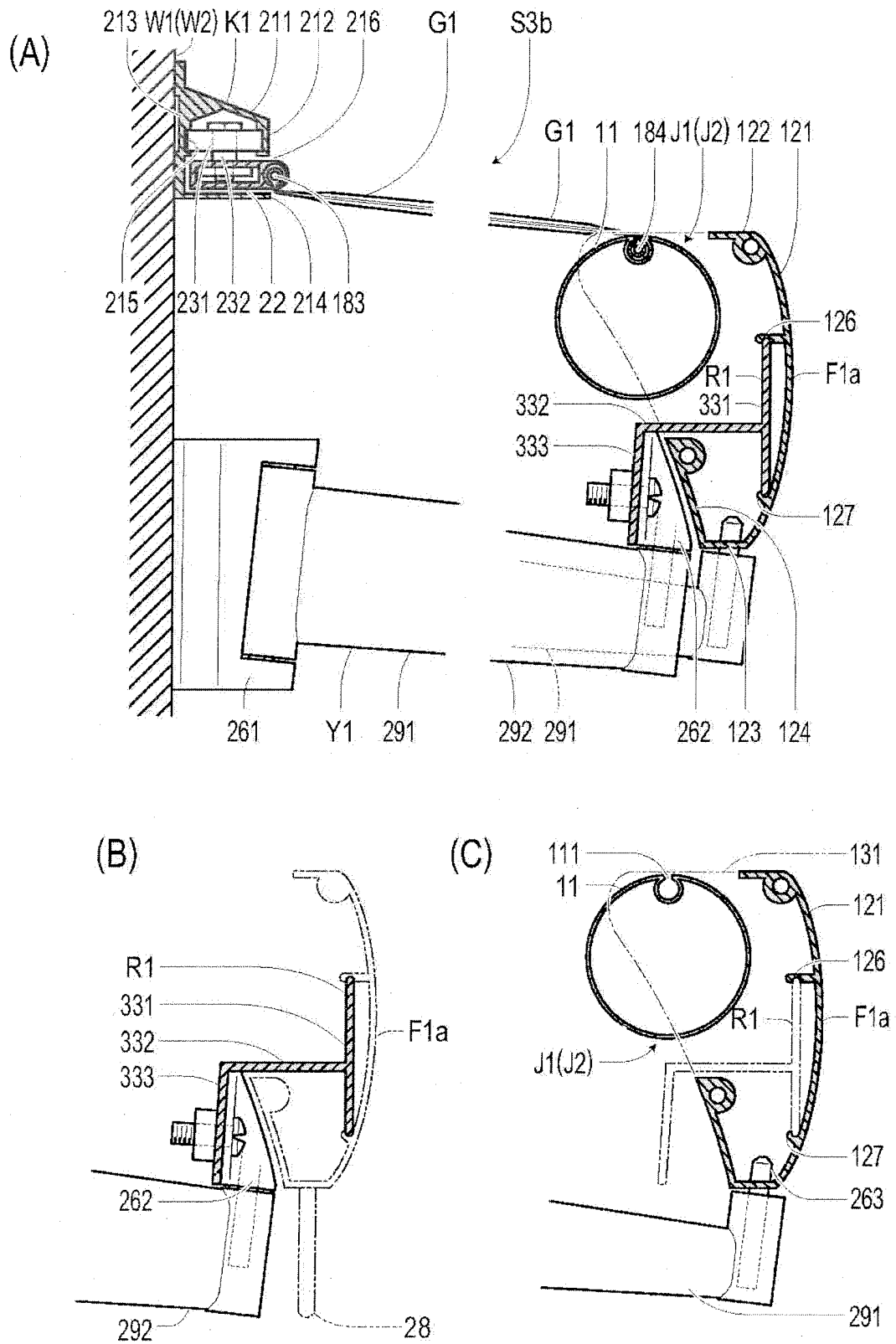


Fig.21

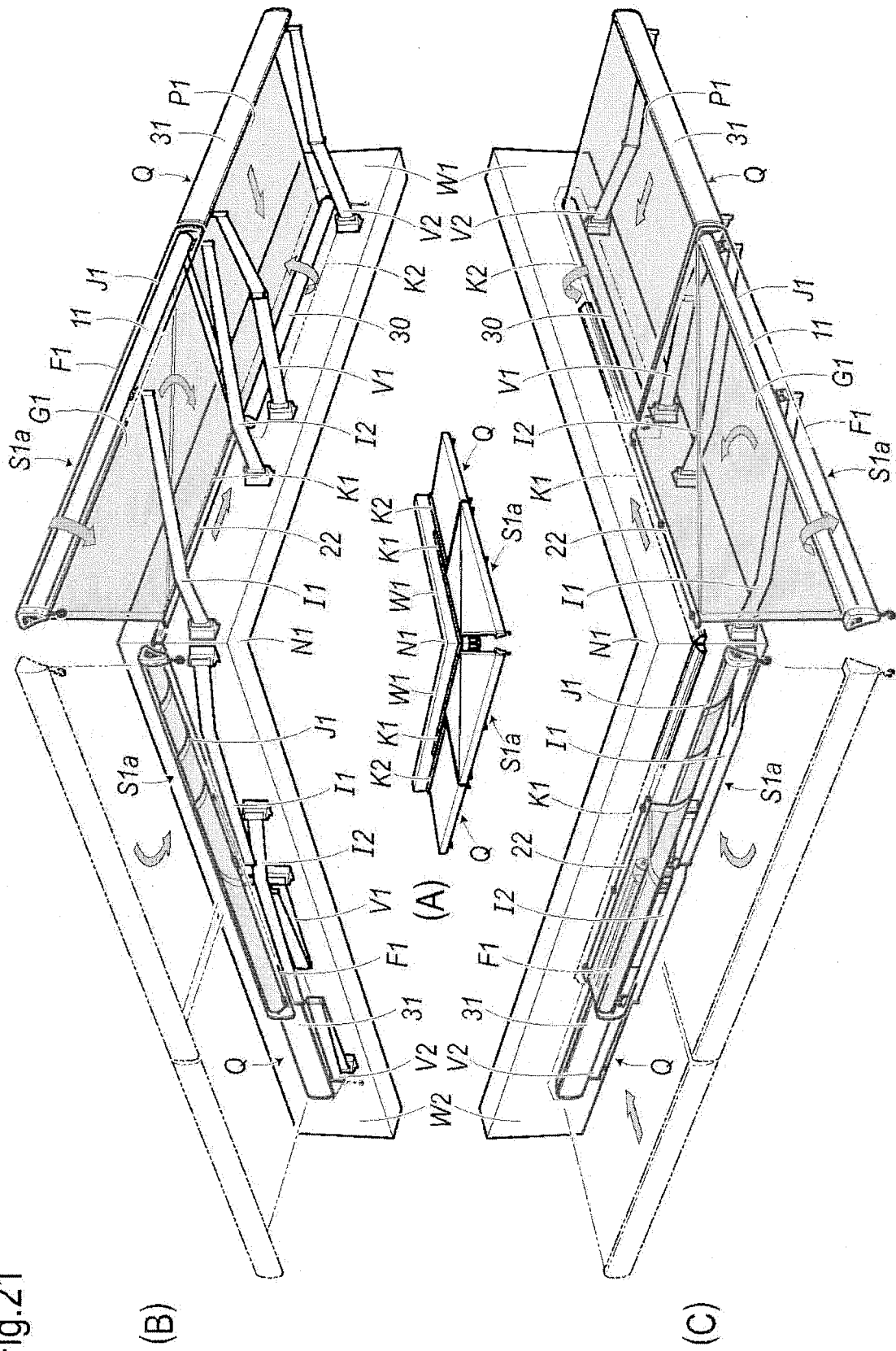
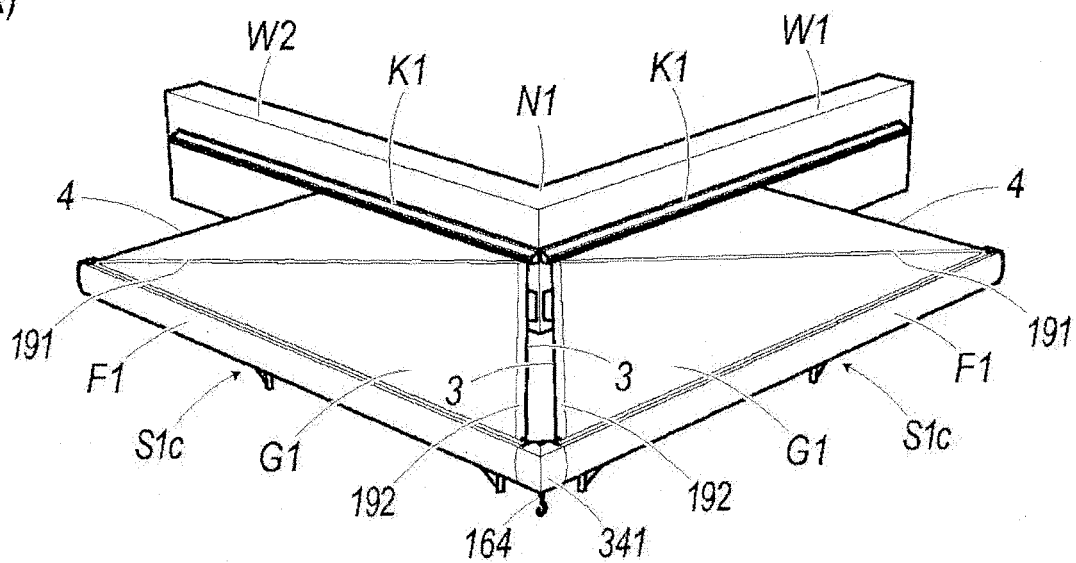


Fig.22

(A)



(B)

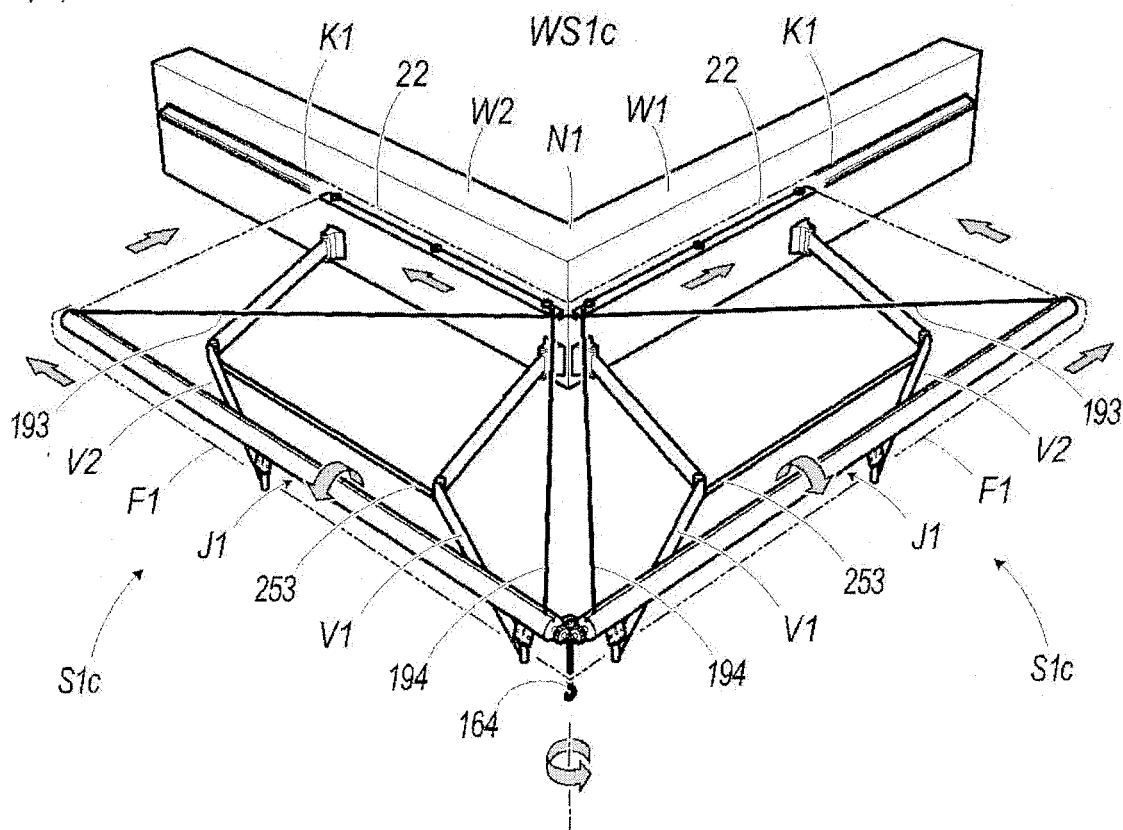


Fig.23

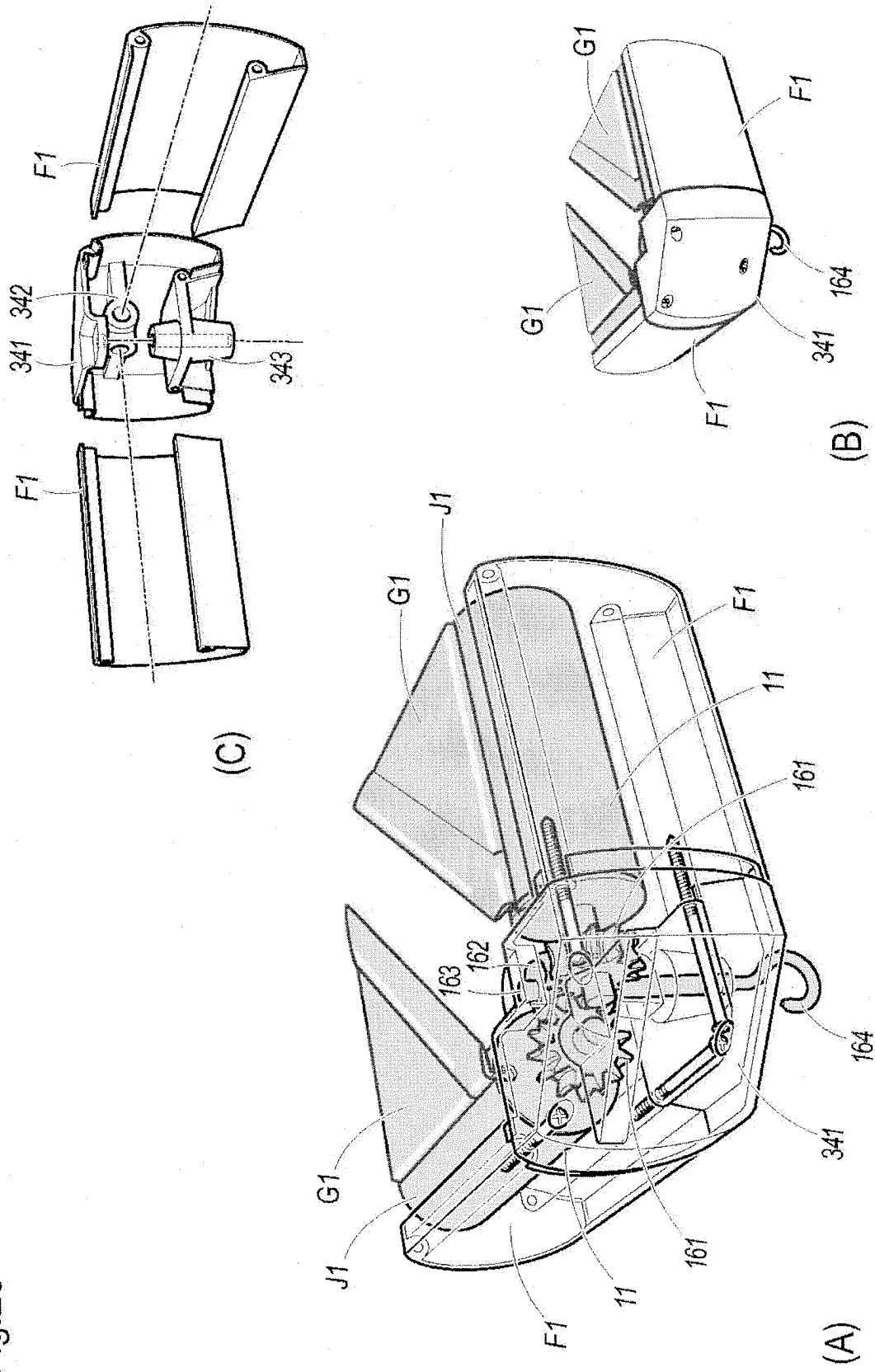


Fig.24

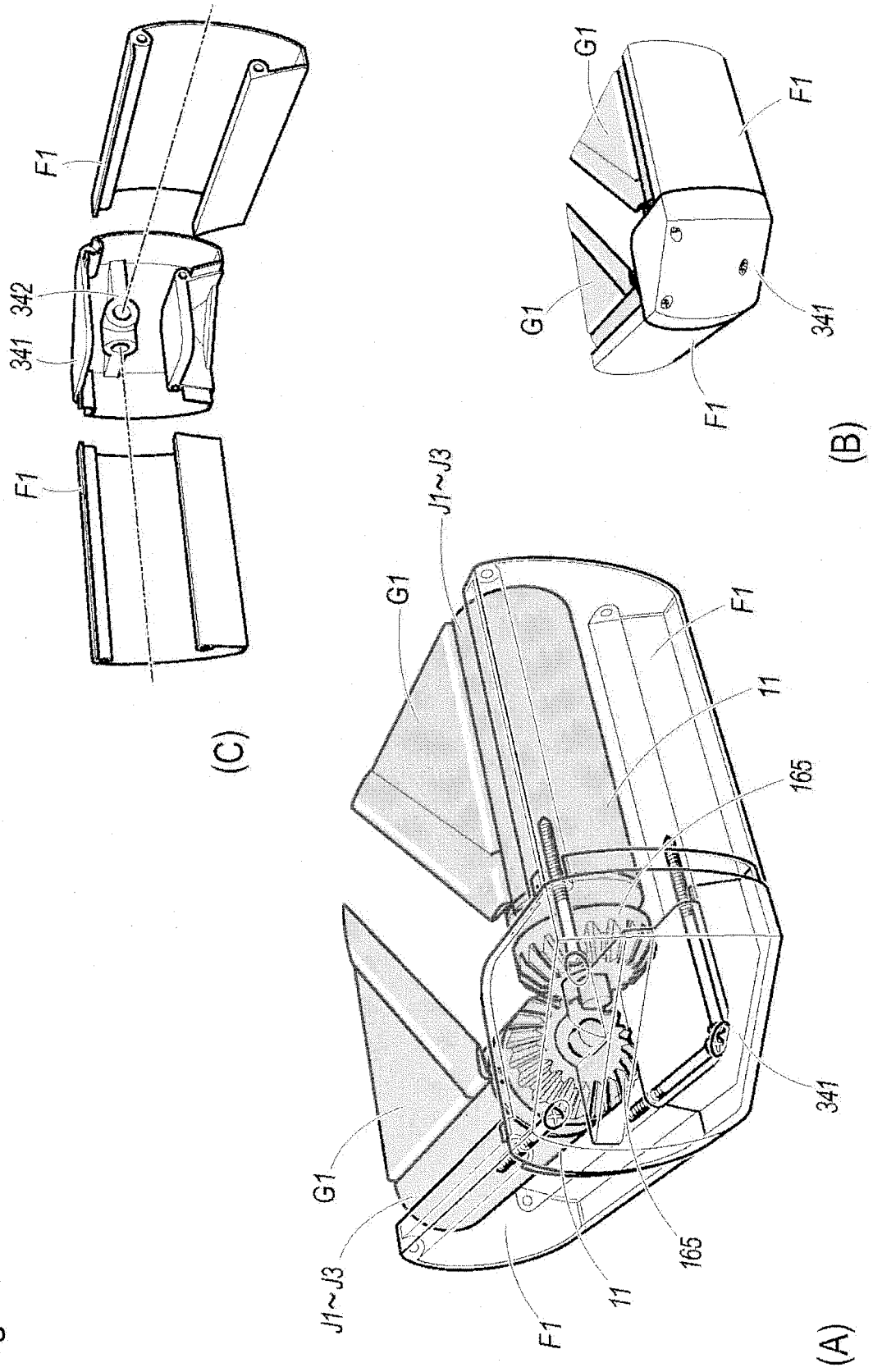


Fig.25

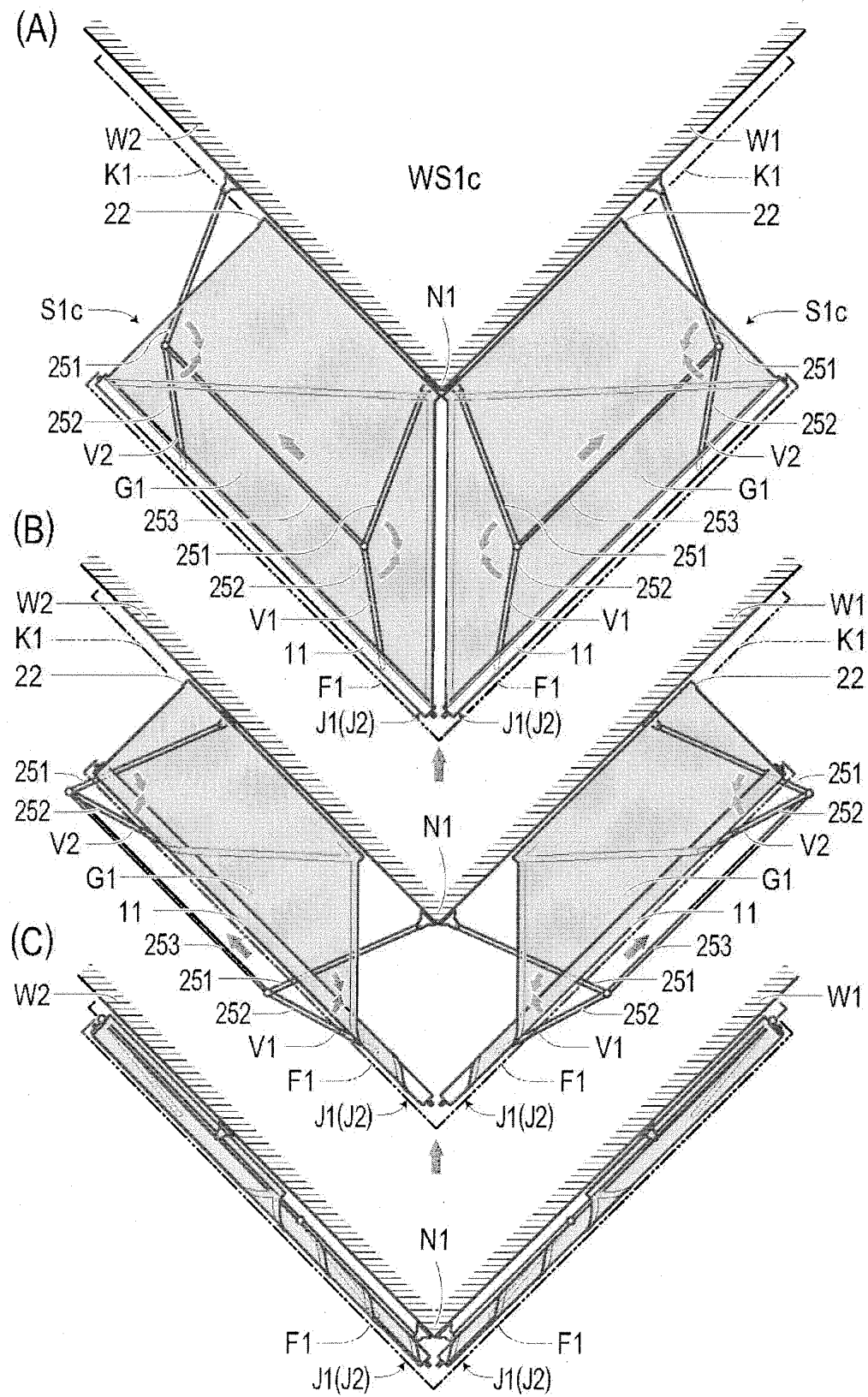
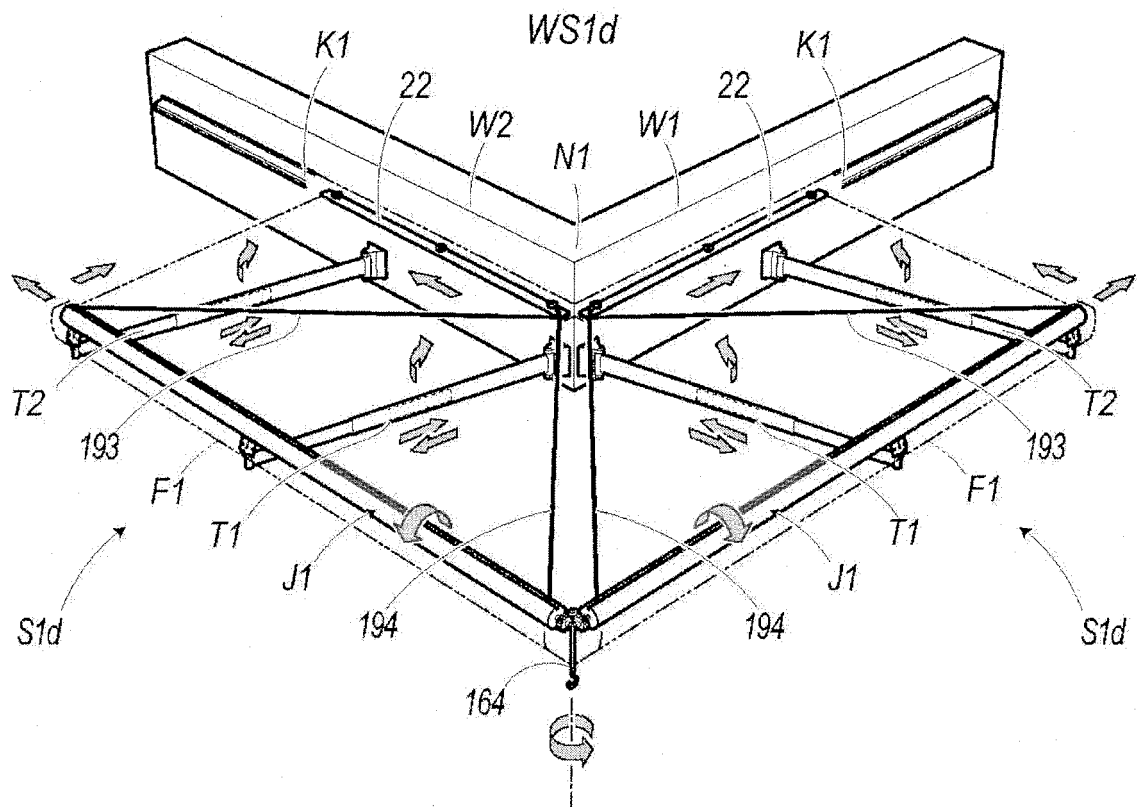


Fig.26

(A)



(B)

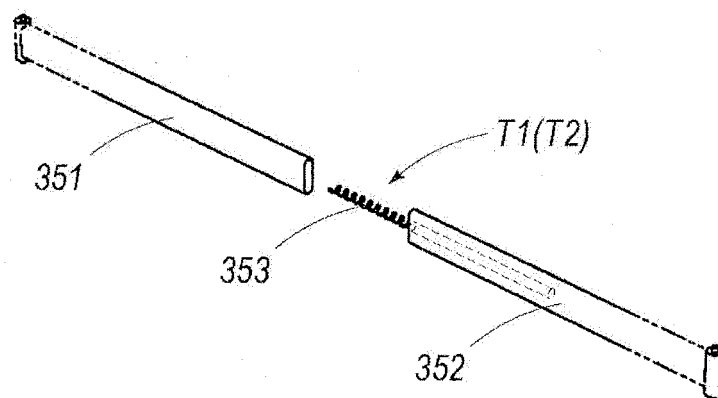


Fig.27

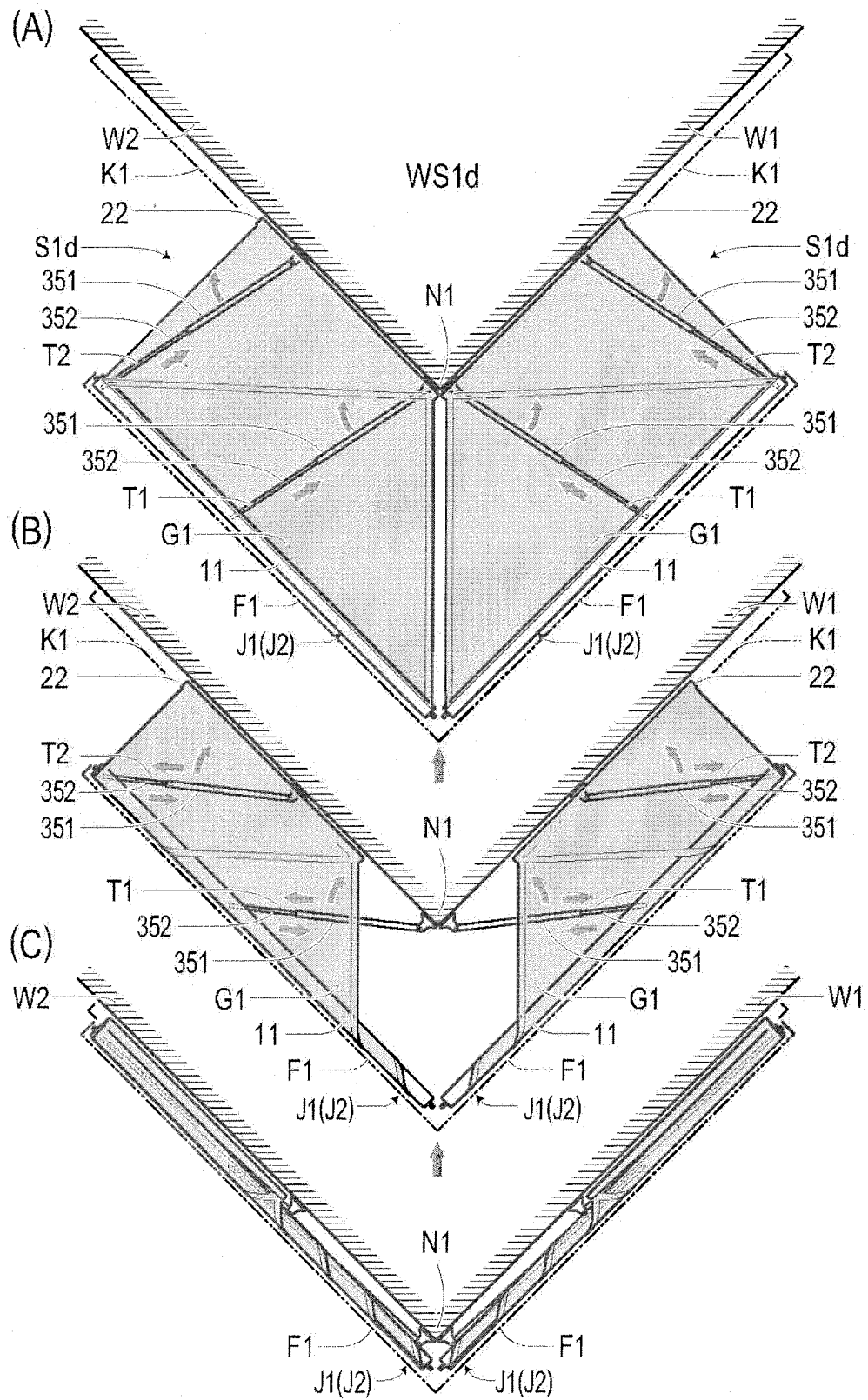


Fig.28

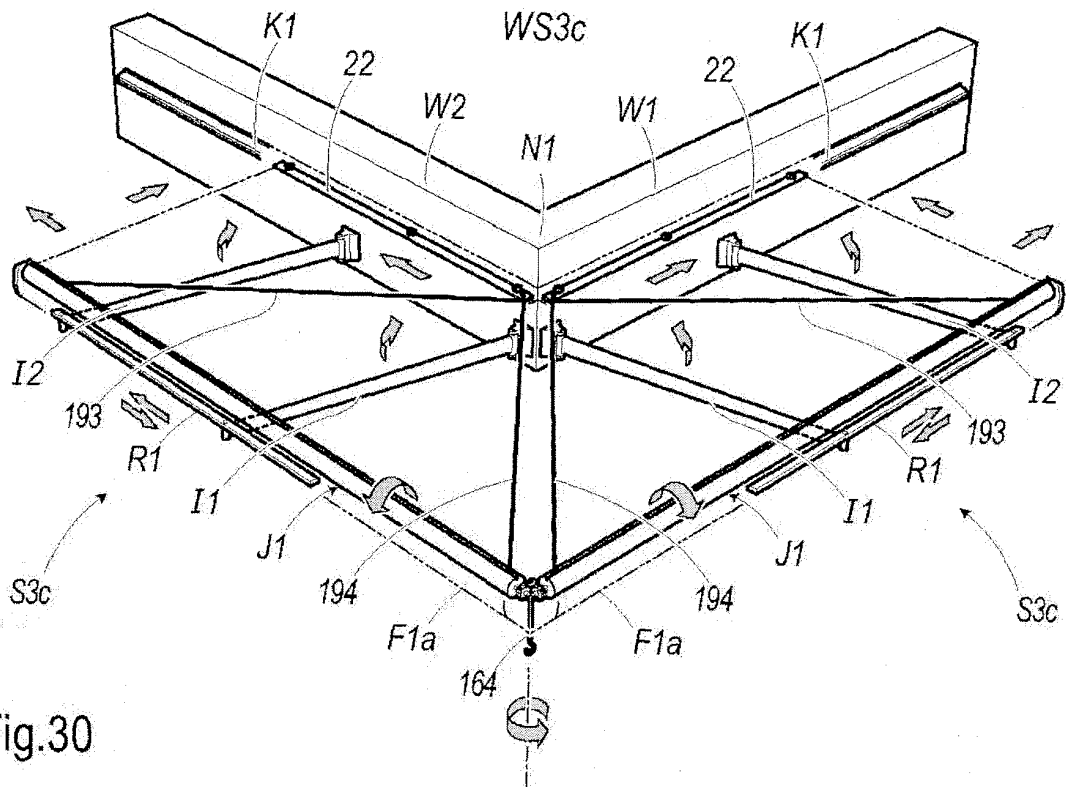


Fig.30

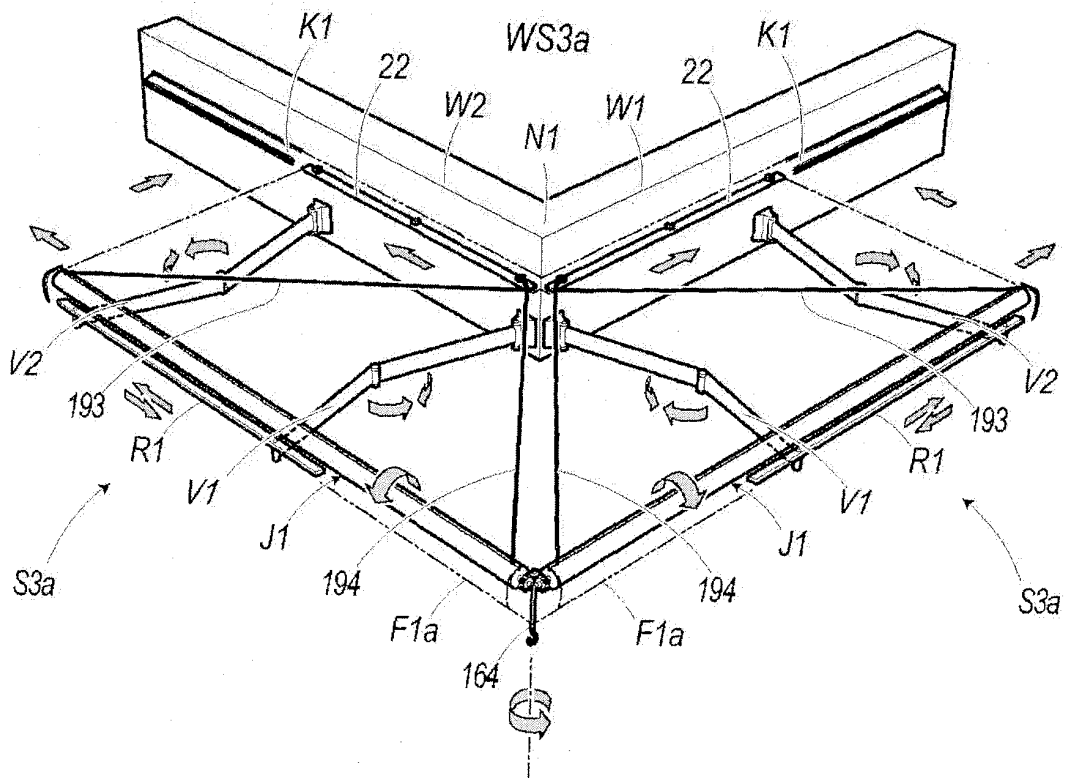


Fig.29

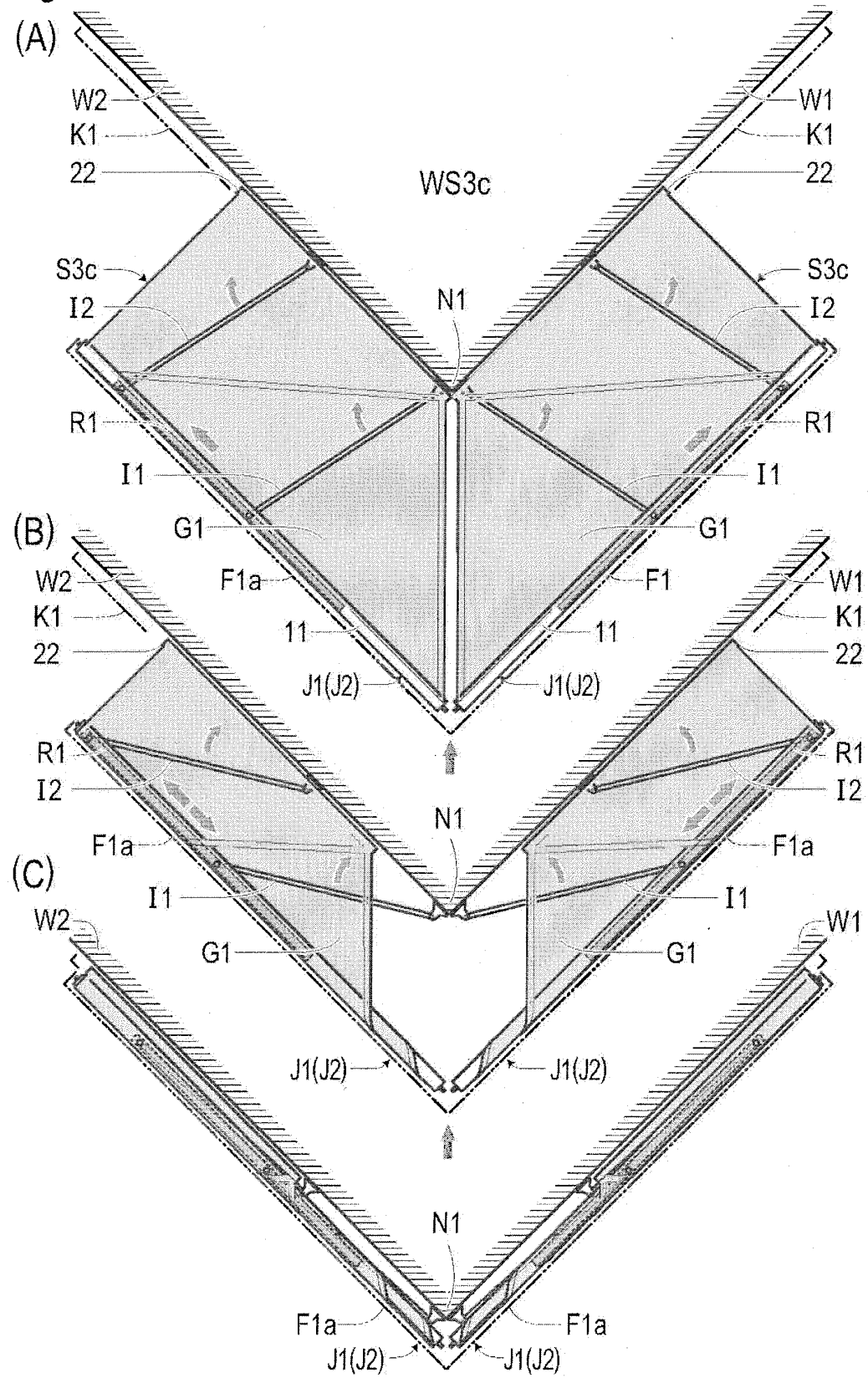


Fig.31

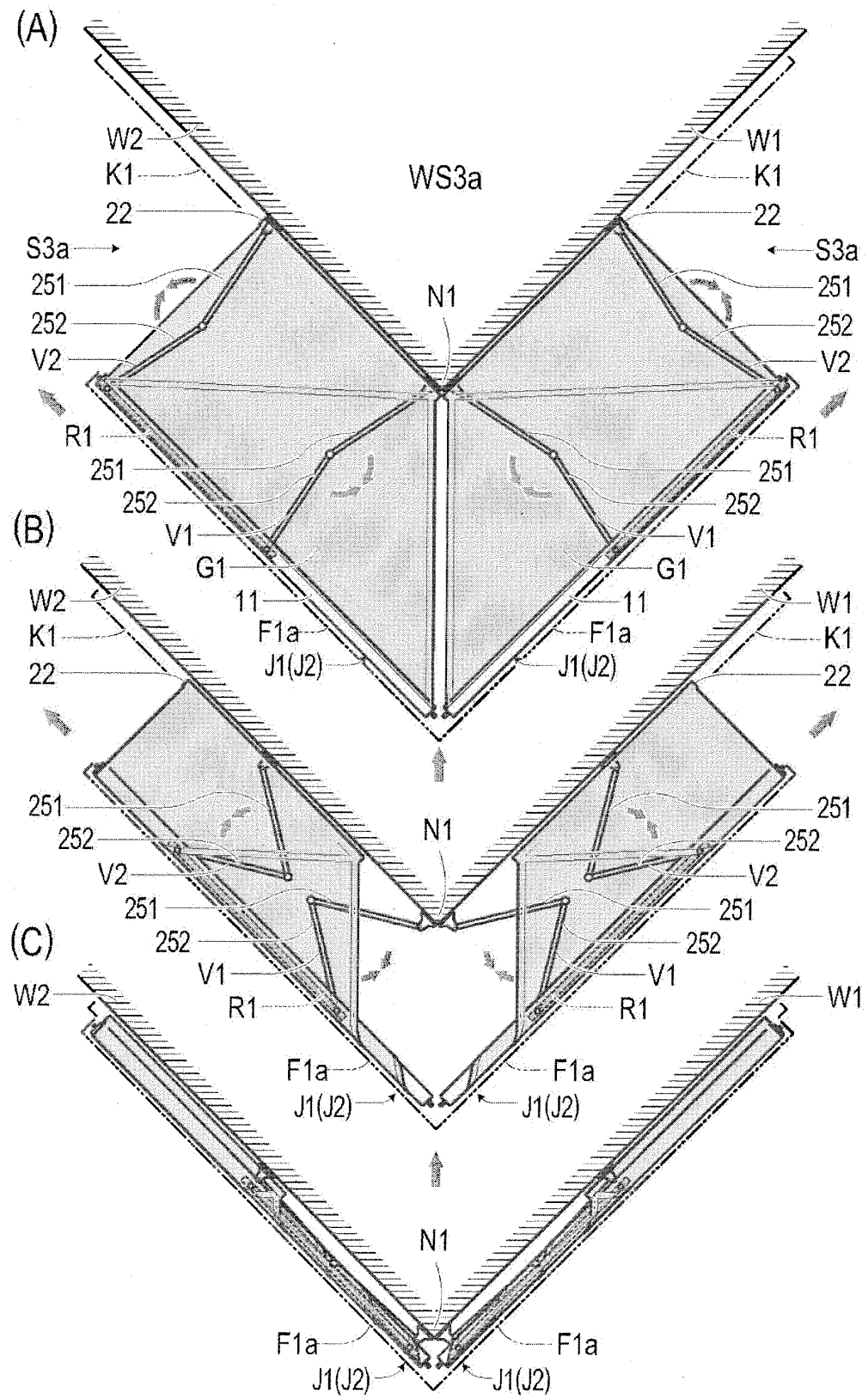


Fig.32

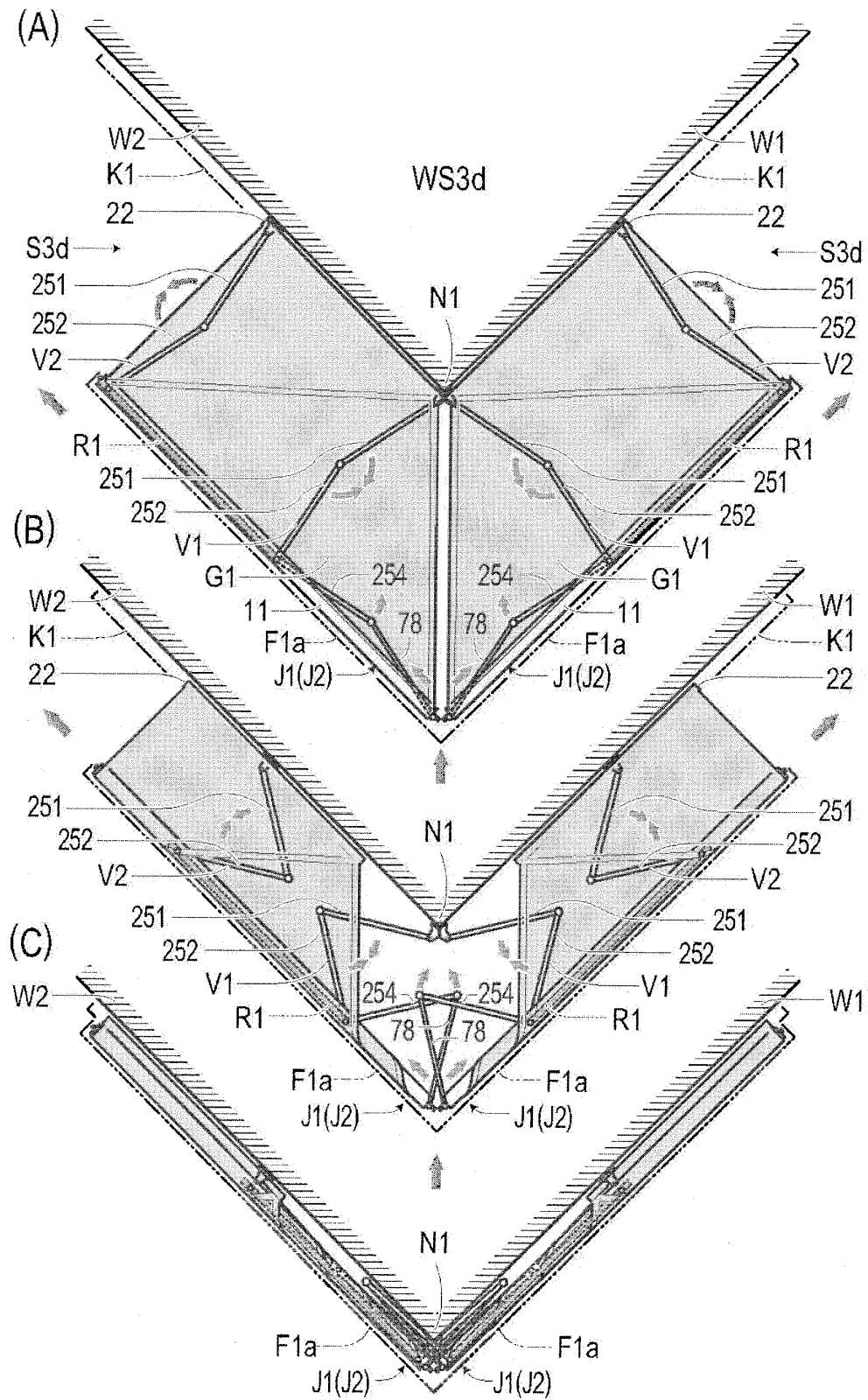


Fig.33

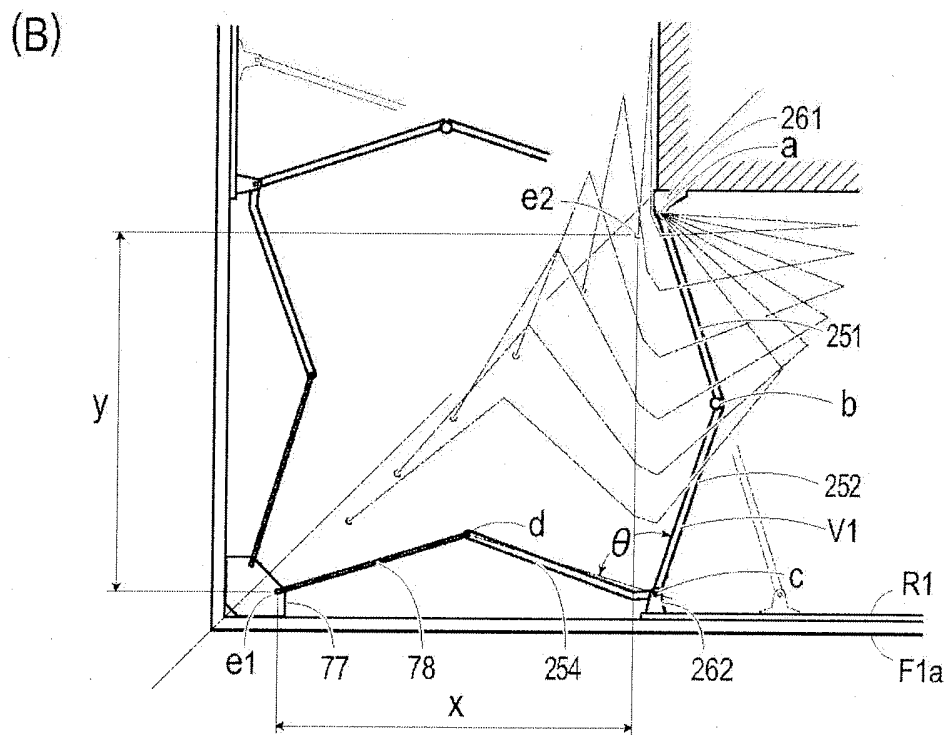
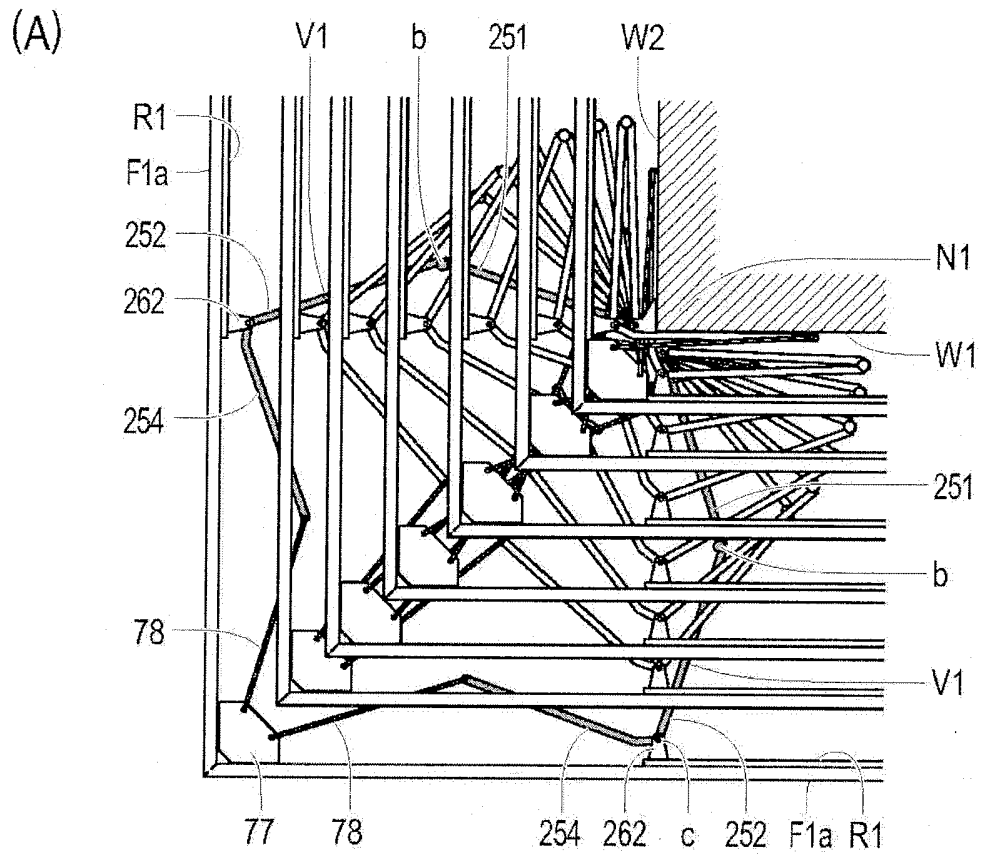
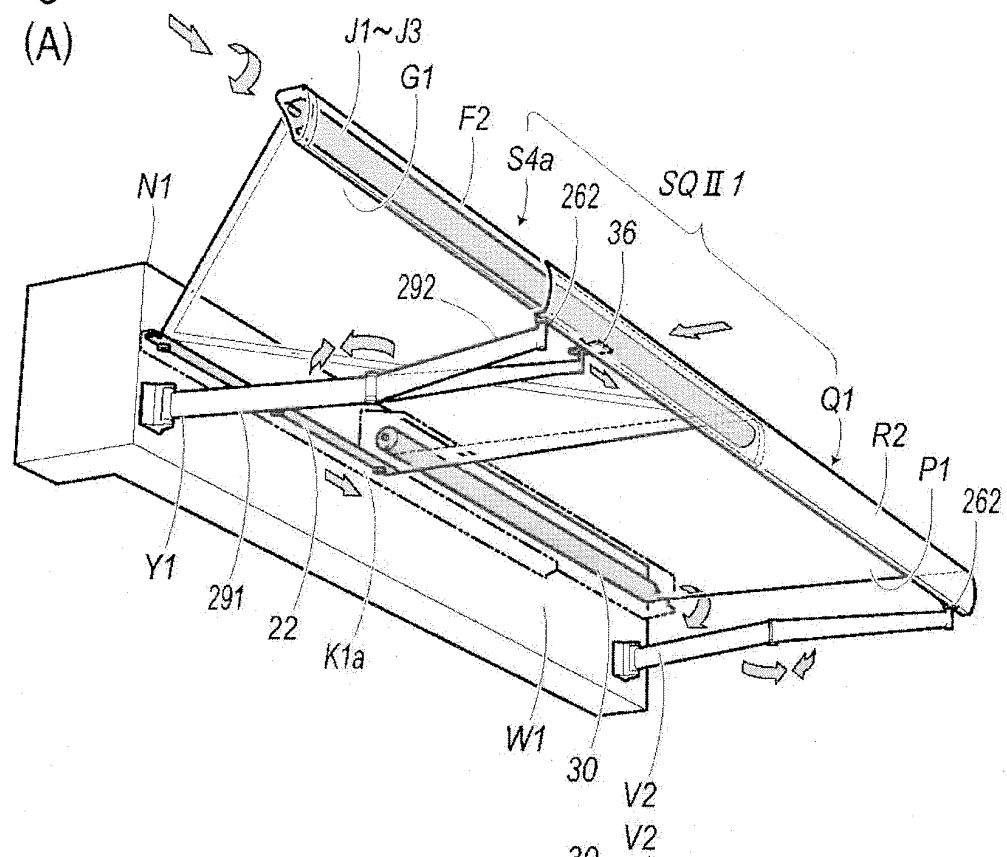


Fig.34

(A)



(B)

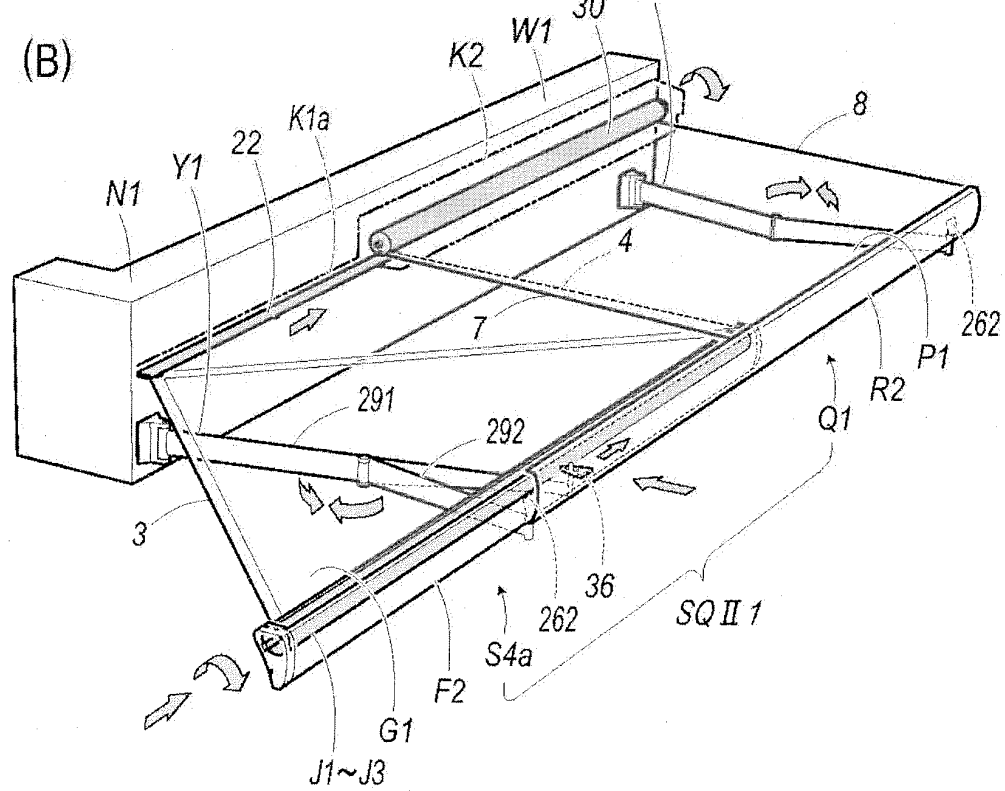


Fig.35

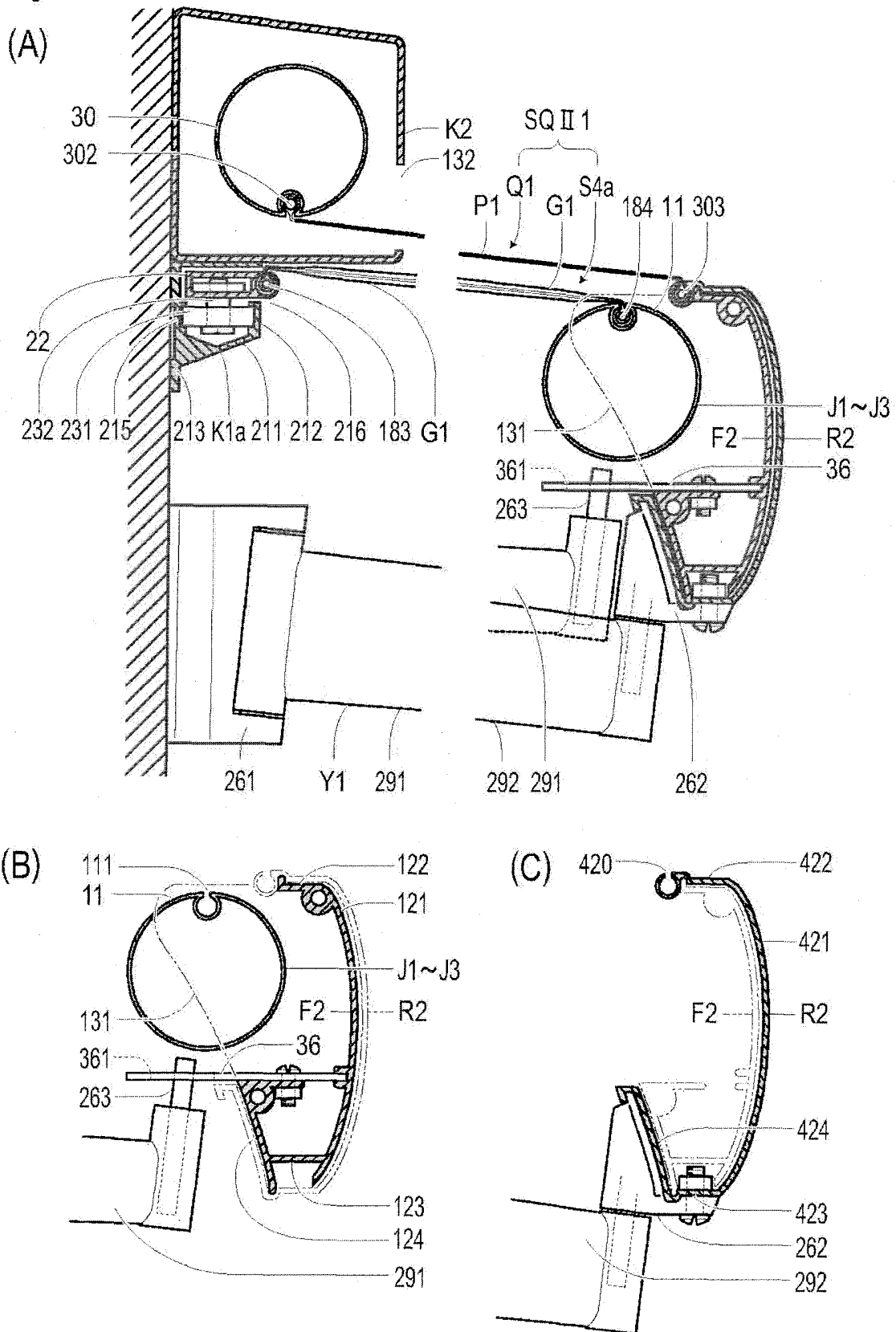


Fig.36

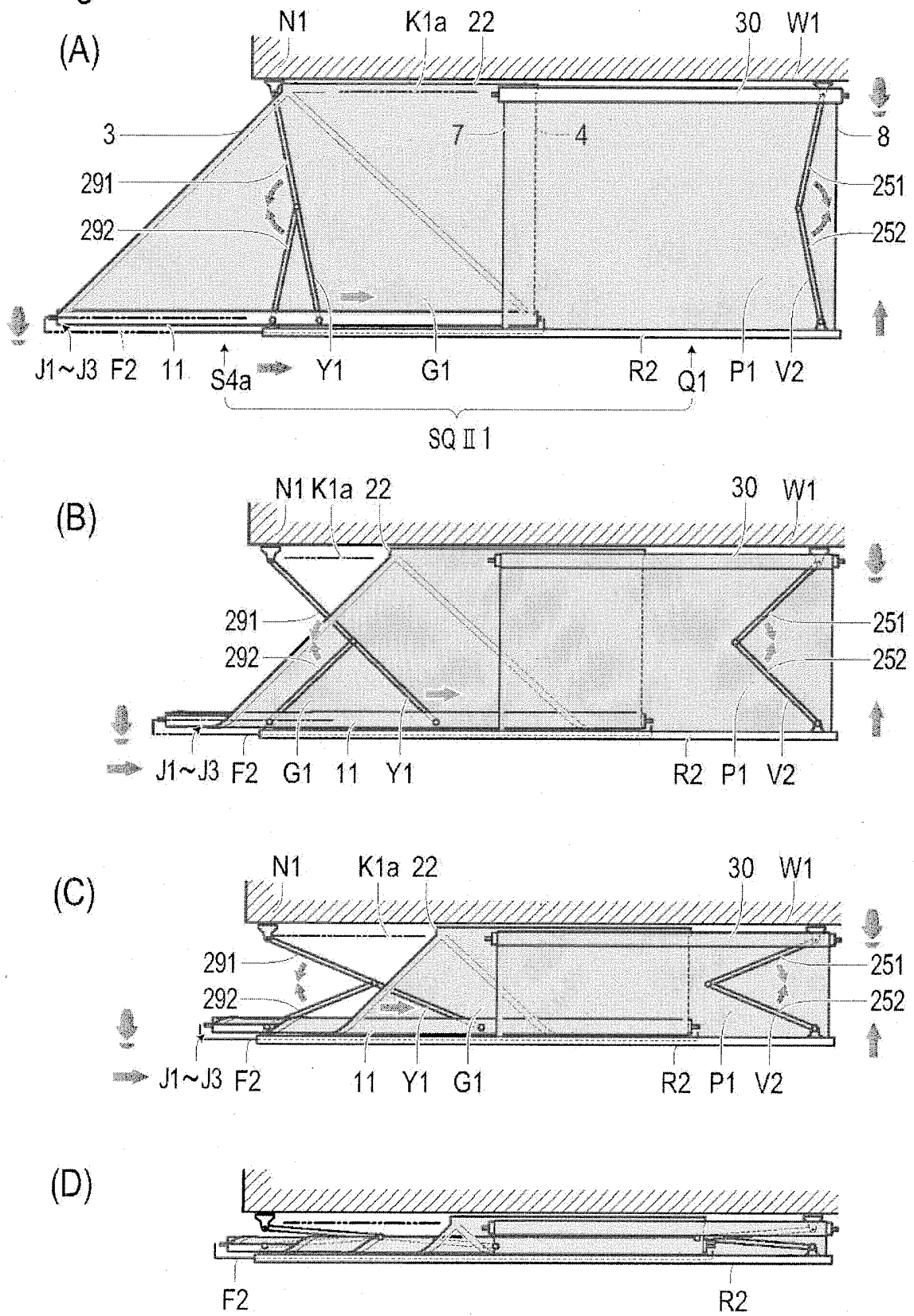
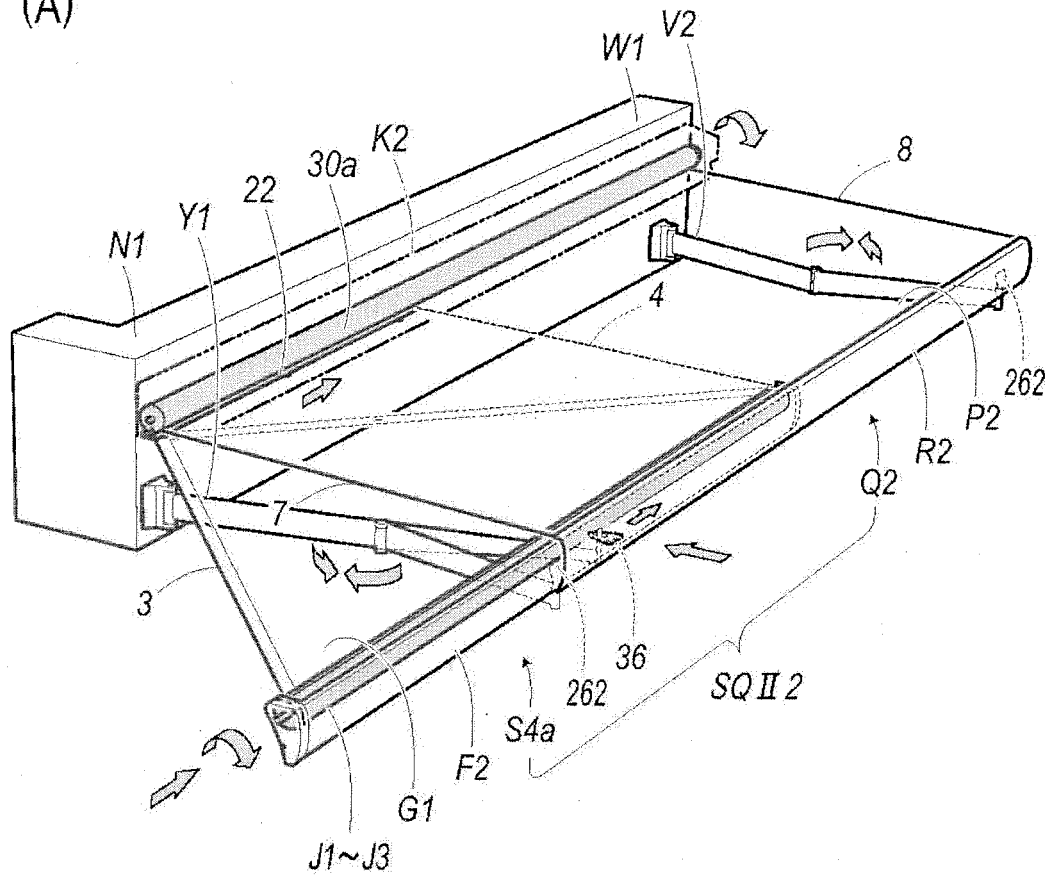


Fig.37

(A)



(B)

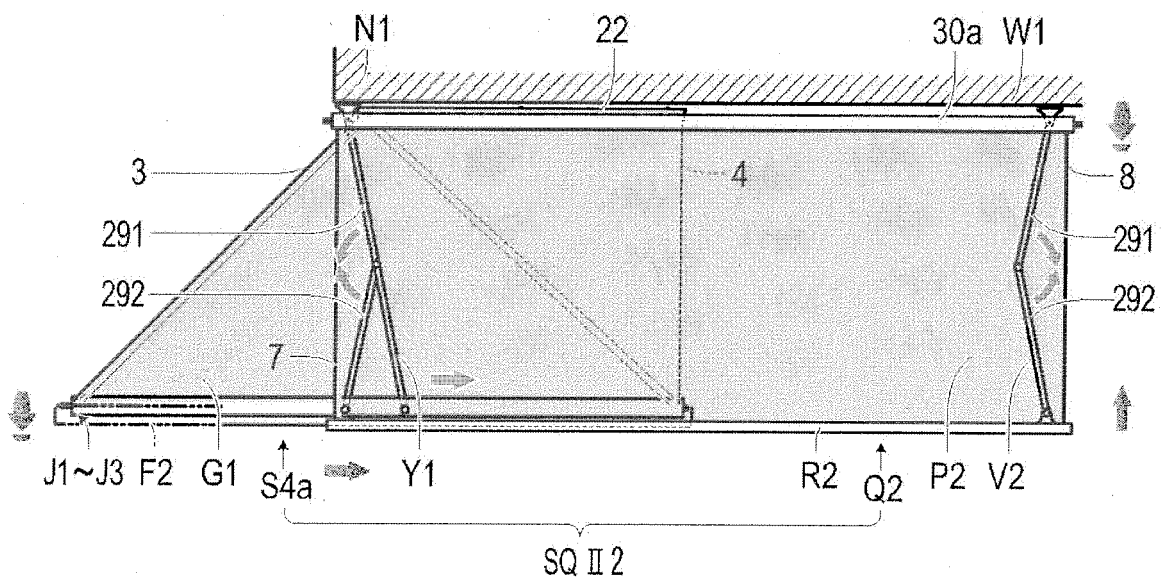
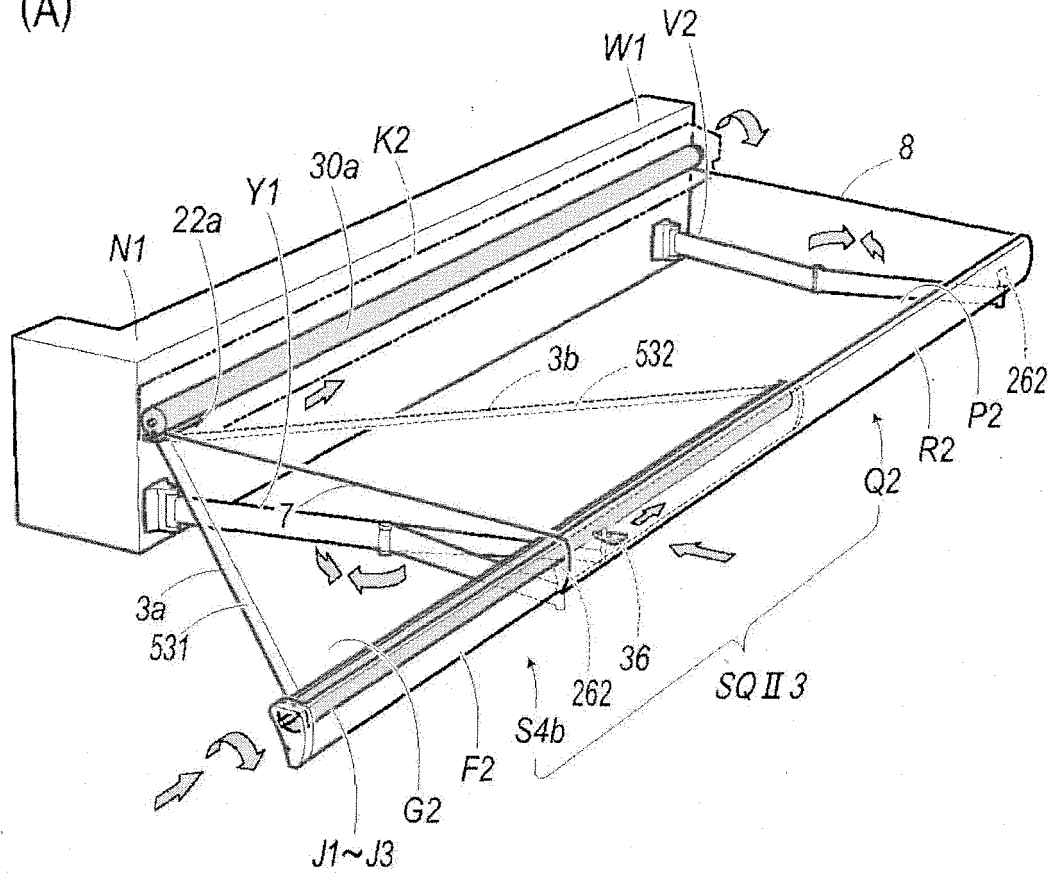


Fig.38

(A)



(B)

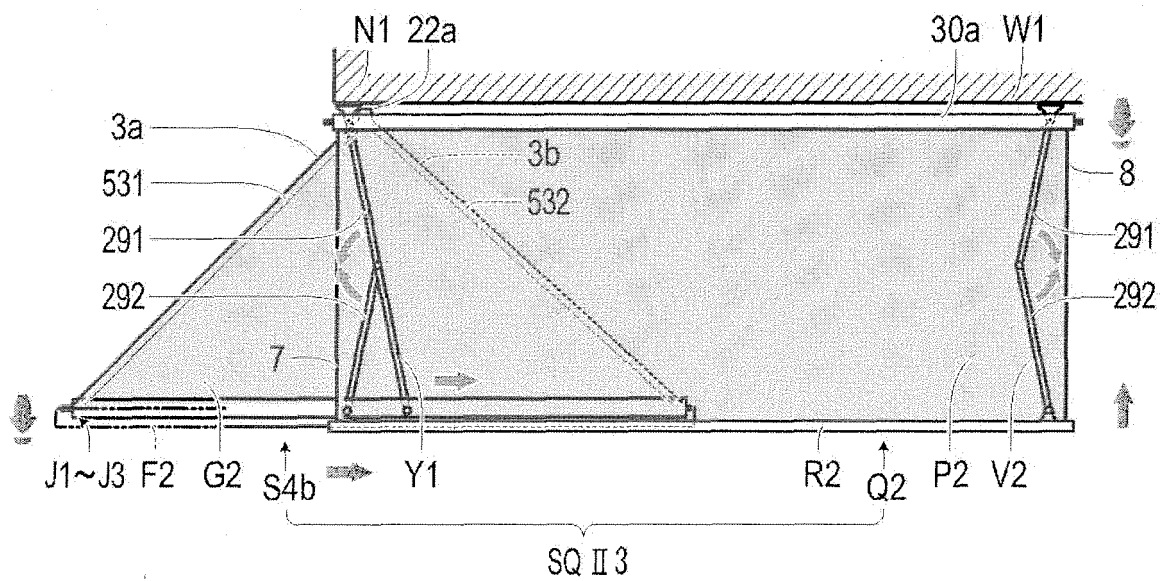
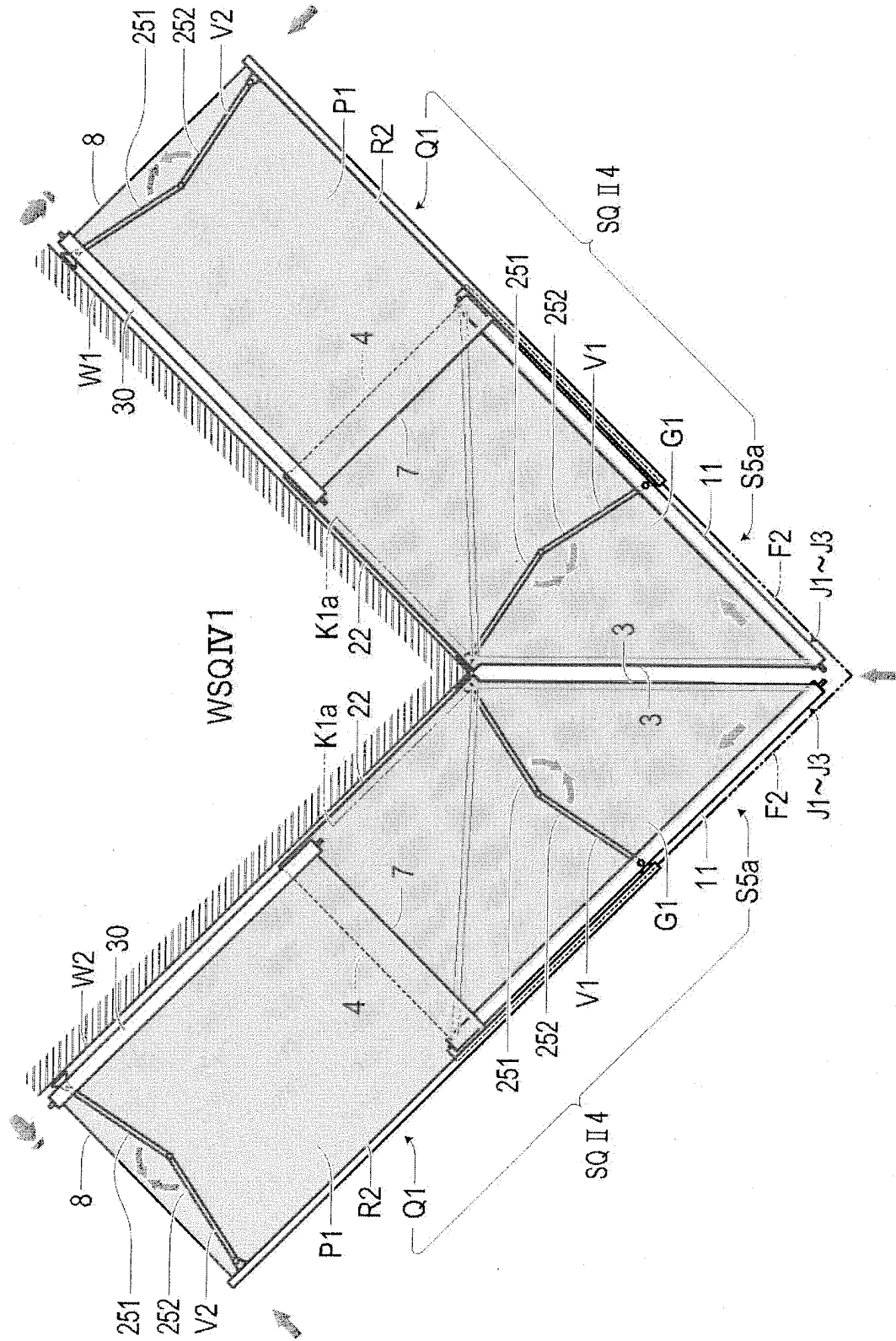


Fig.39



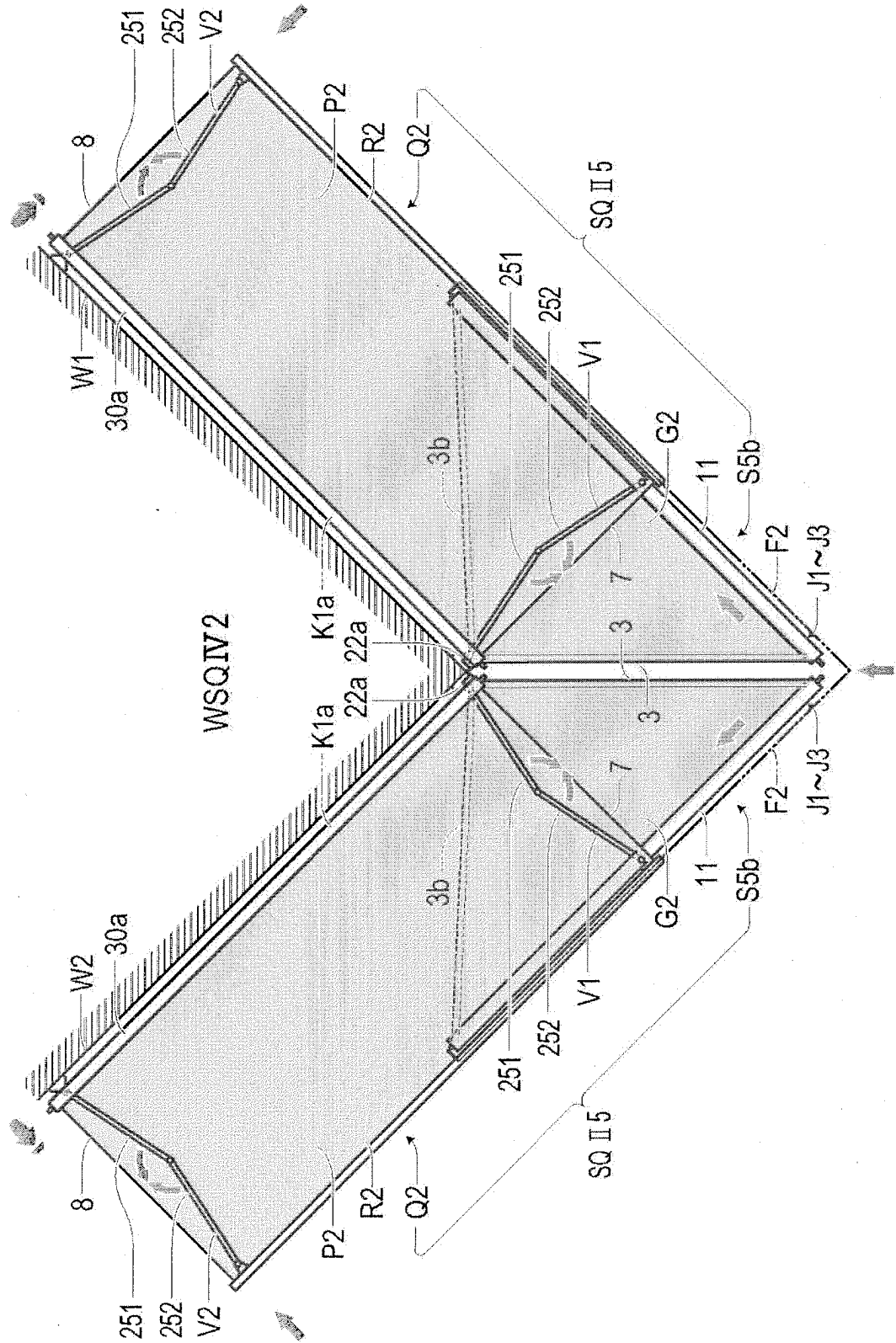


Fig. 40

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/303364

A. CLASSIFICATION OF SUBJECT MATTER

E04F10/06 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E04F10/00-10/10 (2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2006

Kokai Jitsuyo Shinan Koho 1971-2006 Toroku Jitsuyo Shinan Koho 1994-2006

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	WO 2006/003720 A1 (Osamu ITO), 12 January, 2006 (12.01.06), Full text; all drawings	1-12, 20-29, 38-45 13-19, 30-37, 46-59
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 150468/1984 (Laid-open No. 065132/1986) (Yoshiro NUKAGA), 02 May, 1986 (02.05.86), Page 5, lines 1 to 20; Figs. 4 to 5 (Family: none)	1-12, 20-29, 38-45

☒ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

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Date of the actual completion of the international search
16 May, 2006 (16.05.06)Date of mailing of the international search report
30 May, 2006 (30.05.06)Name and mailing address of the ISA/
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/303364

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2004-052460 A (Takano Co., Ltd.), 19 February, 2004 (19.02.04), Page 5, lines 2 to 10; Figs. 1 to 2 (Family: none)	39
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 010890/1988 (Laid-open No. 118029/1989) (Masayoshi FUKUSHI), 09 August, 1989 (09.08.89), Page 7, line 3 to page 9, line 7; Figs. 1 to 3 (Family: none)	1-59

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REFERENCES CITED IN THE DESCRIPTION

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