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(71) Applicant and

(72) Inventor: **YOUN, Shin-Young** [KR/KR]; 111-1403,
Gyeongnamsinsung apt., Jungsan-dong, Gyeongsan-si,
Gyeongsangbuk-do 712-280 (KR).

(74) Agent: **BAEK, Hong-Ki**; 543, Namsan2-dong, Jung-gu,
Daegu 700-442 (KR).

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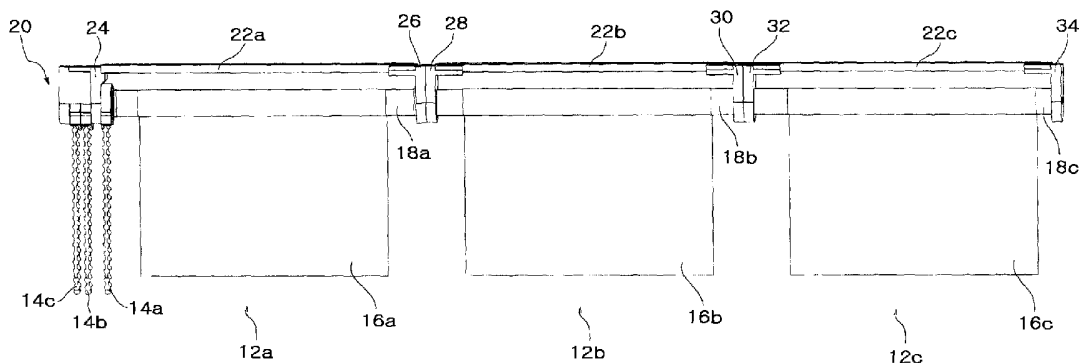
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(54) Title: MULTI-AXIS INDEPENDENT DRIVING ROLL SCREEN APPARATUS



(57) Abstract: An independently driven multiple-shaft roll screen includes at least one sectional roll screen horizontally installed to one side of a first sectional roll screen in series, and a multiple-shaft independently driving controller installed to the other end of the first sectional roll screen and including chain wheels engaged with ball chains such that a corresponding ball chain is independently lifted and lowered by a user at a position and driving shaft pipes coupled with the chain wheels, wherein more than two driving shaft pipes are inserted into a driving shaft pipe of a first sectional roll screen in turn and are coupled with corresponding roll driving parts of respective sectional roll screens such that driving force, generated by the multiple-shaft independently driving controller due to lifting and lowering of a corresponding ball chain, is independently transmitted to a corresponding roll screen through a driving shaft pipe of the driving part of the respective roll screen.

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Description

MULTI-AXIS INDEPENDENT DRIVING ROLL SCREEN APPARATUS

Technical Field

- [1] The present invention relates to a window blinding apparatus, and more particularly, to an improvement of a roll screen.

Background Art

- [2] A window blinding apparatus is used to ensure privacy, to intercept or adjust light, and as an interior design element. There are various types of the window blinding apparatus such as a curtain, a vertical, a roll blind, a roman shade, a sun coating, roll screen, and so on. Consumers buy the window blinding apparatus as their wishes for consideration of use of the window blinding apparatus, the structure of windows, and their fondness and install the same.
- [3] Fig. 1 shows conventional roll screens as a window blinding apparatus for adjusting the height of a screen by rolling up and down the screen serving as a curtain.
- [4] The roll screen apparatus, as shown in Fig. 1, has a structure wherein single driven roll screens 2 are installed to form three sections in the horizontal direction in series. The single driven roll screens 2 individually include a ball chain 4 for winding and unwinding a screen 6.
- [5] Thus, in the case when the single driven roll screens are installed in multiple horizontal sections in series, the user must approach the corresponding single driven roll screen to adjust the winding and the unwinding of the roll screens and pulls the respective ball chains down.

Disclosure of Invention

Technical Problem

- [6] Therefore, the present invention has been made in view of the above and/or other problems, and it is an object of the present invention to provide an independently driven multiple-shaft roll screen, in which individual roll screens are installed in multiple horizontal sections in series, being integrally controlled at a position and driving respective roll screens of the individual section independently.
- [7] It is another object of the present invention to provide an independently driven multiple-shaft roll screen enabling the integrated control of roll screens installed in multiple horizontal sections and having a structure enabling convenient separation and assembly of the respective roll screens.
- [8] It is still another object of the present invention to provide an independently driven multiple-shaft roll screen having a small number of parts and being easily transported.

Technical Solution

- [9] In accordance with the present invention, the above and other objects can be accomplished by the provision of an independently driven multiple-shaft roll screen including: at least one sectional roll screen horizontally installed to one side of a first sectional roll screen in series; and a multiple-shaft independently driving controller installed to the other end of the first sectional roll screen and including chain wheels engaged with respective ball chains such that a corresponding ball chain among the ball chains is independently lifted and lowered by a user at a position and driving shaft pipes coupled with the respective chain wheels, wherein more than two driving shaft pipes are inserted into and penetrate a driving shaft pipe of a first sectional roll screen in turn and are coupled with corresponding roll driving parts of respective sectional roll screens such that a driving force, generated by the multiple-shaft independently driving controller due to lifting and lowering of a corresponding ball chain, is independently transmitted to a corresponding roll screen through a driving shaft pipe of the driving part of the respective roll screen.

Advantageous Effects

- [10] As described above, since individual roll screens are installed in multiple horizontal sections in series, are integrally controlled at a position, and the roll screens of the individual section are independently driven, it is convenient to control the roll screen, separation and assembly of the respective roll screens is convenient, and the transportation thereof is also convenient.

Brief Description of the Drawings

- [11] These and/or other objects and advantages of the present invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings, in which:
- [12] Fig. 1 is a perspective view illustrating a conventional roll screen;
- [13] Fig. 2 is a schematic view illustrating an independently driven multiple-shaft roll screen according to a first preferred embodiment of the present invention;
- [14]
- [15] *Fig. 3 is an exploded perspective view illustrating the independently driven multiple-shaft roll screen according to a first preferred embodiment of the present invention;
- [16] Fig. 4 is a perspective view illustrating a first driving shaft pipe 72 in Fig. 3;
- [17] Fig. 5 is a perspective view illustrating a support piece 82 in Fig. 3;
- [18] Fig. 6 shows that components are assembled to a right support 26 of a first section roll screen 12a in Fig. 3 and an enlarged exploded perspective view corresponding to the assembly;

- [19] Fig. 7 is a perspective view illustrating an assembly of a multiple-shaft independently driving controller 20;
- [20] Fig. 8 is a perspective view illustrating a component of a left coupling pipe 102 in Fig. 3;
- [21] Fig. 9 is an enlarged exploded perspective view illustrating a connector 114 and a connecting pipe 118 in Fig. 3;
- [22] Fig. 10 is a sectional perspective view of an assembly of the connector 114 and the connecting pipe 118 taken along the longitudinal direction;
- [23] Figs. 11 and 12 are views illustrating various examples of the multiple-shaft independently driving controller 20 according to the first preferred embodiment of the present invention;
- [24] Fig. 13 is a schematic view illustrating an independently driven multiple-shaft roll screen according to a second preferred embodiment of the present invention; and
- [25] Fig. 14 is an exploded perspective view illustrating the independently driven multiple-shaft roll screen according to the second preferred embodiment of the present invention.

Best Mode for Carrying Out the Invention

- [26] Hereinafter, an independently driven multiple-shaft roll screen according to the preferred embodiment of the present invention will be described with reference to the accompanying drawings. It is noticed that the same components in the drawings are indicated by the same numerals. Moreover, the description for the conventional function and structure that may confuse spirit of the present invention will be omitted.
- [27] Fig. 2 is a schematic view illustrating an independently driven multiple-shaft roll screen according to a first preferred embodiment of the present invention, and Fig. 3 is an exploded perspective view illustrating the independently driven multiple-shaft roll screen according to a first preferred embodiment of the present invention.
- [28] Moreover, Fig. 13 is a schematic view illustrating an independently driven multiple-shaft roll screen according to a second preferred embodiment of the present invention, and Fig. 14 is an exploded perspective view illustrating the independently driven multiple-shaft roll screen according to the second preferred embodiment of the present invention.
- [29] The independently driven multiple-shaft roll screen 10 according to the preferred embodiment of the present invention can be installed in multiple sections more than at least one section in the horizontal direction in series and can be integrally controlled at a position, that is, by a multiple-shaft independently driving controller 20. In the preferred embodiment of the present invention, an independently driven multiple-shaft roll screen 10 in which roll screens are installed in the horizontal direction by three

sections in series is proposed.

- [30] An aspect of the first preferred embodiment of the present invention is that power transmission to first, second, and third sectional roll screens 12a, 12b, and 12c of the independently driven multiple-shaft roll screen 10 is carried out by driving shafts of first, second, and third sectional roll driving parts 18a, 18b, and 18c. In more detail, driving power to the first sectional roll screen 12a is directly transmitted by a first driving shaft pipe 72, driving power to the second sectional roll screen 12b is transmitted to a second driving shaft pipe 48 passing through the first driving pipe 78, and driving power to the third sectional roll screen 12c is transmitted by a third driving shaft pipe 60 passing through the second driving pipe 128.
- [31] An aspect of a second preferred embodiment of the present invention is that power transmission to the second sectional roll screen 12b and the third sectional roll screen 12c of the independently driven multiple-shaft roll screen 10 is transmitted to the second sectional roll driving part 18b and the third sectional roll driving part 18c passing through first and second installation beams 22a and 22b disposed at the upper sides of the first sectional roll driving part 18a and the second sectional roll driving part 18b.
- [32] The independently driven multiple-shaft roll screen according to the preferred embodiment of the present invention will be described in detail as follows.
- [33] The independently driven multiple-shaft roll screen 10 of Fig. 2 is structured such that the multiple-shaft independently driving controller 20, capable of independently driving the sectional roll driving parts 18a, 18b, and 18c, is coupled with the left side of the first section roll screen 12a having a structure for transmitting driving force to another section so that the respective sectional roll screens 12a, 12b, and 12c horizontally installed in series are independently controlled at a position. The multiple-shaft independently driving controller 20 includes ball chains 14a, 14b, and 14c for independently controlling winding and unwinding of sectional screens 16a, 16b, and 16c of the respective sectional roll screens 12a, 12b, and 12c, first, second, and third chain wheels 61, 44, and 52 (See Fig. 3) respectively engaged with the ball chains 14a, 14b, and 14c, and first, second, and third driving shaft pipes 72, 48, and 60 (See Fig. 3) engaged with the first, second, and third chain wheels 61, 44, and 52, and will be described in detail with reference to the exploded perspective view of Fig. 3 later.
- [34] To the other end of the first sectional roll screen 12a, the second sectional roll screen 12b is horizontally installed in series and the third sectional roll screen 12c is horizontally installed to the other end of the second sectional roll screen 12b in series so that a triple sectional independently driven multiple-shaft roll screen 10 is completed.
- [35] Between right and left supports 24 and 16 of the first sectional roll screen 12a, the

first sectional roll driving part 18a for winding and unwinding the section screen 16a and the first installation beam 22a having guide rail grooves formed in the longitudinal direction are installed. Between right and left supports 30 and 28 of the second sectional roll screen 12b, the second sectional roll driving part 18b for winding and unwinding the section screen 16b and the second installation beam 22b having guide rail grooves formed in the longitudinal direction are installed. Between right and left supports 34 and 32 of the third sectional roll screen 12c, the third sectional roll driving part 18c for winding and unwinding the section screen 16c and the third installation beam 22c having guide rail grooves formed in the longitudinal direction are installed.

[36] Referring to Fig. 3, the multiple-shaft independently driving controller 20 according to the preferred embodiment of the present invention includes the first chain wheel 61, a common support 24 having right and left protruded pipes 40 and 42, the second chain wheel 44 coupled with the second driving pipe 48, a chain wheel cover 50, the third chain wheel 52 coupled with the third driving pipe 60, a controller support 36 having a shaft hole 58, and an installation frame (not shown) for coupling the common support 24 with the controller support 36.

[37] The common support 24 of the multiple-shaft independently driving controller 20 serves as the right support of the first sectional roll screen 12a and the left support of the multiple-shaft independently driving controller 20, and has the right and left protruded pipes 40 and 42.

[38] The second driving shaft pipe 48 has an outer diameter less than the inner diameters of the right and left protruded pipes 40 and 42 of the common support 24, and a proper length such that the second driving shaft pipe 48 protrudes farther than the right protruded pipe 42. A worker inserts the second driving shaft pipe 48 into a lateral protruded pipe 46 of the second chain wheel 44, fastens the same with set screws, and connects the second ball chain 14b (See Fig. 2) to the second chain wheel 44 for the engagement. After that, the other end of the second driving shaft pipe 48 is pushed into the right and left protruded pipes 40 and 42 of the common support 24 so that the second driving shaft pipe 48 protrudes to the outside of the right protruded pipe 42 and is loosely connected to the cylindrical surface of the left protruded pipe 40 of the common support 24, thereby enabling axial rotation.

[39]

[40] *Next, the lateral protruded pipe 46 of the second chain wheel 44 is loosely inserted into a through-hole of the chain wheel cover 50 and the lateral protruded pipe 46 of the second chain wheel 44 protrudes to the other end of the chain wheel cover 50. The third chain wheel 52 is inserted into the cylindrical surface of the lateral protruded pipe 46, thereby enabling axial rotation.

[41] The third driving shaft pipe 60 has a diameter less than the inner diameter of the

second driving shaft pipe 48 and a length such that the third driving shaft pipe 60 slightly protrudes to the outside of the right support 26 of the first sectional roll screen 12a. The third driving shaft pipe 60 has a coupling groove 300, formed in the side, into which a set screw 57 is fastened, and a spline 302 formed in the other end thereof to transmit driving force.

[42] The worker fits the third driving shaft pipe 60 into the lateral protruded pipe 54 of the third chain wheel 52, fastens the set screw 57, and connects the third ball chain 14c (See Fig. 2) to the third chain wheel 52 for the engagement. After that, the other end of the third driving shaft pipe 60 penetrates the second driving shaft pipe 48 so that the other end protrudes to the outside of the second driving shaft pipe 48 and the third chain wheel 52 is loosely hung around the outer circumference of the lateral protruded pipe 46 of the second chain wheel 44, thereby enabling axial rotation. After that, a coupling piece 25 of the common support 24 is inserted into the other side of the guide rail groove of the installation beam and the lateral protruded pipe 54 of the third chain wheel 52 is loosely inserted into the shaft hole 58 of the controller support 36, so that the third chain wheel 52 is assembled to enable axial rotation.

[43] Meanwhile, differently from the first and second chain wheels 44 and 52, the first chain wheel 61 hung around the right protruded pipe 42 of the common support 24 includes a locking piece formed in the side of the cylindrical outer circumference instead of the respective lateral protruded pipes 46 and 54. Before loosely hanging the first chain wheel 61 around the right protruded pipe 42, the first ball chain 14a (See Fig. 2) is connected to the first chain wheel 61.

[44] After hanging the first chain wheel 61 around the right protruded pipe 42 of the common support 24, a first clutch spring 64 is tightly hung around the right protruded pipe 42, while the locking piece 62 of the first chain wheel 62 is positioned between cranked ends of the first clutch spring 64. By doing so, the first clutch spring 64 tightly hung around the right protruded pipe 42 of the common support 24 usually tightens the right protruded pipe 42 due to compressing force of the first clutch spring 64 to prevent undesired rotation of the first sectional roll driving part 18a, but when a user pulls the ball chain 14a (See Fig. 1) in order to wind the sectional screen 16a, the locking piece 62 of the first chain wheel 61 is locked by one of the cranked ends 66 and 68 of the first clutch spring 64 to apply force so that axial rotation of the first sectional roll driving part 18a is enabled.

[45] After tightly inserting the first clutch spring 64, the worker puts a chain wheel cover 70 on the first driving shaft pipe 72 to allow the first driving shaft pipe 72 to penetrate the chain wheel cover 70 and to press the first clutch spring 64 such that the first driving shaft pipe 72 is loosely hung around the outer circumference of the right protruded pipe 42 of the common support 24, whereby the first driving shaft pipe 72 is

coupled with the cranked ends 66 and 68 of the first clutch spring 64. Next, a separation preventing tap 74 having an uneven inner hole is hung around the second driving shaft pipe 48 to prevent right and left-sided part from separating.

[46] The first driving shaft pipe 72, as shown in Fig. 4, is a coupling pipe serving as a driving shaft, and has a protruded ring 304 formed in the end, an inner coupling groove 308 formed in the inner circumference, and an inward locking ring 310 for receiving and fixing the first clutch spring 64, and an outer coupling groove 306 formed in the outer circumference. The inner coupling groove 308 and the outer coupling groove 306 are positioned in symmetric relation about a shaft. The cranked ends 66 and 68 of the first clutch spring 64 are inserted into and coupled with the inner coupling groove 308, and an inward coupling protrusion 80 of the first driving pipe 78 is inserted into and coupled with the outer coupling groove 306.

[47] Referring to Fig. 3 again, the length of the first driving pipe 78 is not depicted in Fig. 3, but is longer than the width of the screen 16a (See Fig. 2). The first driving pipe 78 has the inward coupling protrusion 80 formed in the side and a groove 81 having a locking step. The sectional screen 16a (See Fig. 2) of the first section roll screen 12a is coupled with the inward coupling protrusion 80.

[48] After coupling the first driving shaft pipe 72 and the separation preventing tap 74, the worker inserts a first rectangular guide pipe 76 into the first driving shaft pipe 72 such that an end of the third driving shaft pipe 60 protrudes over the right side of the common support 24 and inserts and fixes the end of the first rectangular guide pipe 76 into a rectangular coupling protrusion 49 of the second driving shaft pipe 48. After that, the inward coupling protrusion 80 of the first driving pipe 78 is inserted into the first driving shaft pipe 72.

[49] A support piece 82, as shown in Fig. 5, has a through-hole 312 having a conical shape and a diameter sufficient to enable the non-load rotation of the first rectangular guide pipe 76 penetrating therethrough, and a narrow groove 314 formed in the outer circumference in the longitudinal direction. The worker hangs the supporting piece 82 around the first rectangular guide pipe 76 and pushes the supporting piece 82 such that the inward coupling protrusion 80 is inserted into the narrow groove 314, so that the supporting piece 82 is positioned at the central portion in the longitudinal direction of the first driving pipe 78 and supports the first rectangular guide 76, thereby preventing the first rectangular guide pipe 76 from being bent.

[50] Meanwhile, the right support 26 of the first sectional roll driving part 18a as a driving part of the first sectional roll screen 12a includes an inwardly protruded pipe 86 and a locking groove 85 formed in an outer shaft hole 84. A rotation pipe 88, as shown in Fig. 6, is inserted into the inwardly protruded pipe 86 from the exterior of the right support 26.

- [51] Referring to Fig. 6, the rotation pipe 88 includes a locking ring 320 formed in the outer circumference of one end thereof, four insertion protrusions 322 formed in the lateral side of the locking ring 320 to form concentric circles, and a rectangular protruded pipe 324 formed in the other end thereof.
- [52] When the rotation pipe 88 is inserted into the inwardly protruded pipe 86 from the exterior, the locking ring 320 of the rotation pipe 88 is locked by the locking groove 85 of the outer shaft hole 84. After insertion of the rotation pipe 88, a driven shaft pipe 90 is hung around the inwardly protruded pipe 86 and a separation preventing tap 93 is tightly hung around the outer circumference of the rotation pipe 88 such that the rotation pipe 88 is fixed to prevent the separation.
- [53] After that, the worker inserts the end of the third driving shaft pipe 60 into the rotation pipe 88 temporarily assembled in the right support 26, inserts and fixes the rectangular protruded pipe 324 of the rotation pipe 88 into and to the first rectangular guide pipe 76, and inserts the inward coupling protrusion 80 of the first driving shaft pipe 78 into a coupling groove 92 of the driven shaft pipe 90 so that the first sectional driving part 18a is completely assembled. At that time, a right coupling piece 27 of the common support 24 is inserted into the guide rail grooves of the first installation beam 22a (See Fig. 2) of the first sectional roll screen 12a and a coupling piece 94 of the first sectional left support 26 is inserted into the other guide rail grooves of the first installation beam 22a.
- [54] Fig. 7 is a perspective view illustrating an assembly of a multiple-shaft independently driving controller 20 of Fig. 3, for easier comprehension, the structures of the respective ball chains 14a, 14b, and 14c are eliminated.
- [55] The first sectional roll screen 12a, including the multiple-shaft independently driving controller 20, the first sectional roll driving part 18a, and the first sectional screen 16a, becomes a sectional roll screen of the independently driven multiple-shaft roll screen, and only one set can sufficiently serve as the roll screen.
- [56] In the present invention, at least one of the sectional roll screens such as the second sectional roll screen 12b and the third sectional roll screen 12c, as shown in Fig. 3, connected to the first sectional roll screen 12a in the horizontal direction in series can be subsequently installed.
- [57] The assembly of the second sectional roll screen 12b will be described as follows.
- [58] Like the first right support 26, an inner protruded pipe 100 is formed in the second left support 28 having a locking groove formed in an outer shaft hole.
- [59] The worker hangs a second clutch spring 104 around the inner protruded pipe 100 of the second left support 28 such that the second clutch spring 104 tightens the inner protruded pipe 100 due to compressing force of the second clutch spring 104. After that, a left coupling pipe 102, the structure of which is depicted in detail in the

perspective view of Fig. 8, is loosely hung around the inner protruded pipe 100 of the second left support 28 and inward protruded steps 110 of the left coupling pipe 102 are positioned between cranked ends 106 and 108 of the tightly hung second clutch spring 104. The second clutch spring 104 is locked by an inward locking ring 112 of the left coupling pipe 102, thereby preventing the separation.

[60] Fig. 9 is an enlarged exploded perspective view illustrating a connector 114 and a connecting pipe 118 in Fig. 3, and Fig. 10 is a sectional perspective view of an assembly of the connector 114 and the connecting pipe 118 taken in the longitudinal direction.

[61] Referring to Figs. 3, 9, and 10, the connector 114 is loosely inserted into the connecting pipe 118 from left to right, thereby enabling axial rotation, and a rectangular rod 116 of the connector 114 penetrates the connecting pipe 118 and protrudes outside of the connecting pipe 118. The engagement between an outer circumferential step formed in the outer circumference of the connector 114 and an inner circumferential step prevents the connector 115 from separating to the right side.

[62] As shown in Figs. 9 and 10, the connector 114 has a spline groove 330 formed in the right side thereof into which the spline 302 of the third driving shaft pipe 60 can be inserted. The connector 114 includes the rectangular rod 116 formed in the right side thereof to be inserted into a second rectangular guide pipe 122. The connecting pipe 118 has four insertion grooves 332 formed in the left circumference in a circle such that the four insertion protrusions 322 of the rotation pipe 88 of the first sectional driving part 18a are inserted thereinto, and spring locking pieces 120 formed in the right end of the connecting pipe 118 along a part of an outward locking ring 121.

[63] If a driving force due to the rotation of the second chain wheel 44 is transmitted to the connecting pipe 118 when the user pulls the ball chain 14b (See Fig. 1) to raise the sectional roll screen 16b, the spring locking pieces 120 of the connecting pipe 118 and the inward protruded steps 110 of the left coupling pipe 102 are locked by one of the cranked ends 106 and 108 of the second clutch spring 104 and serve to apply force, whereby the second clutch spring 104 is released to enable the axial rotation of the second sectional roll driving part 108.

[64] The worker inserts the connector 114 inserted into the connecting pipe 118 into the inner protruded pipe 100 of the second sectional support 28 so that the second clutch spring 104 is surrounded by the spring locking pieces 120 and is locked by the spring locking pieces 120 such that the cranked ends 106 and 108 of the second clutch spring 104 are inserted into openings between the spring locking pieces 120. At that time, since the left side of the locking ring 121 of the connecting pipe 118 contacts the side of the inner protruded pipe 100 of the second left support 28, the connecting pipe 118 is not separated. In this state, a separation preventing step 122 is inserted into the

locking groove of the outer shaft hole of the second sectional support 28 such that the left side of the connecting pipe 118 is tightly inserted into the second left support 28, whereby the connecting pipe 118 is not inwardly separated and its axial rotation is enabled.

[65] Meanwhile, the worker tightly inserts a separation preventing tap 124 into a second rectangular guide pipe 122 and then inserts the rectangular guide pipe 122 into the rectangular rod 116. Next, the end of the second rectangular guide pipe 122 is inserted into a second driving pipe 128 and an inward coupling protrusion 128 of the second driving pipe 128 is inserted into a coupling groove 103 of the left coupling pipe 102.

[66] After that, a support piece 132 having the same structure as that of Fig. 5 is hung around the second guide pipe 122 and is pushed such that a coupling protrusion 130 of the second driving pipe 128 is inserted into a narrow groove 131 of the supporting piece 132. Thus, the supporting piece 132 is positioned at the central portion in the longitudinal direction of the second driving pipe 128 to support the second rectangular guide pipe 122, thereby preventing the second rectangular pipe 122 from being bent.

[67] Also, the right support 30 of the second sectional roll driving part 18b of the second sectional roll screen 12b has a structure similar to that of the right support 26 of the first sectional roll driving part 18a, and a rotation body 138 has the same structure as the rotation pipe 88 of the first sectional roll screen 12a.

[68] When the rotation body 138 is inserted into an inwardly protruded pipe 133 from the outside of the right support 30, a locking ring 160 of the rotation body 138 is locked by a locking groove 136 of an outer shaft hole 134. After insertion of the rotation body 138, a right coupling pipe 140 is hung around the inwardly protruded pipe 133 and a separation preventing tap 142 is tightly hung around the outer circumference of the rotation body 138 so that the rotation body 138 is fixed to prevent the separation.

[69] After that, the worker inserts a rectangular protruded pipe 164 of the rotation body 138 into the second rectangular guide pipe 122 and fixes the same with set screws, and inserts the inward coupling protrusion 130 of the second driving pipe 128 into a coupling groove 141 of the right coupling pipe 140 so that the second sectional driving part 18b is completely assembled. At that time, naturally, a right coupling piece 150 of the left support 28 is inserted into one of the guide rails of an installation beam (not shown) of the second sectional roll screen 12b, and the left coupling piece 152 of the right support 30 is inserted into the other guide rail groove of the installation beam of the second sectional roll screen 12b.

[70] The second sectional roll screen 12b becomes a sectional roll screen of the independently driven multiple-shaft roll screen, and may be horizontally connected to the first sectional roll screen 12a.

- [71] The user inserts the four insertion protrusions 322 of the rotation pipe 88 of the right support 26 of the first sectional roll screen 12a and the spline 302 of the third driving shaft pipe 60 into the four insertion grooves 332 of the connecting pipe 118 of the left support of the second sectional roll screen 12b and the spline groove 330 of the connector 114 such that power transmission is enabled.
- [72] The third sectional roll screen 12c is horizontally installed at the side of the second sectional roll screen 12b.
- [73] The assembly of the third sectional roll screen 12c will be described as follows.
- [74] The left support 32, a separation preventing tap 201, a left connecting pipe 200, a connecting pipe 204, a third driving pipe 206, a right coupling pipe 208 among the parts of the third sectional roll screen 12c forming the third sectional roll screen 12c are respectively identical to the left support 28, the separation preventing tap 122, the left connecting pipe 102, the connecting pipe 118, the third driving pipe 128, the right coupling pipe 140 of the second sectional roll screen 12b, in view of structure and function. Moreover, the right support 34 of the third sectional roll screen 12c is similar to the right support 30 of the second sectional roll screen 12b except for the locking groove 136.
- [75] The worker tightly hangs a third clutch spring 202 around the inwardly protruded pipe 210 of the third left support 32 such that the third clutch spring 202 tightens the inner protruded pipe 210 due to compressing force of the third clutch spring 202. After that, the left coupling pipe 200 is loosely hung around the inwardly protruded pipe 210 and is positioned between cranked ends 106 and 108 of the tightly hung third clutch spring 202. The third clutch spring 202 is locked by an inward locking ring 213 of the left coupling pipe 200, thereby preventing the spring from being separated.
- [76] After that, the worker inserts the connecting pipe 204 into the inwardly protruded pipe 210 of the third left support 32 so that the third clutch spring 202 is surrounded by spring locking pieces 218 and is locked by the spring locking pieces 218 such that the cranked ends 214 and 216 of the third clutch spring 202 are inserted into openings between the spring locking pieces 218. At that time, since the left side of the locking ring 220 of the connecting pipe 204 contacts the side of the inwardly protruded pipe 210 of the third left support 32, the connecting pipe 204 is not separated. In this state, the separation preventing step 201 is inserted into the locking groove of the outer shaft hole of the third sectional support 32 such that the left side of the connecting pipe 204 is tightly inserted into the third left support 32, whereby the connecting pipe 204 is not inwardly separated and its axial rotation is enabled.
- [77] After that, the worker inserts an inward coupling protrusion 224 of the third driving pipe 206 into inward locking ring 213 of the left coupling pipe 200. Moreover, the worker inserts the inward coupling protrusion 224 of the third driving pipe 206 into a

coupling groove 222 of the right coupling pipe 208 and loosely hangs the right coupling pipe 208 integrated with the third driving pipe 206 around an inwardly protruded pipe 226 so that the assembly of the third sectional driving part 18c is completed. Meanwhile, a right coupling piece 230 of the third sectional left support 32 is inserted into a guide rail groove of one side of an installation beam (not shown) of the third sectional roll screen 12c and a left coupling piece 232 of the third sectional support 34 is inserted into a guide rail groove of the other side of the installation beam.

[78] Figs. 11 and 12 are views illustrating various examples of the multiple-shaft independently driving controller 20 according to the first preferred embodiment of the present invention.

[79] Although the structure of multiple-shaft independently driving controller 20 of Fig. 11 is similar to that of Fig. 7, the chain wheel covers 70 and 50 of Fig. 7 can be selectively omitted and the left protruded pipe 40 of the common support 24 is eliminated. The first driving shaft pipe 78 is coupled with the first chain wheel 61 hung around the right protruded pipe 41 of the common support 24, the second driving shaft pipe 48 penetrates the first driving shaft pipe 78 from the right side to the left side and is fixed directly to the second chain wheel 44, the third driving shaft pipe 60 penetrates the second driving shaft pipe 48 from the right side to the left side and is fixed to the third chain wheel 52, and the other end of the third chain wheel 52 is coupled with the controller support 36 to enable the axial rotation. Thus, the third driving shaft pipe 60 is directly fixed to the third chain wheel 52, the second driving shaft pipe 48 is directly fixed to the second chain wheel 44, and the first driving shaft pipe 78 is coupled with the first chain wheel 61.

[80] The multiple-shaft independently driving controller 20 of Fig. 12 includes a first support 24 for supporting the first driving shaft pipe 78 coupled with the first chain wheel 61, a second support 36b for supporting the second driving shaft pipe 48 coupled with the second chain wheel 44, and a third support 36a coupled with the third driving shaft pipe 60 coupled with the third chain wheel 52, wherein the first, second, and third supports 24, 36b, and 36a are respectively integrally formed with guide protruded pipes 42, 42b, and 42a such that axial rotation is enabled.

[81] Next, the second preferred embodiment of the present invention will be described in detail with reference to Figs. 13 and 14 as follows.

[82] Fig. 13 is a schematic view illustrating an independently driven multiple-shaft roll screen according to a second preferred embodiment of the present invention, and Fig. 14 is an exploded perspective view illustrating the independently driven multiple-shaft roll screen according to the second preferred embodiment of the present invention. In the structure of the independently driven multiple-shaft roll screen in Figs. 13 and 14, the same reference numerals are assigned to the identical components and parts to

those of Figs. 2 and 3, and their description will be omitted.

- [83] An aspect of the second preferred embodiment of the present invention is that power transmission to the second sectional roll screen of the independently driven multiple-shaft roll screen 10 is carried out to the second section roll driving part 18b by a power transmitting axis 550 and power transmission to the third sectional roll screen is carried out to the third sectional roll driving part 18c by the power transmitting axis 550 of first and second installation beams 422a and 422b above the first and second sectional roll driving parts 18a and 18b. The power transmission to the first, second, and third sectional roll screen is independently carried out without power transmission to another sectional roll screen.
- [84] To this end, in the second preferred embodiment of the present invention, the first, second, and third installation beams 422a, 422b, and 422c are expended to a predetermined height different from the first preferred embodiment, like the structure of the first installation beam 422a in Fig. 14, left and right supports 424, 426, 428, 430, 432, and 434 of the respective sectional roll screens also have a predetermined height, and expanded parts of the first left and right supports 424 and 426 and the second left and right supports 428 and 430 have shaft holes for forming the power transmission axis 550. Moreover, the structure of the multiple-shaft independently driving controller 20 is modified such that the power transmission to the second sectional roll driving part 18b and the third sectional roll driving part 18c is carried out through the power transmission axis 550, differently from the first preferred embodiment.
- [85] Firstly, the worker assembles the first sectional roll driving part 18a, the second sectional roll driving part 18b, and the third sectional roll driving part 18c and installs the respective installation beams 422a, 422b, and 422c.
- [86] After that, a lower gear 502 is positioned in a lower gear accommodating part 429 of the second sectional left support 428, and is fixed to an end of a connecting pipe 118a protruded from the left side of the second sectional left support 428. In the same manner, a second lower gear 506 is positioned in a lower gear accommodating part 433 of the third sectional left support 432, and is fixed to an end of a connecting pipe 504a protruded from the left side of the third sectional left support 432.
- [87] Moreover, a second upper gear 504 is positioned in an upper gear accommodating part 431 of the second sectional right support 430, a shaft connector 462 rotatably penetrates the shaft hole of the expanded part of the second sectional left and right supports 428 and 430, and an end of the shaft connector 462 is fixed to the second upper gear 504 by a key. At that time, the other end of the shaft connector 462 formed with a spline hole slightly protrudes from the left side of the second sectional left support 428 and is inserted into and fixed by a separation preventing tap 464, so that the shaft connector 462 is prevented from separating from the second sectional left and

right supports 428 and 430.

[88] After that, a second driving shaft pipe 448 coupled with a second chain wheel 444 penetrates shaft holes of the first sectional left and right supports 424 and 426, an upper gear 500 is positioned in the upper gear accommodating part 427 of the first sectional right support 426 and fixed to the leading end of the second driving shaft pipe 448 by a key, such that axial rotation of the second driving shaft pipe 448 is enabled. After that, a chain wheel cover 450 is loosely hung around the third driving shaft pipe 460 coupled with a third chain wheel 452, and in this state, the third driving shaft pipe 460 is pushed to penetrate the second driving shaft pipe 460 such that the third driving shaft pipe 460 slightly protrudes to the outside of the first upper gear 500 of the first sectional right support 426. A shaft protrusion of a controller support 436 is inserted into the third chain wheel 452 such that axial rotation of the third chain wheel 452 is enabled and the controller support 436 is fixed to an expanded part of the first sectional left support 424.

[89] By doing so, the first sectional roll screen 12a, the second sectional roll screen 12b, and the third sectional roll screen 12c are respectively assembled, and the second sectional roll screen 12b is installed to the side of the first sectional roll screen 12a and the third sectional roll screen 12c is installed to the side of the second sectional roll screen 12b in the horizontal direction in series, so that the independently driven multiple-shaft roll screen 10 is completely assembled. At that time, the first upper gear 500 of the first sectional roll screen 12a must be engaged with the first lower gear 502 of the second sectional roll screen 12b, and the second upper gear 504 of the second sectional roll screen 12b must be engaged with the second lower gear 506.

[90] By doing so, in the independently driven multiple-shaft roll screen 10 according to the second preferred embodiment of the present invention, when the user pulls a corresponding ball chain, a driving force generated by the multiple-shaft independently driving controller 20 is directly transmitted to a driving shaft of the roll driving part 18a in the first sectional roll screen 12a and another sectional roll screens 12b and 12c, is independently transmitted to the corresponding roll screens 12b and 12c through the power transmission shaft 550 provided in the channel of the installation beams 422a, 422b, and 422c above a roll screen driving shaft.

[91] Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

Industrial Applicability

[92] The independently driven multiple-shaft roll screen of the present invention can be

applied to a window blinding apparatus such as a roll blinder, a roman shade, a roll screen, and the like.

Claims

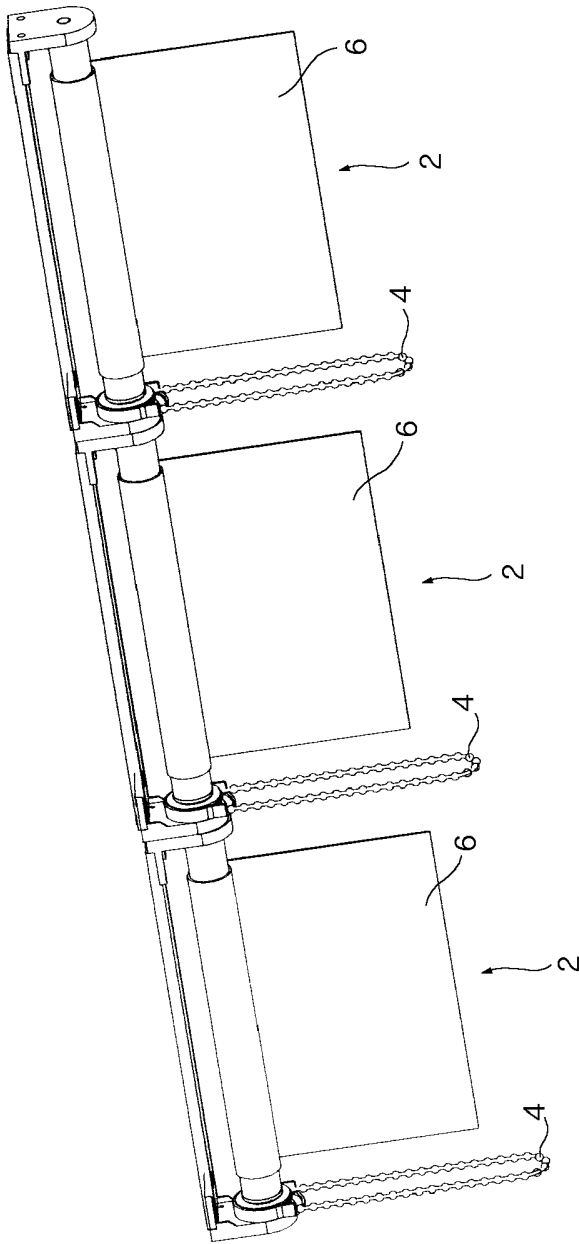
- [1] An independently driven multiple-shaft roll screen comprising:
at least one sectional roll screen horizontally installed to one side of a first sectional roll screen in series; and
a multiple-shaft independently driving controller installed to the other end of the first sectional roll screen and including chain wheels engaged with respective ball chains such that a corresponding ball chain among the ball chains is independently lifted and lowered by a user at a position and driving shaft pipes coupled with the respective chain wheels,
wherein more than two driving shaft pipes are inserted into and penetrate a driving shaft pipe of a first sectional roll screen in turn and are coupled with corresponding roll driving parts of respective sectional roll screens such that a driving force, generated by the multiple-shaft independently driving controller due to lifting and lowering of a corresponding ball chain, is independently transmitted to a corresponding roll screen through a driving shaft pipe of the driving part of the respective roll screen.
- [2] An independently driven multiple-shaft roll screen comprising:
a first sectional roll screen (12a);
second and third sectional roll screens (12b and 12c) installed to the right side of the first sectional roll screen (12a) in the horizontal direction in series;
a multiple-shaft independently driving controller (20) integrally formed with the left side of the first sectional roll screen (12a) and including first, second, and third chain wheels (61, 44, 52) engaged with first, second, and third ball chains (14a, 14b, and 14c) such that a user can independently lift and lower the first, second, and third ball chains (14a, 14b, and 14c), and first, second, and third driving shaft pipes (72, 48, and 60) coupled with the first, second, and third chain wheels (61, 44, and 52),
wherein the second driving shaft pipe (48) is inserted into and penetrates a first driving pipe (78) coupled with the first sectional driving shaft pipe (72) and the third driving shaft pipe (60) is inserted into and penetrates the second driving shaft pipe (48) such that axial rotational force of the second driving shaft pipe (48) is transmitted to a second sectional roll driving part (18b) by a guide pipe (76) and a rotation pipe (88) rotating in a right support (26) of the first sectional roll screen (12a), and an axial rotational force of the third driving shaft pipe (60) is transmitted to a third sectional roll driving part (18c) by a connector (114), a guide pipe (122), and a rotation body (138) rotating in a right support (30) of the second sectional roll screen (12b).

- [3] An independently driven multiple-shaft roll screen comprising:
at least one sectional roll screen horizontally installed to one side of a first sectional roll screen in series; and
a multiple-shaft independently driving controller installed to the other end of the first sectional roll screen and including chain wheels engaged with respective ball chains such that a corresponding ball chain among the ball chains is independently lifted and lowered by a user at a position and driving shaft pipes coupled with the respective chain wheels,
wherein a driving force, generated in the multiple-shaft independently driving controller by the corresponding ball chain pulled by a user, is directly transmitted to a first sectional roll driving part of the first sectional roll screen through a roll screen driving shaft, and is independently transmitted to the roll driving part of a corresponding sectional roll screen through a power transmission shaft provided in an installation beam channel above the roll screen driving shaft.
- [4] The independently driven multiple-shaft roll screen as set forth in claim 1, wherein the multiple-shaft independently driving controller is structured such that a first sectional chain wheel coupled with a driving shaft pipe of a first sectional roll screen and a second sectional chain wheel coupled in a driving shaft pipe of a second sectional roll screen are respectively hung around right and left protruded pipes of a common support for supporting one side of the first sectional roll screen to enable axial rotation, a corresponding chain wheel coupled with a driving shaft pipe of a next sectional roll screen is hung around a lateral protruded pipe of the second sectional chain wheel to enable the axial rotation in turn, lateral protruded pipes of a final sectional chain wheel are assembled in a controller support to enable the axial rotation, and corresponding ball chains are engaged with corresponding chain wheels.
- [5] The independently driven multiple-shaft roll screen as set forth in claim 1, wherein the multiple-shaft independently driving controller is structured such that a first sectional chain wheel coupled with a driving shaft pipe of a first sectional roll screen is hung around a protruded pipe of a common support for supporting one side of the first sectional roll screen to enable axial rotation, a corresponding chain wheel coupled with a driving shaft pipe of a next sectional roll screen is inserted into a shaft hole of the first sectional wheel chain to enable the axial rotation in turn, a lateral protruded pipe of a final sectional chain wheel is assembled in a controller support to enable the axial rotation, and corresponding ball chains are engaged with corresponding chain wheels.
- [6] The independently driven multiple-shaft roll screen as set forth in claim 1, wherein the multiple-shaft independently driving controller is structured such

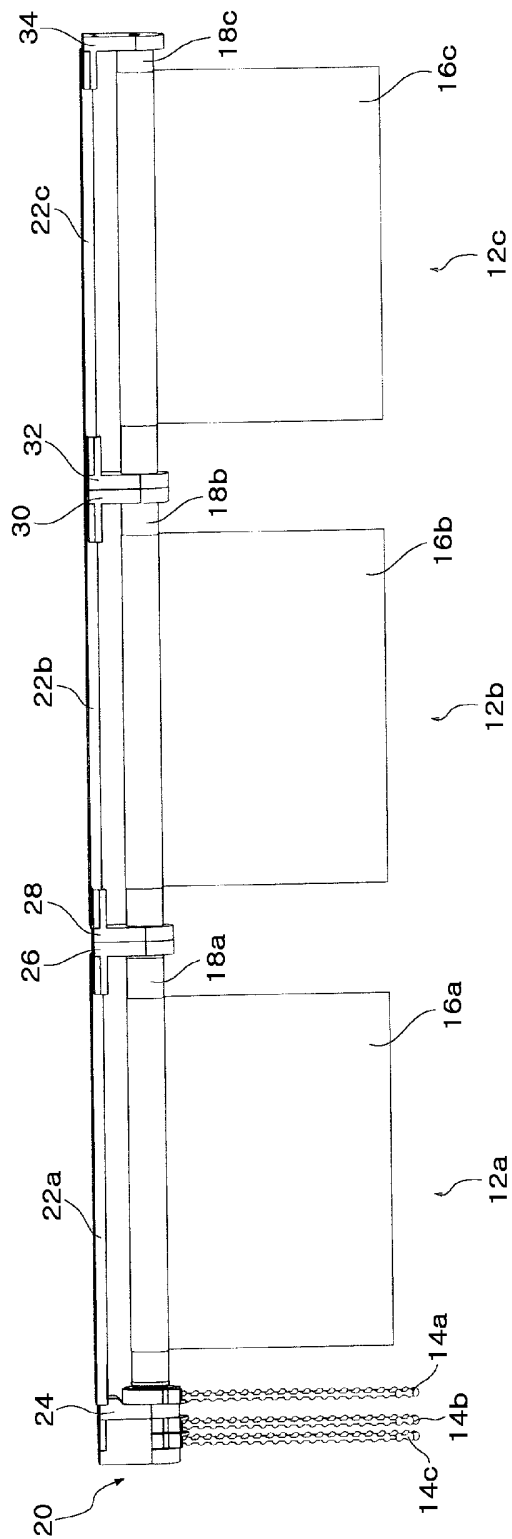
that a first sectional chain wheel coupled with a driving shaft pipe of a first sectional roll screen and a second sectional chain wheel coupled in a driving shaft pipe of a second sectional roll screen are respectively hung around right and left protruded pipes of a common support for supporting one side of the first sectional roll screen to enable axial rotation, chain wheels coupled with corresponding driving shaft pipes are respectively inserted into controller supports to enable the axial rotation, and corresponding ball chains are engaged with corresponding chain wheels.

- [7] The independently driven multiple-shaft roll screen as set forth in claim 1, wherein the multiple-shaft independently driving controller comprises: a plurality of supports having a guide protruded pipe and integrally formed; and chain wheels coupled with corresponding driving shaft pipes hung around guide protruded pipes of corresponding supports to enable axial rotation; wherein the corresponding chain wheels are engaged with the respective corresponding ball chains.
- [8] The independently driven multiple-shaft roll screen as set forth in claim 1, wherein each of plural sectional roll screens is separated from another sectional roll screens when transporting the independently driven multiple-shaft roll screen and is coupled with an adjacent sectional roll screen when assembling the independently driven multiple-shaft roll screen.
- [9] The independently driven multiple-shaft roll screen as set forth in any one of claims 4 to 8, wherein a clutch spring and a coupling pipe coupled with a driving pipe of the sectional roll screen are hung around an inwardly protruded pipe of each roll screen such that the clutch spring is selectively tightened and released according to transmission of rotational force through a corresponding driving shaft pipe so that the driving pipe of the sectional roll screen is selectively rotated.

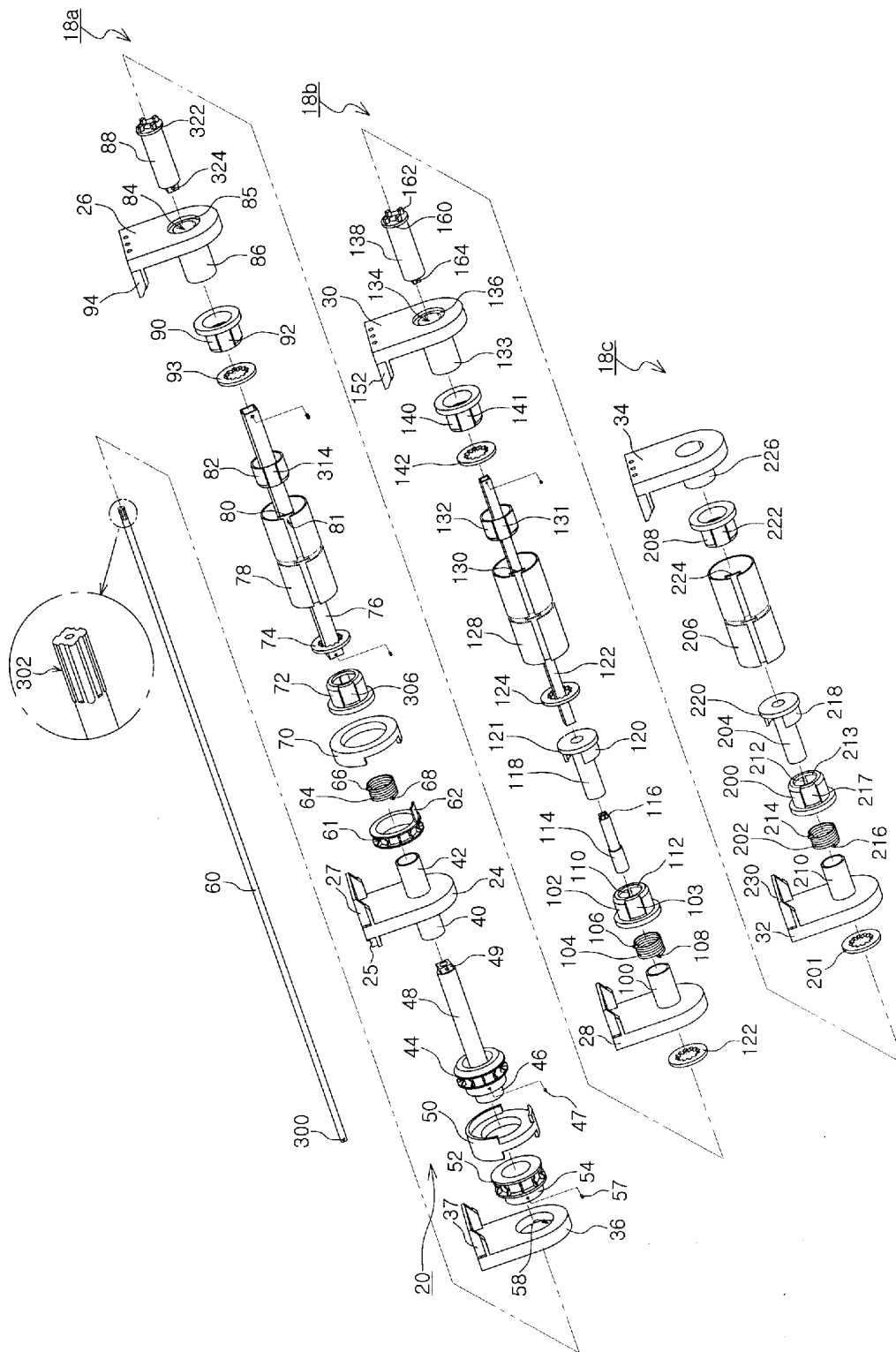
[Fig. 1]



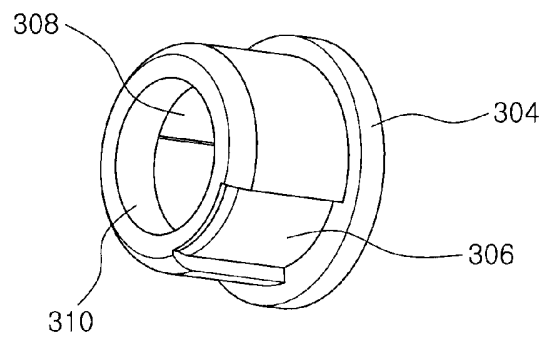
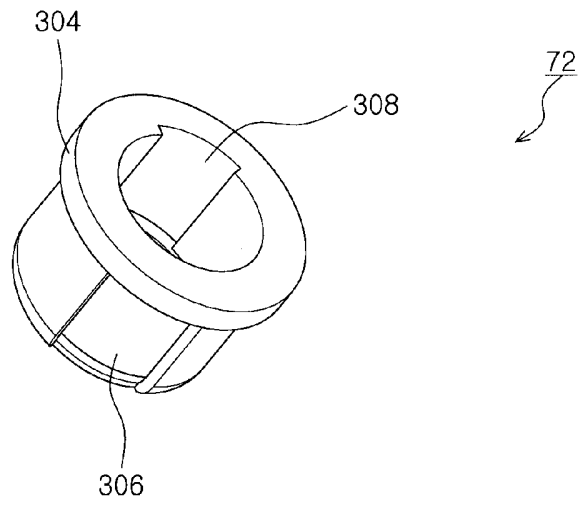
[Fig. 2]



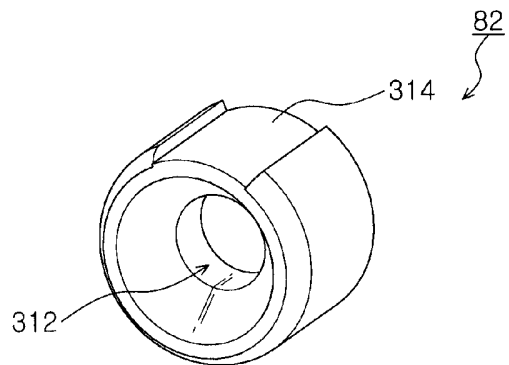
[Fig. 3]



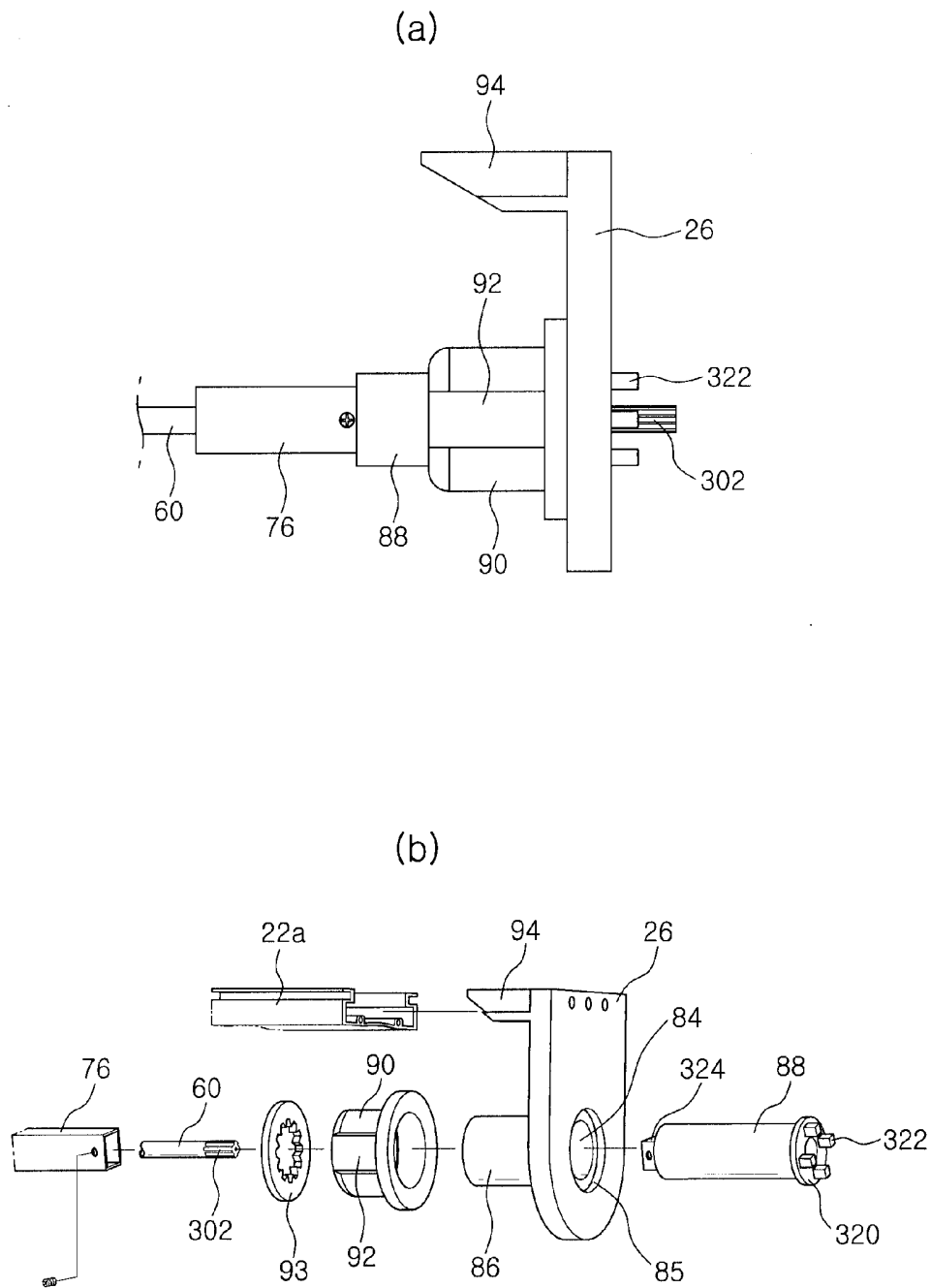
[Fig. 4]



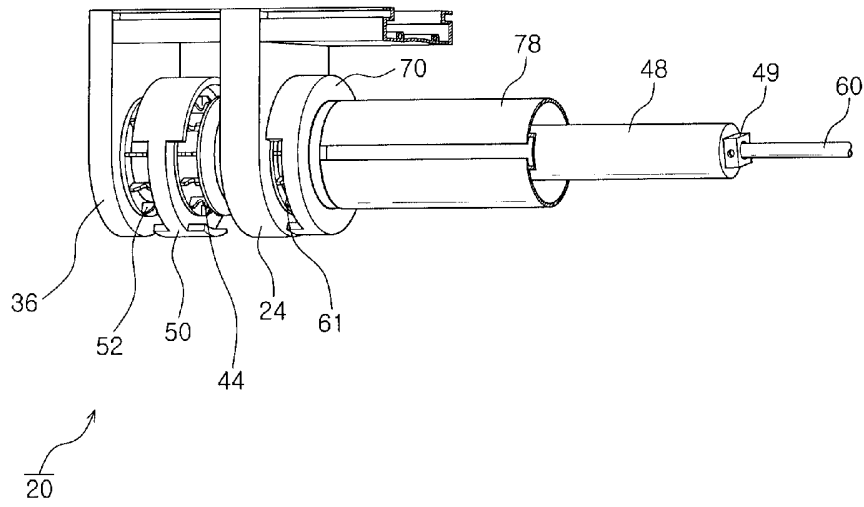
[Fig. 5]



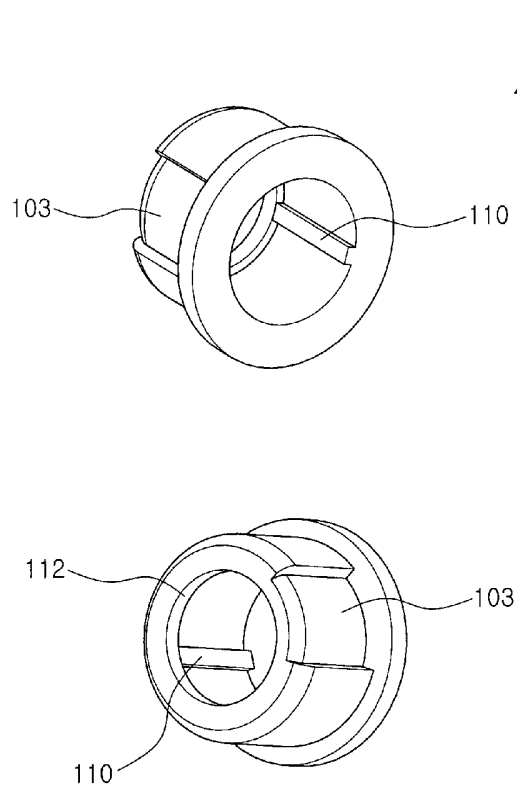
[Fig. 6]



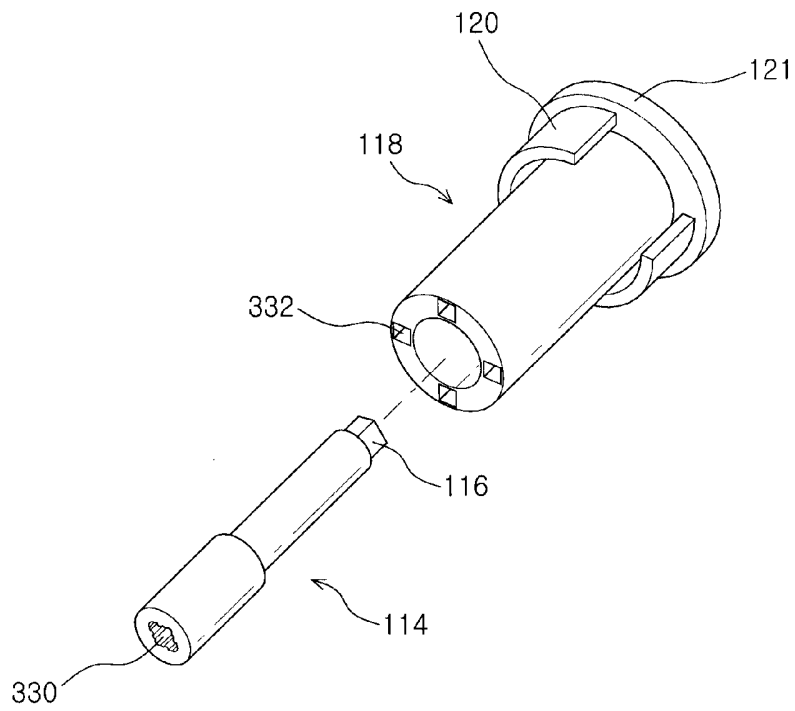
[Fig. 7]



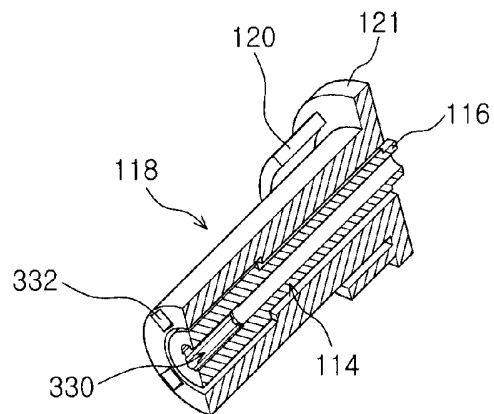
[Fig. 8]



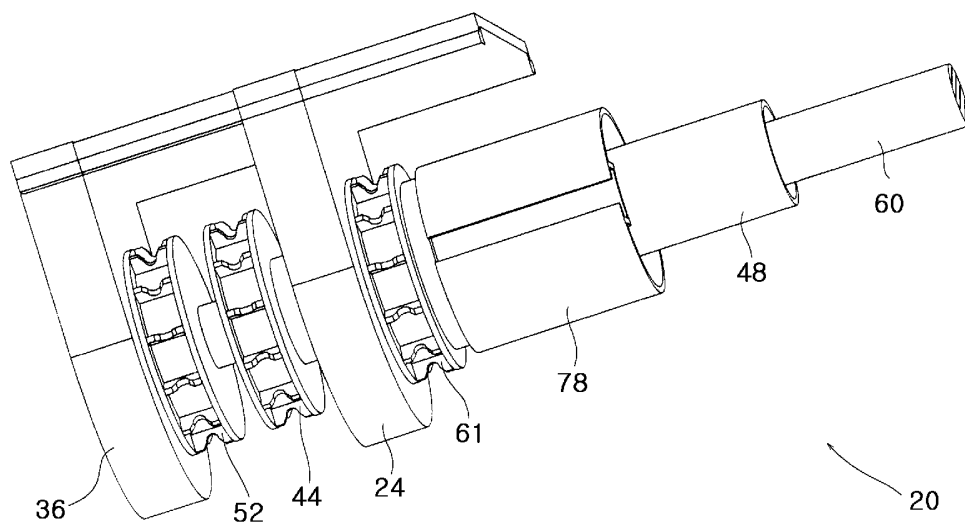
[Fig. 9]



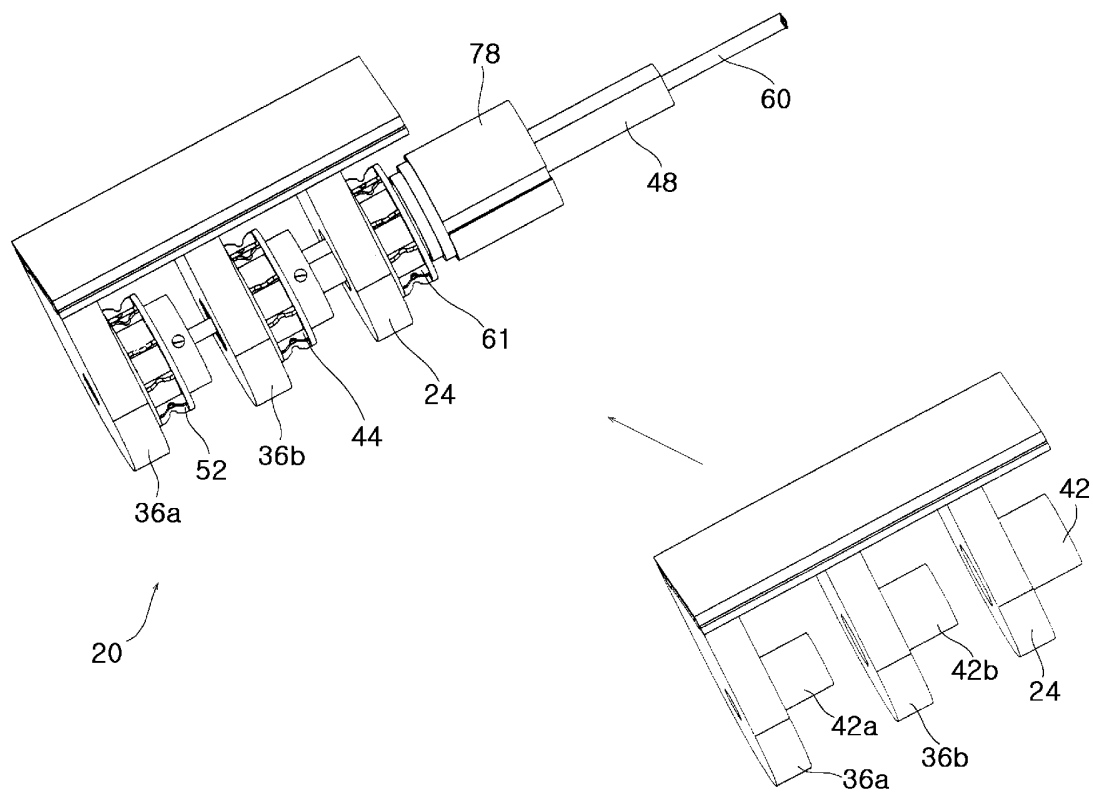
[Fig. 10]



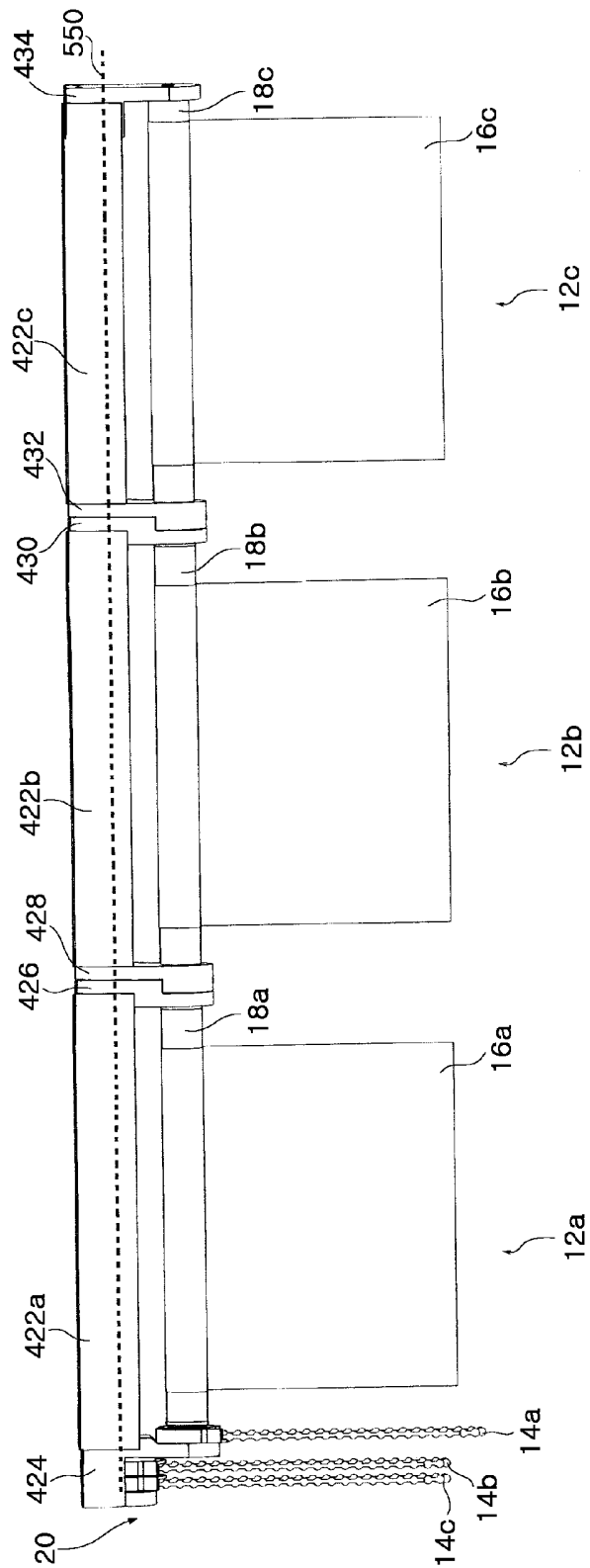
[Fig. 11]



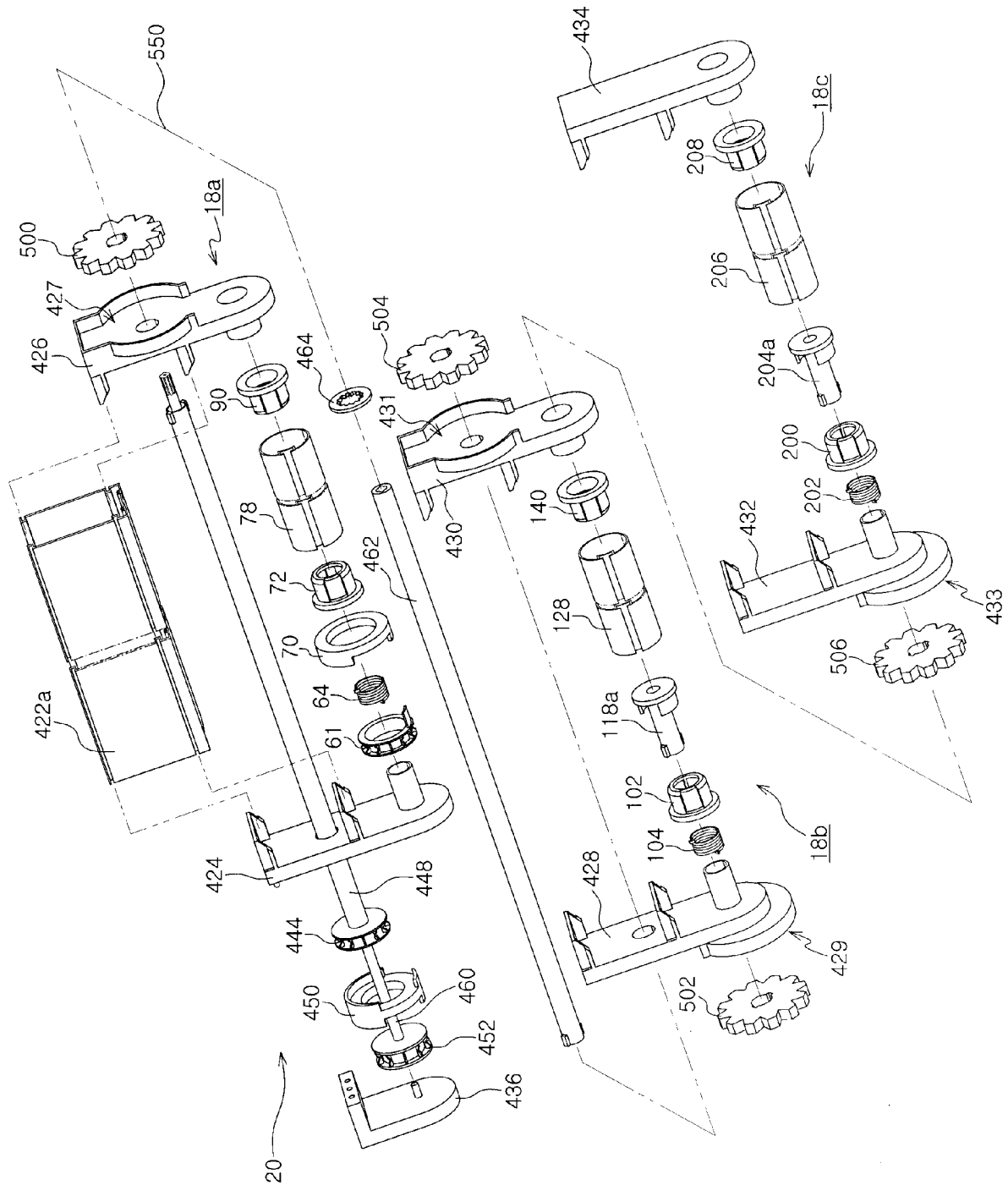
[Fig. 12]



[Fig. 13]



[Fig. 14]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2005/002862

A. CLASSIFICATION OF SUBJECT MATTER**IPC7 E06B 9/42**

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)

IPC7 E06B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
KR, JP : IPC as above

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.
A	JP 10-72987 A (OSEI SOUBI CO., LTD) 17 March 1998 See the abstract and Fig 1. 2	1
A	JP 10-292752 A (OBAYASHI KUMI CO., LTD) 4 November 1998 See the abstract and Fig 1.2	1
A	JP 06-117169 A (HITACHI CO., LTD) 26 April 1994 See the abstract and Fig 1.	1
A	JP 08-303147 A (NICHIBEI) 19 November 1996 See the abstract and Fig 1.2	1
A	US 6705378 B1 (Brian P. Smidt) 16 March 2004 See the abstract and Fig 1,2,3	1
A	KR 02-330904 B1(Lee, Chang Kil) 3 April 2002 See the Fig 3-6	1



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

14 DECEMBER 2005 (14.12.2005)

Date of mailing of the international search report

15 DECEMBER 2005 (15.12.2005)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2005/002862

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 10-72987 A	17 March 1998	None	
JP 10-292752 A	4 November 1998	None	
JP 06-117169 A	26 April 26	None	
JP 08-303147 A	19 November 1996	None	
US 6705378 B1	16 March 2004	None	
KR 02-330904 B1	3 April 2002	None	