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(71) Applicant: **Hunter Douglas Industries B.V.**
3071 EL Rotterdam (NL)

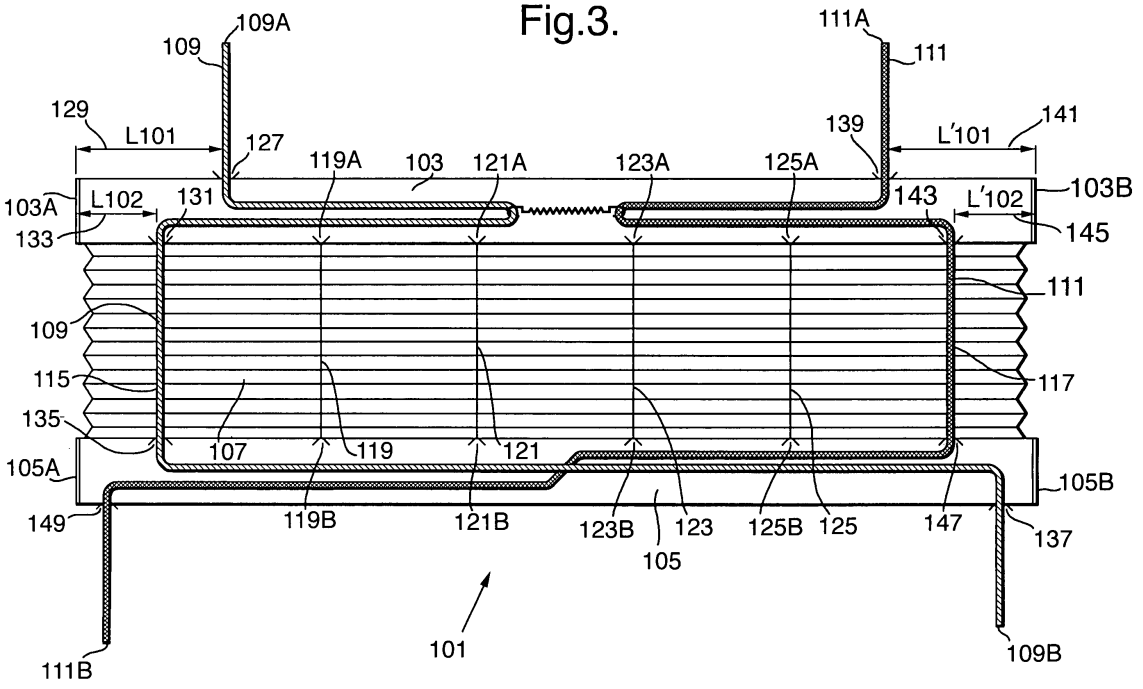
(72) Inventors:
- **Leepel, Frederik Willem**
  4741 GB Hoeven (NL)
- **Franssen, Johannes Robertus**
  4834 EC Breda (NL)

(74) Representative: **Smith, Samuel Leonard**
J.A. Kemp & Co.
14 South Square
Gray's Inn
London WC1R 5JJ (GB)

(54) Window covering assembly with tension cords

(57) A window covering assembly for an architectural opening such as a window. The window covering assembly comprises a first or top movable rail having left and right longitudinal ends, a second or lower movable rail having left and right longitudinal ends, blind material connected to the two rails and extendible and retractable between the two by moving one or both rails away from or toward each other and a pair of first and second main tension cords routed in mirror image one to another through and along the top movable rail, the blind material and the bottom movable rail. The first cord of the pair of the first and second main tension cords is routed to enter the top movable rail at a first entrance point which is adjacent one of the left or right longitudinal ends of the rail and spaced a first length measured from said end. The first cord is then routed through or along the rail to exit the top movable rail at a first exit point which exit point is spaced at a second length from the same one of the left or right longitudinal rail ends as the first entrance point. The first length exceeds the second length.

Fig.3.



EP 2 034 124 A2

Description

[0001] This invention relates to a window covering assembly with tension cords guiding one or more movable rails and the covering material.

[0002] Such window covering assemblies are known in the art and are typical pleated blinds or cellular blinds.

[0003] When such blind assemblies have a fixed rail and a movable rail, the tension cords will generally be routed from the fixed rail through the window covering material and to the movable rail, and from there to a position on a window sill or other fixed surface. One of the best known cord-routings is the so-called H-routing in which the tension cords cross-over from left to right, within the movable rail.

[0004] Other such window blind assemblies can have two movable rails or shuttle rails and provide the blind user with more choice in positioning the shading material in an architectural opening. He can for example leave open area's over both the top and the bottom rail. This is of course a desirable feature for window coverings.

[0005] The tension cords in such cord tensioned blind assemblies provide the necessary friction to the or each movable rail to keep the rail from moving on its own accord, i.e. move downward under influence of its own weight. Thus a user can manipulate a movable rail by hand to the desired position, release the rail and the tensioned cords will ensure that the rail remains in that position. Generally springs are used to tension the cords to provide the desired amount of friction. The springs will also compensate for the variation in cord-length caused by stretch or crimp. It is usual for a cord tensioned blind to have a dedicated pair of cords that are tensioned specifically for holding a single shuttle rail in position. For an additional moving rails an extra pair of cords is added, or a loop is added to each tension cord which loop is routed through the other rail and about a spring in that rail. Depending on the width of the blind assembly there can be provided additional guide cords, which are also tensioned by springs, are also routed through the covering, but serve mainly to guide the covering material. In pleated or cellular blinds these additional cords are important tools to neatly stack the pleats or cells when the blind is retracted. The tension on these additional cords is much less than for the main tension cords, and will be chosen to only compensate for the stretch and crimp of the cords. The cord routings can be chosen to allow the rails to be manipulated at any point on it's length without skewing, or a less complicated routing can be chosen when the rail can be hand operated at two spaced apart locations.

[0006] It has been found that window covering assemblies with two movable rails, as described above, cannot be made in any size. When the movable rails are over a certain length, the top rail tends to sag through the middle.

[0007] Apart from using stronger (and thus heavier and bulkier) rails, a satisfactory technical solution to this problem was never found.

[0008] It is therefore an object of the invention to provide a window blind assembly with tension cords which

- allows for big blinds to be made, i.e. with long (wide) head rails and
- prevents the head rail from such a blind from bending (sagging)

[0009] According to one aspect of the invention, there is provided a window covering assembly for an architectural opening such as a window , said window covering assembly having a first or top movable rail having left and right longitudinal ends and a second or lower movable rail having left and right longitudinal ends, and blind material connected to the two rails and extendible and retractable between the two by moving one or both rails away from or toward each other, and
a pair of first and second main tension cords being routed in mirror image one to another through and along the top movable rail, the blind material and the bottom movable rail and the first cord of the pair of the first and second main tension cords being routed to enter the top movable rail at a first entrance point which is adjacent one of the left or right longitudinal ends of the rail and spaced a first length measured from said end, and the first cord then being routed through or along the rail to exit the top movable rail at a first exit point which exit point is spaced at a second length from the same one of the left or right longitudinal rail ends as the first entrance point,
and the first length exceeding the second length.

[0010] In a particular embodiment of the invention the window covering assembly comprises cord tensioning means in the top movable rail for tensioning the first and second main tension cords.

[0011] Advantageously the tensioning means are positioned beyond the first entrance point in the direction towards the opposite longitudinal end of the top movable rail, and the first main tension cord is routed from the first entrance points to the tension means, slidingly connected thereto and looped back past the first entrance points to the first exit point.

[0012] Further advantageously the tensioning means comprises at least one tension spring.

[0013] In a further particular embodiment the tensioning means comprises a single spring in the longitudinal center of the top movable rail and wherein the first and second main tension cords are slidably connected to either end of the spring.

[0014] According to a second aspect of the invention, the window covering assembly further comprises at least one auxiliary tension cord being routed to enter the top movable rail at the first entrance point adjacent one of the right or left longitudinal ends of the top movable rail and being spaced the first length measured from said end, the auxiliary tension cord then being routed through or along the rail to exit the top movable rail at a second exit point which exit point is spaced at a third length from the same one of the left or right longitudinal rail ends as

the first entrance point, and the first tension cord then being routed through the blind material towards the lower movable rail and the third length exceeding the first length.

[0015] According to a third aspect of the invention, the window covering assembly further comprises at least one auxiliary tension cord being routed to enter the top movable rail at a second entrance point coinciding with the right or left longitudinal end of the top movable rail, such that the first length is next to nothing , and the auxiliary tension cord then being routed through or along the rail to exit the top movabie rail at a second exit point which exit point is spaced at a third length from the left or right longitudinal rail end coinciding with the second entrance point.

[0016] According to a further particular embodiment of the invention the window covering assembly further comprises means for attaching the tension cords to top and bottom fixed surfaces extending parallel to the top and bottom movable rails.

[0017] Advantageously the connecting means comprise mounting blocks.

[0018] Further aspects, embodiments and advantages of the invention will be apparent from the detailed description below of particular embodiments and the drawings thereof.

Figure 1 is a schematic perspective view of a prior art cord guided pleated blind with two movable rails and a first pair of tension cords dedicated for holding the top shuttle rail in position;

Figure 2 is a schematic illustration of torques resulting from forces transmitted by the tension cords to the top movable rail when routed according to Figure 1.

Figure 3 is a schematic perspective view of the cord guided blind of the invention with two movable rails showing the inventive routing of the first pair of tension cords dedicated for holding the top shuttle rail in position;

Figure 4 is a schematic illustration of torques resulting from forces transmitted by the tension cords to the top movable rail when routed according to Figure 3.

Figure 5 is the first embodiment of a blind assembly using the inventive cord routing, and showing six tension cords.

Figure 5A is a representation of the cross-hatchings used in Figure 5 to distinguish the tension cords from one another

Figure 6 is a second embodiment of a blind assembly using the inventive cord routing.

[0019] Figure 1 shows a prior art cord guided blind 1, having a movable top rail 3 and a movable bottom rail 5 and blind material 7 extending between these two rails. Also shown are left and right tensioned guide cords 9, 11 which are tensioned by common central spring 13. The routing of these cords and the spring hold the top movable rail 3 in different vertical positions in the blind after it has been moved up or down along the cords.

[0020] As can be seen in Figure 1, the first main or left tension cord 9 enters the top rail 3 at a first entrance point 27 a first distance L1 29 from the left end 3A of the top rail. The cord is routed via main tension spring 13 to a first exit point 31 at a second distance L2 33 measured from the left end 3A of the top rail 5. The first main tension cord 9 is then routed through the shade material 7, preferably through a first and preferably the left most column 15 of aligned openings 15A, to enter the bottom rail 5 at a bottom rail entry point 35 directly opposite to the top rail exit point 31. The first main tension cord 9 exits the bottom rail 5 at a right bottom exit point 37 at or adjacent its right end 5B. The left tension cord 9 further is depicted with top and bottom ends 9A, 9B, which ends can be connected to a fixed surface by any convenient means, such as mounting blocks.

[0021] Similarly the second main or right tension cord 11 is routed in mirror image. Thus it enters the top rail 3 at right entrance point 39 a first distance L'1 41 from the right end 3B of the top rail. The cord is routed via main tension spring 13 to a point of exit 43 at a second distance L'_2 45 measured from the right end 3B of the top rail 3. The cord is then routed through the shade material 7, preferably through a right-most column 17 of aligned openings 17A, to enter the bottom rail 5 at a bottom rail entrance point 47 directly opposite to top rail exit point 43 . The right tension cord 11 exits the bottom rail 5 at bottom rail left exit point 49 at or adjacent its left end 5A. The right tension cord 11 further is depicted with top and bottom ends 11A, 11B, which ends can be connected to a fixed surface by any convenient means.

[0022] The first distances L1, L'1 of the entry points 27, 39 of the left and right cords 9, 11 measured from the respective left and right rail ends 3A, 3B are smaller than the second distances L2, L'2 of the exit points 31,43 for the same cords measured relative to the same rail ends.

[0023] This is a known way of routing the tension cords. The main left and right tension cords cross each other in the bottom movable rail, as shown in Figure 1.

[0024] Not shown in Figure 1 is a second pair of main left and right tension cords for the bottom movable rail 5 and the tension spring for these cords. The cord routing for the second pair is identical to the routing of the first pair, but starts from the bottom rail, where the spring is. Effectively by turning figure 1 over, the cord routing of the second pair is shown.

[0025] Also not shown in Figure 1 are auxiliary tension cords and springs for guiding the blind material. Such cords would run through intermediate columns 19,21,23 and 25 of aligned openings, the top and bottom rails are provided with suitable top rail exit points 19A, 21A, 23A and 25A and bottom entry points 19B, 21 B, 23B, 25B.

[0026] The top rail 3 of the prior art cord tensioned blind assembly as shown in Figure 1 and described above, tends to sag in the middle when the blind rail exceeds a

certain length between the two longitudinal ends 3a,3b.

[0027] For keeping rails in a chosen position such that they don't move by their own weight and slide down along the cords, the tension springs provide a force which acts through the tensioned cord onto the rail at each point of contact of the tension cord with the movable rail. The net force acting on the rail is built up from the tension spring force acting on the cord and the weight of the blind. In order to keep the rails in position the spring force acting on the main tension cords is significant. Contrary, for the auxiliary cords it is next to nothing.

[0028] It has been found that the traditional cord routing for the main tension cords, as shown in Figure 1, results in a pair of left and right torques that urge the opposite ends 3A, 3B of the movable top rail 3 upwardly. This is schematically illustrated in Figure 2, showing the points of entry 27, 39 and exit 31,43 of each main tension cord 9 and 11 and the resulting torques as arrows T1 and T2. By arrow F in the middle of the rail is indicated how the rail tends to sag. The sagging is of course also related to the stiffness of the rail in relation to it's length. Thus in the smaller prior art blinds these torques T1, T2 did not result in an effective sagging of the shorter rail; the rail was stiff enough not to sag. But in wide blind assemblies with elongated rails the top shuttle rail tends to sag in the middle.

[0029] Figure 3 shows the solution to this problem in accordance with the invention. Basically by changing the routing of the main left and right tension cords for the top rail the problem of the 'wrong' torques has been solved. Figure 3 is a schematic view of a first embodiment of the invention in which like parts of figure 1 have the same numbers greater by 100.

[0030] Thus Figure 3 is a schematic representation of the cord guided blind 100 of the invention, having a movable top rail 103 and a movable bottom rail 105 and blind material 107 extending between these two rails. Also shown are main first and second (or left and right) tension cords 109, 111 for movable top rail 103 which cords are tensioned by common central spring 113.

[0031] The left tension cord 109 enters the top rail 103 at first entrance point 127 a first distance L_{101} 129 from the left end 103A of the top rail. The cord is routed via main tension spring 113 to a first exit point 131 at a second distance L_{102} 133 measured from the left end 103A of the top rail 103: Similarly the right tension cord 111 enters the top rail 103 at right entrance point 139 a first distance L'_{101} 141 from the right end 103B of the top rail. The cord is routed via main tension spring 113 to a right exit point 143 at a second distance L'_{102} 141 measured from the left end 103B of the top rail 103.

[0032] In accordance with the invention the first distances L101, L'101 (129, 141) exceed the second distances L102, L'102 (133, 145).

[0033] By applying the cord routing of the invention for the main tension cords 109, 111, the resulting torques are reversed. This is schematically illustrated in Figure 4, showing entrance points 127, 139 and exit points 131,143 for each main tension cords 109 and 111 for the top movable rail 103 mirrored relative to the routing of figure 1 and the resulting reversed torques as arrows T3, T4.

The left and right torques T3, T4 now urge the opposite ends 103A and 103B of the movable rail 103 down and thus prevent the middle of the rail from sagging. If the forces where high enough, and as indicated by the dotted arrow B, the rail would bulge upwardly.

[0034] The net distance between each pair of entrance and exit points (127, 131 and 139, 143) at either end 103A, 103B of the rail 103 which results in the desired Torques T3, T4 and prevents sagging is determined by a various variables. These variables include, the length of the top rail 103, it's longitudinal stiffness, the total weight of the blind 100, the chosen location of the left and right columns of cord openings 115, 117 for routing the main tension cords through the blind material (which determine the exit positions in the top movable rail), as well as the strength of the central spring tensioning the main cords in the top rail of the blind.

[0035] Figure 5 shows a preferred embodiment of a cord tensioned shade with six parallel spaced apart tension cords running through the shade material. Like parts of figure 3 have the same referral numbers greater by 100.

[0036] The blind assembly of Figure 5 is shown mounted into a window frame 269, the frame having a top and bottom frame member 271, 273 and a left and a right frame member 275, 276. The tension cords are connected to the top and bottom frame members by way of four mounting blocks, a pair of top left and right mounting blocks 279, 281 and a pair of bottom left and right mounting blocks 283, 285.

[0037] Figure 5 shows all main tension cords 209, 211 and the main tension springs 213, 259, the four auxiliary tension cords 251, 253, 255, 257 and four auxiliary springs 261, 263, 265, 267 used in the blind assembly of this embodiment. Since the use of colors in the drawings is not allowed, cross-hatchings are used intended to help the reader to distinguish the different tension cords. For clarity Figure 5A is added showing cord sections with the cross-hatchings used in Figure 5.

[0038] For the auxiliary tension cords the blind material is provided with additional columns of openings, besides the first and last columns of openings 215, 217 for the two main tension cords 209, 211. These additional columns are the second, third fourth and fifth columns 219, 221, 223, 225 in the blind material 207 and they are spaced apart between the first and last columns 215, 217. The top and bottom rails 203 and 205 comprise cord openings, preferably provided with suitable grommets, aligned at the top and bottom ends of each of these columns, thus top second, third, fourth and fifth openings 219A, 221A, 223A, , 225A, in the bottom second, third, fourth and fifth openings 219B, 221 B, 223B, 225B. For the first column 215 the top opening in the top rail is indicated with ref. number 231 and the bottom opening is

215B, for the sixth column 217 the top opening is 243 and the bottom is 217B.

[0039] Like in the embodiment of Figure 3, the head rail 203 is provided with a first cord entrance 227 a first distance L201 measured from the left end 203A of the rail and first cord exit 231 at a second distance L202 measured from the left end 203A. And a right cord entrance a first distance L'201 measured from the right end 203B of the rail and a right cord exit at a second distance L'202 measured from the right end 203B. And of course the first distances L201 and L'201 are larger than the second distances L202 and L'202 respectively.

The cord routing of the main tension cords 209, 211 with respect the top main spring 213, are identical to the routing shown and described in relation to Figure 3, thus it will not be explained in relation to this Figure 5.

[0040] The main tension cords 209, 211 each have an extra leg to be routed to the bottom main spring 259 in order to act on the bottom movable rail 207. These routings are as follows.

Left main tension cord 209, starting from the top left cord tension block 279 at top frame member 271 of the window frame 269, is routed through left or first top rail entrance 227 into rail 203 and out through right top rail exit 243, then through the sixth column of openings 217 and into the bottom bar 205 through right bottom bar entrance opening 217B slidingly attached to the right end of the main bottom tension spring 259 looped back to exit the bottom bar through right bottom bar exit 237 to be attached to the bottom right mounting block 285.

Similarly the extra leg of right main tension cord 211 starts at the top right mounting block 281 at top frame member 271, is routed through right top rail entrance 239 into rail 203 and out through left top rail exit 231, then through the first column of openings 215 and into the bottom bar 205 through left bottom bar entrance opening 215B, slidingly attached to the left end of the main bottom tension spring 259 looped back to exit the bottom bar through left bottom bar exit 249 to be attached to the bottom left mounting block 283.

[0041] The auxiliary tension cords are routed as follows.

The first auxiliary tension cord 251 starts from the top left cord tension block 279 at top frame member 271 of the window frame 269, is routed through left top rail entrance 227 into rail 203, is slidingly connected to the first auxiliary tension spring 261 in the top rail and back out through second left top rail exit 219A, then through the second column of openings 219 and into the bottom bar 205 through second bottom bar entrance opening 219B and exits the bottom bar through left bottom bar exit 249 to be attached to the bottom left mounting block 283.

The second auxiliary tension cord 253 starts from the top right cord tension block 281 at top frame member 271 of the window frame 269, is routed through right top rail entrance 239 into rail 203 and back out through third top rail exit 221A, then through the third column of openings 221 and into the bottom bar 205 through third bottom bar entrance opening 221 B and is slidingly connected to the third auxiliary tension spring 265 in the bottom bar and exits the bottom bar through right bottom bar exit 237 to be attached to the bottom right mounting block 285.

The third auxiliary tension cord 255 starts from the top left cord tension block 279 at top frame member 271 of the window frame 269, is routed through left top rail entrance 227 into rail 203, out through fourth top rail exit 223A, then through the fourth column of openings 223 and into the bottom bar 205 through fourth bottom bar entrance opening 223B is slidingly connected to the fourth auxiliary tension spring 267 in the bottom rail and exits the bottom bar through left bottom bar exit 249 to be attached to the bottom left mounting block 283. The fourth auxiliary tension cord 257 starts from the top right cord tension block 281 at top frame member 271 of the window frame 269, is routed through right top rail entrance 239 into rail 203, is slidingly connected to the second auxiliary tension spring 263 in the top bar and out through fifth top rail exit 225A, then through the fifth column of openings 225 and into the bottom bar 205 through fifth bottom bar entrance opening 225B and exits the bottom bar through right bottom bar exit 237 to be attached to the bottom right mounting block 285.

[0042] Thus these routings are similar to the prior art routing of Figure 1 of the main tension cords 9, 11, i.e. the first length measured from the entrance point of the auxiliary cord into the top movable rail 203 to the adjacent rail end 203A or 203B is smaller than the length measured from the exit point of the auxiliary cord leaving the top movable rail 203 to the same rail end. However, since the tension springs tensioning these auxiliary cords 251,253,255,257 are not particularly strong and only serve to compensate for stretch or crimp of the cords, the adverse torques resulting from these spring forces are not enough to result in sagging of the top rail 203.

[0043] By routing the auxiliary cords this way the top and bottom shuttle rails can be operated at any point along their length without skewing or exhibiting other problems. This feature is especially necessary for blind assemblies in high windows that cannot be reached by hand. Such as in conservatories.

[0044] As can be seen from figure 5 all tension cords are held by two top mounting blocks and two bottom mounting blocks. It is a fact that by this routing the cords above the top shuttle rail and up to the top frame member of the window frame are visible

The cord exiting the bottom rail can be hidden from view by suitable side covers.

[0045] Figure 6 is an alternative embodiment of the invention, in the description like parts are given the referral numbers of Figure 5 greater by 100.

[0046] In figure 6 the main and auxiliary tension cords 309, 311, 351, 353, 355 and 357 are shown outside the blind and the rails.

[0047] In the embodiment of Figure 6, when compared to the embodiment of Figure 5 , the auxiliary tension cords 351,353,355,357 are routed in a different manner

into and out of the top movable rail 303.

[0048] The first and third auxiliary tension cords 351 and 355 start from a fifth mounting block 387 at the top frame member 371. The fifth mounting block 387 is fixed to the top frame member 371 in or adjacent the corner with left frame member 375. The first auxiliary tension cord 351 enters the top movable rail at or adjacent the left rail end 303A by a left auxiliary entrance point 391. As in the embodiment of Figure 5, the first auxiliary tension cord then exits the top movable rail by exit point 319A. The third auxiliary tension cord 355 exits the top movable rail by exit point 323A.

[0049] The second and fourth auxiliary tension cords 353 and 357 start from a sixth mounting block 389 at the top frame member 371. The sixth mounting block 389 is fixed to the top frame member 371 in or adjacent the corner with right frame member 377. The second auxiliary tension cord 353 enters the top movable rail at or adjacent right rail end 303B by a right auxiliary entrance point 393. As in the embodiment of Figure 5, the second auxiliary tension cord then exits the top movable rail by exit point 321A. The fourth auxiliary tension cord exits the top movable rail by exit point 325A.

[0050] The difference of the embodiment of figure 6 with respect to that of figure 5 is thus that the auxiliary tension cords enter the top rail at a auxiliary entrance points 391, 393 which are located closer to the respective rail ends 303A and 303B, than the exit points for these cords. The auxiliary entrance points 391, 393 can even even coincide with the rail ends 303A and 303B, which is actually shown in Figure 6.

[0051] The resulting negative torques will be bigger than those of figure 5, however they still to not cause the movable head rail to sag, since the springs used to tension the auxiliary cords are very weak and are only intended to compensate for cord stretch or cord crimp.

[0052] The auxiliary cords are drawn in Figure 6 to enter and exit the rails at the longitudinal ends, but these positions could have been adjacent the longitudinal ends as shown in Figure 1. The effects are the same.

[0053] This alternative routing for the auxiliary cords reduces the number of cords in sight over the top movable rail 303 by half, making is a desirable embodiment.

[0054] In this application the word "cord" means either a single cord with two ends, or a cord-section between two fixed points.

[0055] This invention is not limited to the specific above-described embodiments which may be modified without departing from the claimed invention or sacrificing all of its advantages. For example in stead of sharing a common main spring each main tension cord could be provided with a dedicated spring. Also different number of auxiliary tension cords can be used and alternative routings for the auxiliary tension cords can be used without departing from the claimed invention. Also in this regard, the terms in the foregoing description and the following claims, such as "left", "right", "front", "rear", "vertical", "horizontal", "lateral" and "longitudinal" have been used only as relative terms to describe the blind assembly of the invention.

Claims

1. A window covering assembly for an architectural opening such as a window , said window covering assembly comprising

   - a first or top movable rail having left and right longitudinal ends,
   - a second or lower movable rail having left and right longitudinal ends,
   - blind material connected to the two rails and extendible and retractable between the two by moving one or both rails away from or toward each other, and
   - a pair of first and second main tension cords routed in mirror image one to another through and along the top movable rail, the blind material and the bottom movable rail

   wherein,

   the first cord of the pair of the first and second main tension cords is routed to enter the top movable rail at a first entrance point which is adjacent one of the left or right longitudinal ends of the rail and spaced a first length measured from said end, and

   the first cord is then routed through or along the rail to exit the top movable rail at a first exit point which exit point is spaced at a second length from the same one of the left or right longitudinal rail ends as the first entrance point,

   and wherein the first length is exceeds the second length.

2. The window covering assembly of claim 1 wherein the blind assembly further comprises cord tensioning means in the top movable rail for tensioning the first and second main tension cords.

3. The window covering assembly of claim 2 wherein the tensioning means are positioned beyond the first entrance point in the direction towards the opposite longitudinal end of the top movable rail, and wherein the first main tension cord is routed from the first entrance points to the tension means, slidingly connected thereto and looped back past the first entrance points to the first exit point.

4. The window covering assembly of claim 2 or 3 wherein said tensioning means comprises at least one tension spring.

5. The window covering assembly of claim 4 wherein said tensioning means comprises a single spring in the longitudinal center of the top movable rail and

wherein the first and second tension cords are slidably connected to either end of the spring.

6. The window covering assembly any of the claims 1-5 further comprising at least one auxiliary tension cord routed to enter the top movable rail at the first entrance point adjacent one of the right or left longitudinal ends of the top movable rail and spaced the first length measured from said end,
the auxiliary tension cord is then routed through or along the rail to exit the top movable rail at a second exit point which exit point is spaced at a third length from the same one of the left or right longitudinal rail ends as the first entrance point, and the first tension cord is then routed through the blind material towards the lower movable rail,
and wherein the third length exceeds the first length.

7. The window covering assembly of any of the claims 1-5 further comprising at least one auxiliary tension cord routed to enter the top movable rail at an auxiliary entrance point coinciding with the right or left longitudinal end of the top movable rail, such that the first length is next to nothing , and
the auxiliary tension cord is then routed through or along the rail to exit the top movable rail at a second exit point which exit point is spaced at a third length from the left or right longitudinal rail end coinciding with the second entrance point.

8. The window covering assembly of any of the preceding claims further comprising means for attaching the tension cords to top and bottom fixed surfaces extending parallel to the top and bottom movable rails.

9. The window covering assembly of claim 8 wherein the connecting means comprise mounting blocks.

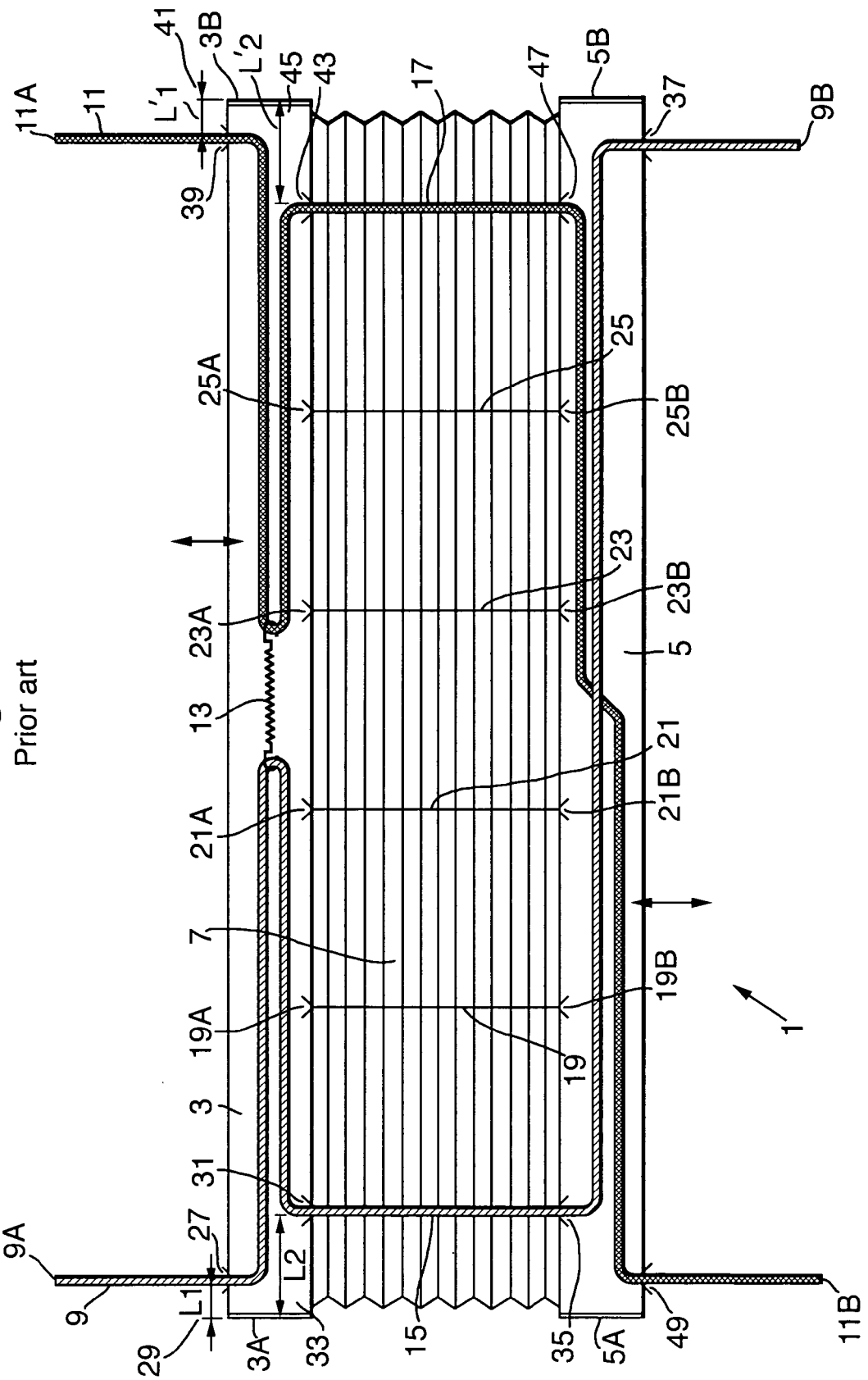


Fig.1.
Prior art

Fig.2.
Prior art

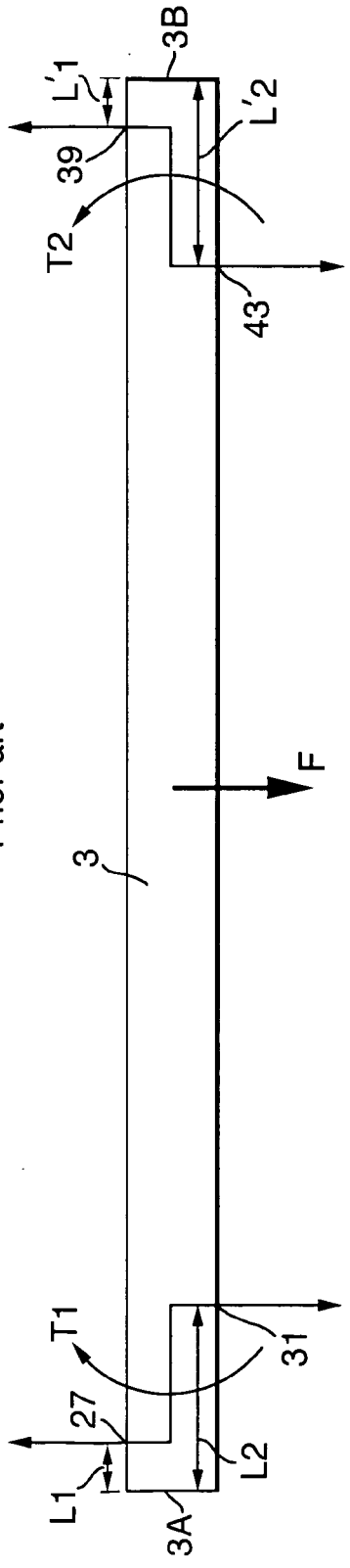


Fig.4.

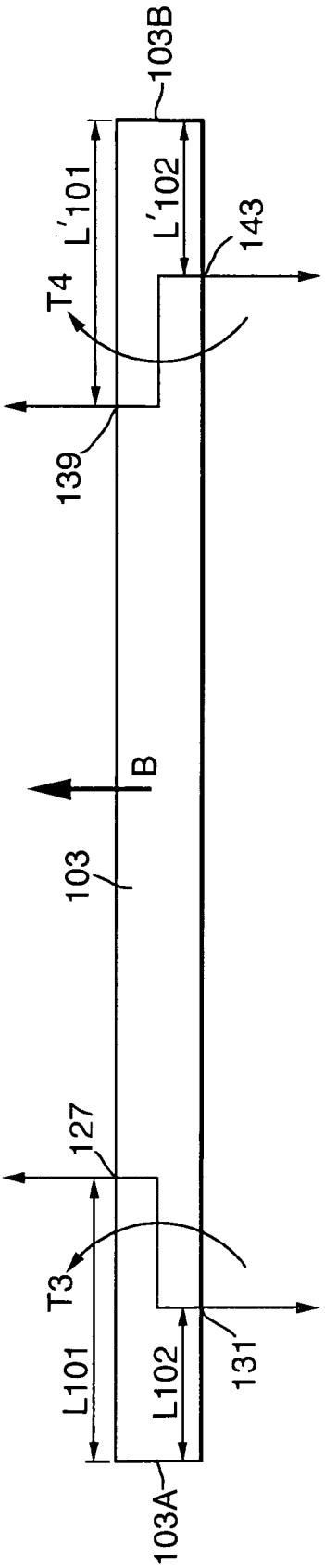


Fig.3.

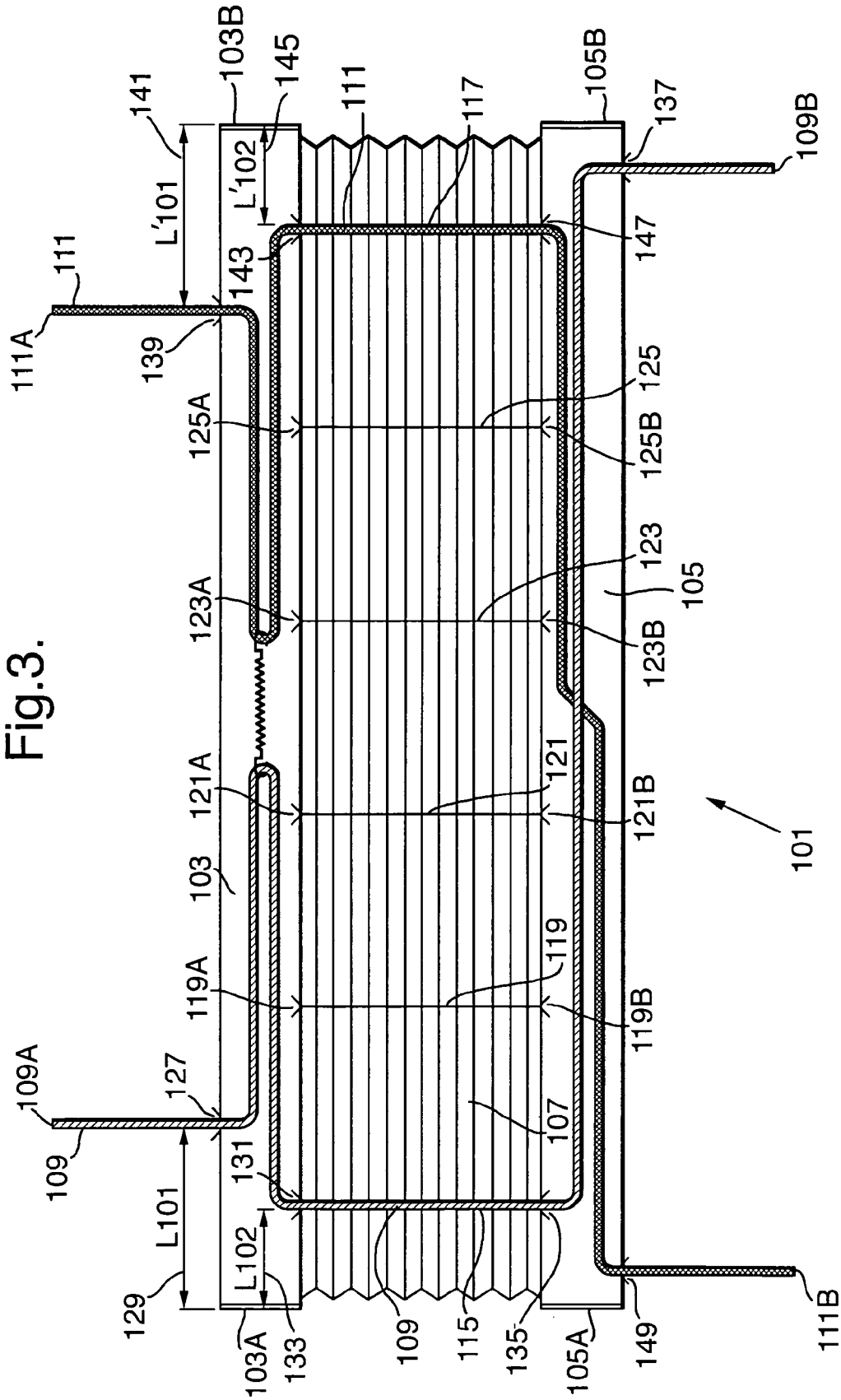

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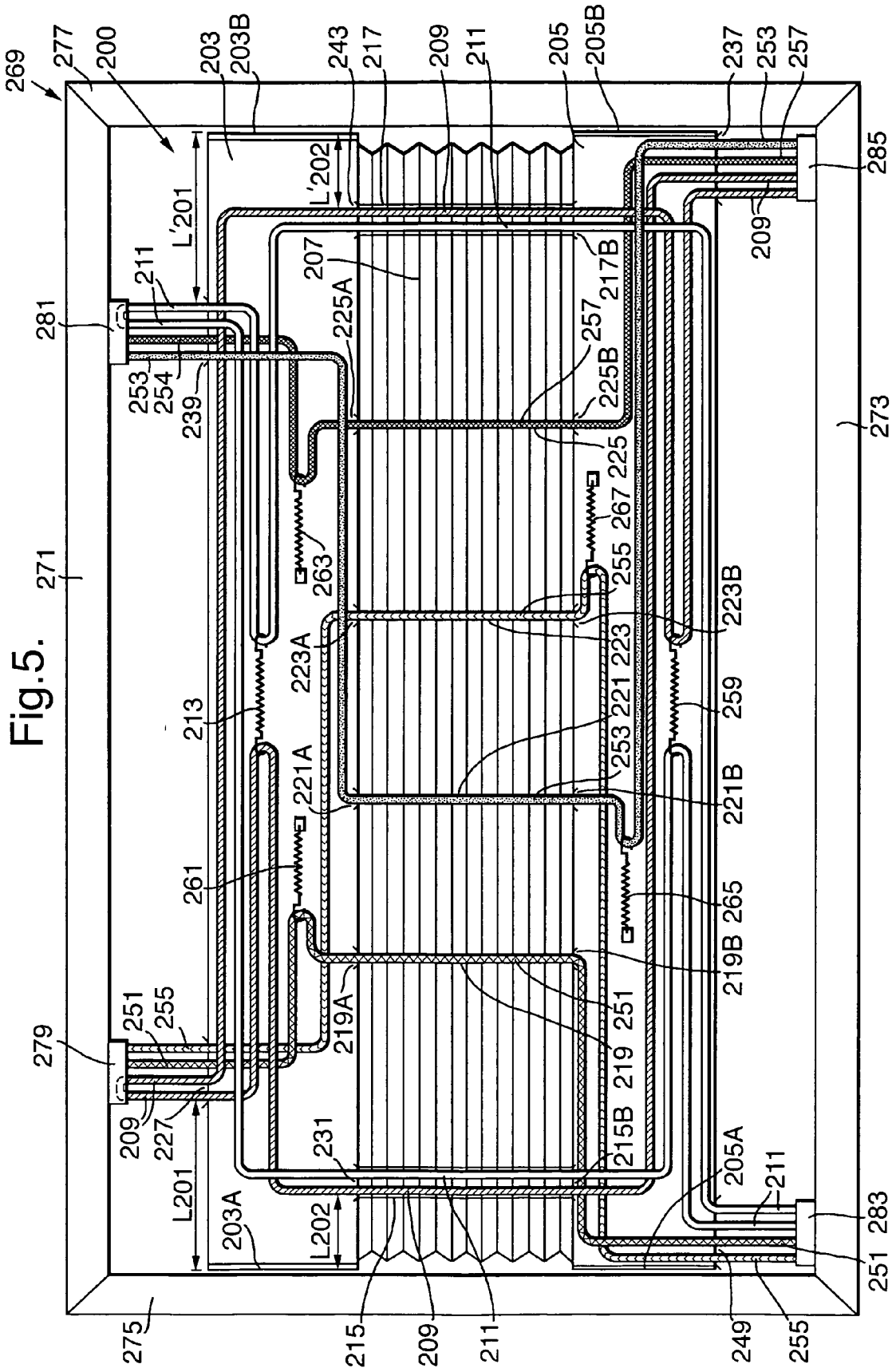
Fig.5.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217B
225A
257
225B
225
267
263
255
223B
223A
223
221
259
213
221A
253
221B
261
265
219B
219A
251
219
215B
231
205A
211
283
L201
203A
L202
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251
255

Fig.5A.

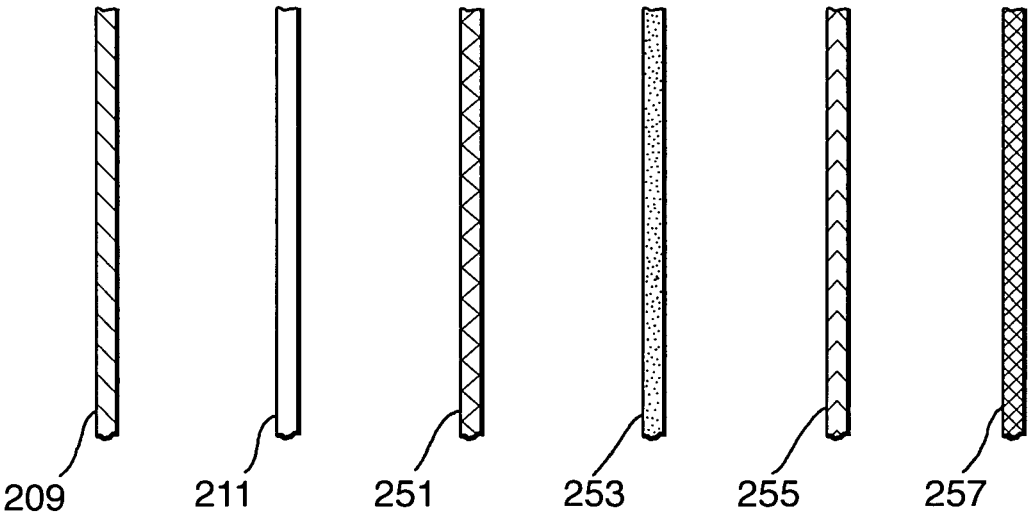
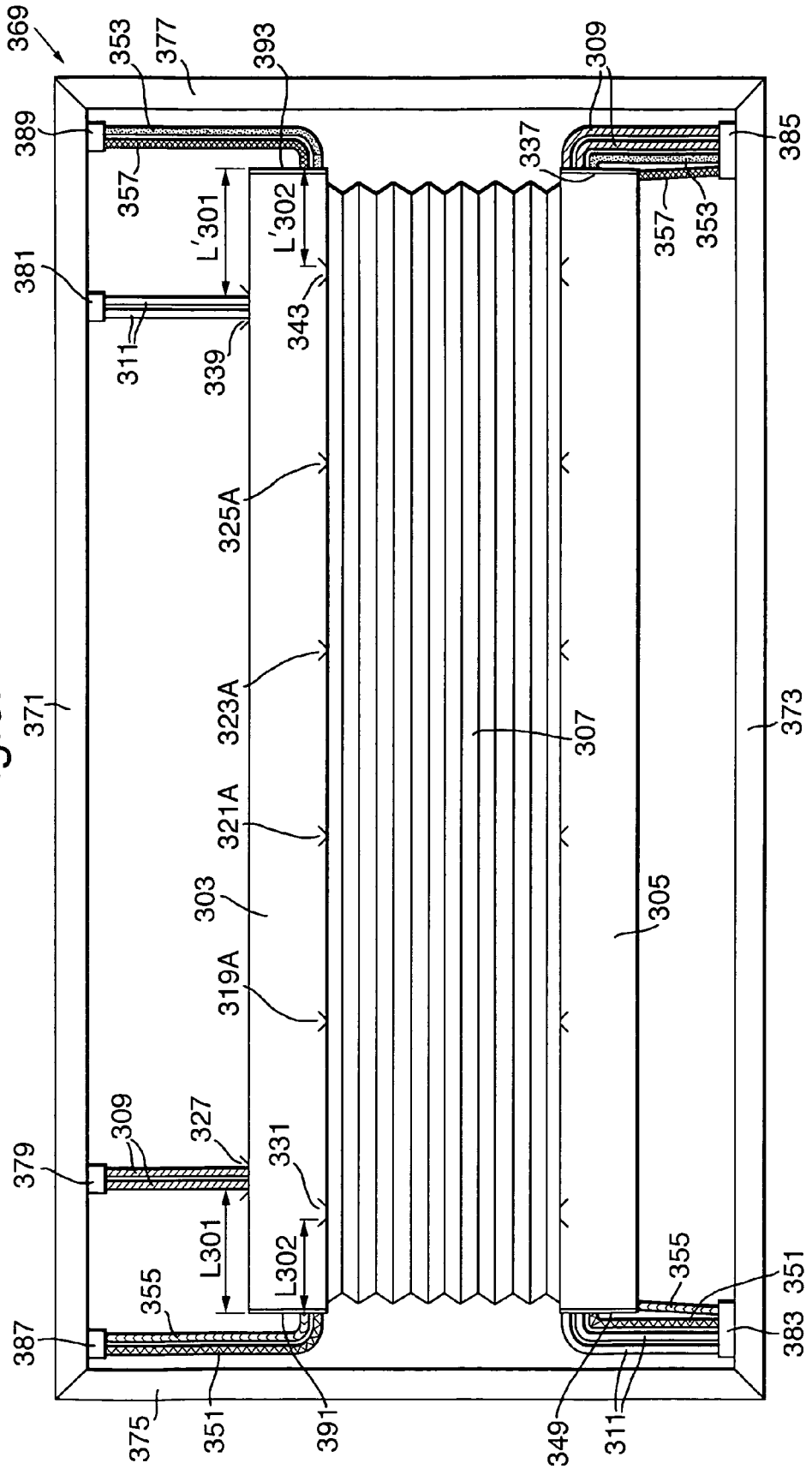


Fig.6.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L'301
L'302
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319A
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L301
L302
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311