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

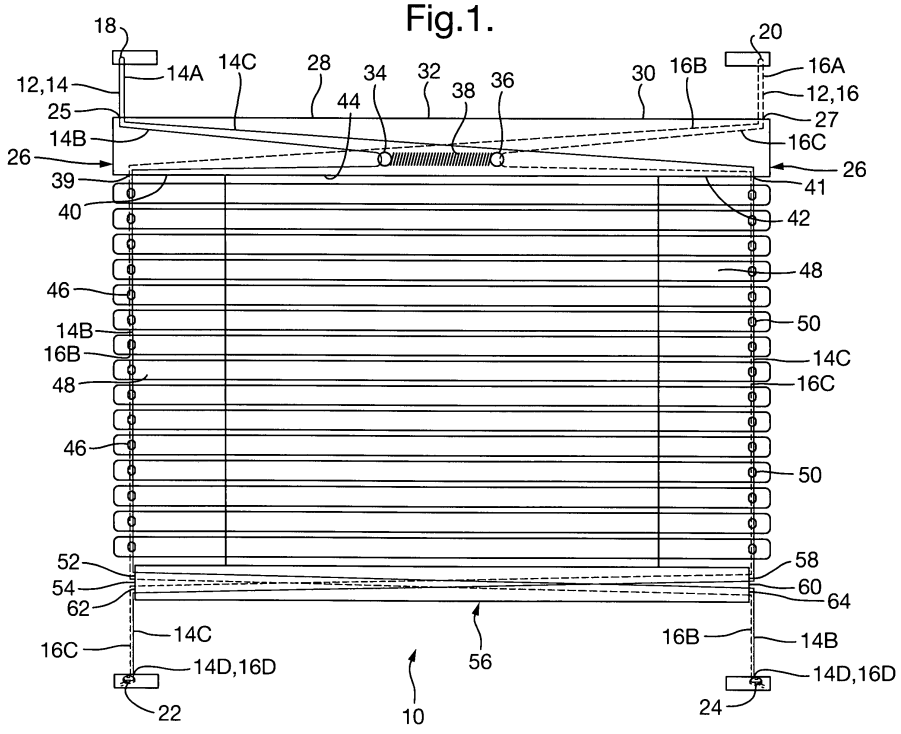
(72) Inventor: **Dekker, Nico**
3162 PA Rhoon (NL)

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

(54) Tension cord routing for window covering

(57) A routing for a pair of tension cords in a window covering with parallel, top and bottom rails that can be moved vertically along the tension cords, the tension cords: i) being connected by top and bottom pairs of attachment members to top and bottom portions of a window, ii) having middle portions which are attached to either the top or bottom pairs of attachment members, and iii) having end portions which are secured to the other of the top and bottom pairs of attachment members; the cord routing being **characterized in that** the middle portions are movably looped about the top or bottom pairs of attachment members and the tension cords are connected to each other by a single tension spring, whereby the tension cords are maintained in proper tension to keep the rails parallel when one or both rails are moved vertically along the tension cords

Fig.1.



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Description

[0001] This invention relates to the routing of a pair of tension cords in a window covering (e.g., a Venetian blind or a pleated blind) with parallel, top and bottom rails that can be moved vertically along the tension cords. The invention particularly relates to the routing of tension cords, so that only a single tension spring need be connected to the tension cords to keep them in proper tension, i.e., so that the rails remain parallel when moved.

[0002] Window coverings with top and bottom rails that can be moved vertically along tension cords are known, for example, from WO 2006/050728, EP 1 447 516, DE 100 27 771 A1 and EP 1 489 258 B1. EP 1 489 258 B1 says that it requires only one tension spring in a rail of its window covering to maintain proper tension in its tension cords, but this patent describes no routing of tension cords which would allow the use of only one tension spring. Nor does it say how its spring is attached to its tension cords. Indeed, it is believed that all such earlier window coverings required the use of at least one tension spring for each tension cord in each movable rail to maintain proper tension in their tension cords.

[0003] In accordance with this invention, an improved routing is provided for a pair of tension cords in a window covering with parallel, top and bottom rails that can be moved vertically along the tension cords, the tension cords: i) being connected by top and bottom pairs of attachment members to top and bottom portions of a window, ii) having middle portions which are attached to either the top or bottom pairs of attachment members, and iii) having end portions which are secured to the other of the top and bottom pairs of attachment members; the cord routing being **characterized in that** the middle portions are movably looped about the top or bottom pairs of attachment members and the tension cords are connected to each other by a single tension spring, whereby the tension cords are maintained in proper tension to keep the rails parallel when one or both rails are moved vertically along the tension cords.

[0004] Advantageously, the spring is in the top or bottom rail. In one advantageous embodiment, the spring is in the top rail, the middle looped portions of the tension cords are attached to the top attachment members, and one end of each tension cord is attached to each of the bottom attachment members. In this regard, it is particularly advantageous that the tension cords pass twice through the bottom rail.

[0005] In another advantageous embodiment, the spring is in the bottom rail, the middle looped portions of the tension cords are attached to the bottom attachment members, one end of each tension cord is attached to each of the top attachment members, and the tension cords pass twice through the top rail.

[0006] In yet another advantageous embodiment, the spring is between the top pair of attachment members, both ends of one tension cord are attached to one of the bottom attachment members and both ends of the other tension cord are attached to the other attachment member.

[0007] It is also advantageous that the tension spring is closer to the looped middle portions of the tension cords than to the end portions of the tension cords.

[0008] Additionally, the window covering is advantageously a Venetian blind and means for tilting slats of the Venetian blind are provided at the top rail.

[0009] Further aspects of the invention will be apparent from the detailed description below of particular embodiments and the drawings thereof, in which:

- Figure 1 is a schematic view of a first embodiment of the routing of a pair of tension cords in a window covering in accordance with this invention;
- Figure 2 is a schematic view of a second embodiment of the routing of a pair of tension cords in a window covering in accordance with this invention; and
- Figure 3 is a schematic view of a third embodiment of the routing of a pair of tension cords in a window covering in accordance with this invention.

[0010] Figure 1 shows a Venetian blind 10 of the invention. The blind 10 is suspended in front of a window (not shown) by means of a routing 12 of first and second tension cords 14, 16. The tension cord routing 12 involves looping middle portions 14A, 16A of the pair of tension cords 14, 16 movably about a top pair of attachment members 18, 20, affixed above, and to longitudinally opposite sides of, the window (e.g., at about the top of the window frame). In this regard, the looped middle tension cord portions 14A, 16A can slide somewhat in both longitudinal directions over and about the top attachment members 18, 20 despite friction between the tension cords and the top attachment members. Thereby are formed movable left and right portions 14B, 14C and 16B, 16C of the tension cords 14, 16, extending downwardly from their looped middle tension cord portions 14A, 16A towards their end portions 14D, 16 D. The tension cord routing 12 also involves securing the end portions 14D, 16D of the tension cords 14, 16 to a bottom pair of attachment members 22, 24, affixed below, and to longitudinally opposite sides of, the window (e.g., at about the bottom of the window frame).

[0011] The left and right, tension cord portions 14B, 14C and 16B, 16C extend downwardly from the top attachment members 18, 20 to and through openings 25, 27 in left and right sides 28, 30 of a top surface 32 of a longitudinally (or horizontally)-extending top rail 26 of the blind 10. From the openings in the top surface 32 of the top rail 26, the tension cords 14, 16 extend, within the top rail, downwardly and towards each other. A first left cord portion 14B and a second right cord portion 16C are then looped through openings 34, 36 in the left and right ends of a single, longitudinally-extending tension spring 38 at about the longitudinal and vertical middle of the top rail and then extend downwardly and away from each other to and through openings 39, 41 in left and right

sides 40, 42 of a bottom surface 44 of the top rail 26. A first right cord portion 16B and a second left cord portion 14C cross and extend downwardly and away from each other to and through the openings 39, 41 in the bottom surface 44 of the top rail 26. Preferably, the left side openings 25, 39 in the top rail 26 are near its left end, and the right side openings 27, 41 are near the right end of the top rail. It is also preferred that the left and right openings 25, 27 in the top surface 32 be vertically aligned with the left and right, top attachment members 18, 20 respectively.

[0012] Subsequently, the first left and right, cord portions 14B, 16B extend downwardly from the left opening 39 in the bottom surface 144 of the top rail 26, though holes 46 near the left edge of longitudinally-extending slats 48 of the blind 10. Likewise, the second left and right, cord portions 14C,16C extend downwardly from the right opening 41 in the bottom surface 144 of the top rail 26, though holes 50 near the right edge of the slats 48. The left holes 46 in the slats 48 are preferably aligned vertically with the left bottom opening 39 of the top rail 26, and the right holes 50 in the slats are preferably aligned vertically with the right bottom opening 41 of the top rail. It is also preferred that the left and right ends of the top rail 26 are vertically aligned with the left and right ends, respectively, of the slats 48.

[0013] Then, the first left and right, cord portions 14B, 16B extend downwardly to, and then longitudinally through, an upper opening 52 in a left end 54 of a longitudinally (or horizontally)-extending bottom rail 56 of the blind 10, and the first left and right cord portions 14C, 16C extend downwardly to, and then longitudinally through, an upper opening 58 in a right end 60 of the bottom rail 56. Hence, it is preferred that the bottom rail ends 54, 60 are between the left and right holes 46, 50 in the slats 48, with the left bottom rail end 54 being slightly to the right of the left slat holes 46 and the right bottom rail end 60 being slightly to the left of the right slat holes 50. Thereby, the cord portions 14C, 16C and 14B, 16B extend vertically between the slat holes 46, 50 and the bottom rail upper openings 52, 58, respectively.

[0014] Within the bottom rail 56, the second left and right, cord portions 14C, 16C and the first left and right, cord portions 14B, 16B then extend in opposite longitudinal directions until they extend downwardly to and through, respectively, a lower opening 62 in the left end 54 of the bottom rail 56 and a lower opening 64 in the right end 60 of the bottom rail. Then, the first left and right, cord portions 14B, 16B extend downwardly, and their ends are knotted to the right bottom attachment member 24, and the second left and right, cord portion 14C,16C extend downwardly, and their ends are knotted to the left attachment member 22. Hence, it is preferred that the bottom rail ends 54, 60 are between the bottom attachment members 22, 24, with the bottom rail left end 54 being only slightly to the right of the left bottom attachment member 22 and the bottom rail right end 60 being only slightly to the left of the right bottom attachment member 24. Thereby, the cord portions 14C, 16C and 14B, 16B extend vertically between the bottom rail lower openings 62, 64 and the attachment members 22, 24, respectively.

[0015] The parallel, top rail and bottom rail 26, 56 can each be easily moved upwardly and downwardly along the tension cords 14, 16 to open and close the blind 10 and then be held in place by friction between the tension cords and the openings 25, 27, 39, 41, 52,58, 62, 64 in the rails. Because proper tension is maintained in the tension cords, the top and bottom rails remain parallel after one or both of them is moved along the tension cords. This feature can be enhanced by having both halves 14B, 14C and 16B, 16C of each tension cord 14, 16 pass through the rail without the spring 38 (i.e., the bottom rail 56 in Figure 1) to balance the friction between the tension cords and the top rail and between the tension cords and the bottom rail.

[0016] Conventional ladder cords (not shown) can be attached to the slats 48, and a conventional mechanism (not shown) can be provided at the top rail 26 for tilting the ladder cords and thereby the slats as described, for example, in DE 20 2004 020 934 U1, DE 100 27 771 A1 and EP 1 489 258 B1.

[0017] Figure 2 shows a second embodiment of a Venetian blind 110 of the invention which is similar to the Venetian blind 10 of Figure 1 and for which corresponding reference numerals (greater by 100) are used below for describing the same parts or corresponding parts.

[0018] The blind 110 is suspended by means of a routing 112 of first and second tension cords 114, 116. The tension cord routing 112 involves looping middle portions 114A, 116A of the pair of tension cords 114, 116 movably about left and right, top attachment members 118, 120 and securing end portions 114D, 116D of the tension cords to left and right, bottom attachment members 122, 124.

[0019] Movable, left and right, tension cord portions 114B, 114C and 116B, 116C extend downwardly from the top attachment members 118, 120 to and through openings 125, 127 in left and right sides 128, 130 of a top surface 132 of a top rail 126 of the blind 110. From the openings in the top surface 132 of the top rail, the tension cords 114, 116 extend, within the top rail, downwardly and towards each other. The first left cord portion 114B and the second right cord portion 116C are then looped through openings 134, 136 in the left and right ends of a tension spring 138 at about the longitudinal and vertical middle of the top rail and then extend downwardly and away from each other to and through openings 139, 141 in left and right sides 140, 142 of a bottom surface 144 of the top rail 126. The second left cord portion 114C and first right cord portion 116B cross and extend downwardly and away from each other to and through the openings 139, 141 in the bottom surface 144 of the top rail. Preferably, the left and right openings 125, 127 in the top surface 132 of the top rail 126 are near its left and right ends respectively, and the left and right openings

139, 141 in the bottom surface 144 of the top rail are spaced away from its left and right ends, respectively. It is also preferred that the left and right openings 125, 127 in the top surface 132 be vertically aligned with the left and right, top attachment members 118, 120, respectively.

[0020] Subsequently, the first left and right, cord portions 114B, 116B extend downwardly from the left opening 139 in the bottom surface 144 of the top rail 126, though holes 146 in the left side of longitudinally-extending slats 148 of the blind 110. Likewise, the second left and right, cord portions 114C, 116C extend downwardly from the right opening 141 in the bottom surface 144 of the top rail , though holes 150 in the right side of the slats 48. Preferably, the holes 146 and 150 are located where the cross-rungs of ladder cords (not shown) are to be inserted into the slats 148 and are vertically aligned with the left and right openings 139, 141, respectively in the bottom surface 144 of the top rail 126. It is also preferred that the left and right ends of the top rail 126 are vertically aligned with the left and right ends, respectively, of the slats 148.

[0021] Then, the first left and right, cord portions 114B, 116B extend downwardly to and through an opening 152 in a left side of a top surface 154 of a bottom rail 156, and the second left and right, cord portions 114C, 116C extend downwardly to and through, an opening 158 in a right side of the top surface 154 of the bottom rail. The second and first , left and right, cord portions 114C, 116C and 114B, 116B, respectively, then extend in opposite longitudinal directions until they extend downwardly to and through, respectively, a lower opening 162 in the left side of a bottom surface 163 of the bottom rail 156 and a lower opening 164 in the right side of the bottom surface 163 of the bottom rail. Preferably, the left and right openings 152, 158 in the top surface 154 of the bottom rail 156 are spaced away from its left and right ends, respectively, and are vertically aligned with the holes 146, 150 in the slats 148. It is also preferred that the left and right openings 162, 164 in the bottom surface 163 of the bottom rail 156 are adjacent its left and right ends, respectively, and that the left and right ends of the bottom rail are vertically aligned with the left and right ends, respectively, of the slats 148.

[0022] Then, the first left and right, cord portions 114B, 116B extend downwardly, and their ends are knotted to the right bottom attachment member 124, and the second left and right, cord portions 114C, 116C extend downwardly, and their ends are knotted to the left bottom attachment member 122. Hence, it is preferred that the left and right openings 162, 164 in the bottom surface 163 of the bottom rail 156 are vertically aligned with the left and right, bottom attachment members 122, 124, respectively.

[0023] The parallel, top and bottom rails 126, 156 can each be easily moved upwardly and downwardly along the tension cords 114, 116 to open and close the blind 10 and then be held in place by friction between the tension cords and the openings 125, 127, 139, 141, 152, 158, 162, 164 in the rails. Because proper tension is maintained in the tension cords, the top and bottom rails remain parallel after one or both of them is moved along the tension cords. This feature can be enhanced by having both halves 114B, 114C and 116B, 116C of each tension cord 114, 116 pass through the rail without the spring 138 (i.e., the bottom rail 156 in Figure 2) to balance the friction between the tension cords and the top rail and between the tension cords and the bottom rail.

[0024] Conventional ladder cords (not shown) can be attached to the slats 148, and a conventional mechanism (not shown) can be provided at the top rail 126 for tilting the ladder cords and thereby the slats.

[0025] Figure 3 shows a third embodiment of a Venetian blind 210 of the invention which is similar to the Venetian blind 10 of Figure 1 and for which corresponding reference numerals (greater by 200) are used below for describing the same parts or corresponding parts.

[0026] The blind 210 is suspended by means of a routing 212 of first and second tension cords 214, 216. The tension cord routing 212 involves looping middle portions 214A, 216A of the pair of tension cords 214, 216 movably about left and right, top attachment members 218, 220 in a longitudinally-extending head rail 219, above a window (not shown), and securing end portions 214D, 216D of the tension cords to left and right, bottom attachment members 222, 224, below the window.

[0027] Movable, left and right tension cord portions 214B, 214C and 216B, 216C extend towards each other from the top attachment members 218, 220 and are then looped through openings 234, 236 in the left and right ends of a tension spring 238 at about the longitudinal middle of the head rail 219. The left and right tension cord portions 214B, 214C and 216B, 216C then extend downwardly and away from each other to and through openings 221, 223, respectively, in left and right sides of a bottom surface 217 of the head rail 219 of the blind 210. From the openings 221, 223 in the bottom surface 217 of the head rail, the tension cords 214, 216 extend downwardly to and through openings 225, 227, respectively, in left and right sides 228, 230 of a top surface 232 of a top rail 226.

[0028] Within the top rail 226, a first left cord portion 214B and a second right cord portion 216C extend downwardly to and through openings 239, 241, respectively, in left and right sides 240, 242 of a bottom surface 244 of the top rail, and a second left cord portion 214C and first right cord portion 216B cross and then extend downwardly and away from each other to and through the right and left openings 241, 239, respectively in the bottom surface 244 of the top rail. Preferably, the left and right openings 225, 239, and 227, 241 in the top and bottom surfaces 232, 244 of the top rail 226 are near its left and right ends, respectively, the top left opening 225 is vertically aligned with the bottom left opening 239, and the top right opening 227 is vertically aligned with the bottom right opening 241. It is also preferred that the left and

right ends of the top rail 226 are vertically aligned with the left and right ends, respectively, of the head rail 219.

[0029] Subsequently, the first left and right, cord portions 214B, 216B extend downwardly from the left opening 239 in the bottom surface 244 of the top rail 226, though holes 246 in the left side of longitudinally-extending slats 248 of the blind 210. Likewise, the second left and right, cord portions 214C, 216C extend downwardly from the right opening 241 in the bottom surface 244 of the top rail 226 though holes 250 in the right side of the slats 248. Preferably, the holes 246, 250 are located near the longitudinal ends of the slats 248 and are vertically aligned with the left and right, bottom openings 239, 241, respectively, in the top rail.

[0030] Then, the first right cord portion 216B extends downwardly to and through an upper opening 252 in a left end 254 of a bottom rail 256, the second left cord portion 214C extends downwardly to and through an upper opening 258 in a right end 260 of the bottom rail, and the first left cord portion 214B and the second right cord portion 216C extend downwardly, past the left and right ends 254, 260 of the bottom rail, to the left and right, bottom attachment members 222, 224, respectively. Hence, it is preferred that the bottom rail ends 254, 260 are between the left and right holes 246, 250 in the slats 248, with the left bottom rail end 254 being slightly to the right of the left slat holes 246 and the right bottom rail end 260 being slightly to the left of the right slat holes 250, so that the first right cord portion 216B and the second left cord portion 214C extend vertically between the slat holes 246, 250 and the bottom rail upper openings 252, 258, respectively. Hence, it is also preferred that the left and right, bottom attachment members 222, 224 be vertically aligned with the left and right, slat holes 246, 250, so that the first left cord portion 2148 and the second right cord portion 216C extend vertically between the slat holes and the attachment members.

[0031] Within the bottom rail 256, the second left cord portion 214C and the first right cord portion 216B cross and then extend downwardly and away from each other to and through left and right, lower openings 262, 264, respectively, in the left and right ends 254, 260 of the bottom rail. Then, the second left cord portion 214C and the first right cord portion 216B extend downwardly from the lower openings 262, 264, and their ends 214D, 216D are knotted to the left and right bottom attachment members 222, 224, respectively. Hence, it is preferred that the bottom rail ends 254, 260 are between the bottom attachment members 222, 224, with the bottom rail left end 254 being only slightly to the right of the left bottom attachment member 222 and the bottom rail right end 260 being only slightly to the left of the right bottom attachment member 224, so that the cord portions 214C, 216B extend vertically between the bottom rail lower openings 262, 264 and the attachment members 222, 224, respectively.

[0032] The top and bottom rails 226, 256 can each be easily moved upwardly and downwardly along the tension cords 214, 216 and then be held in place by friction between the tension cords and the openings 225, 227, 239, 241, 252, 258, 262, 264 in the rails.

[0033] The attachment members 218, 220 may take the form of cord tensioning devices which allow the cord/spring tension to be adjusted. In particular, the cord tensioning devices may allow the relative positions of the looped middle portions to the head rail 219 to be adjusted. In this respect, the relative positions of the attachment members 218, 220 themselves may be or means may be provided to adjust the loop positions relative to the respective attachment members 218, 220. It is also possible for the attachment members 218, 220 to act as cord tensioning devices by taking up additional length of the cords.

[0034] Conventional ladder cords (not shown) can be attached to the slats 248, and a conventional mechanism (not shown) can be provided at the top rail 226 for tilting the ladder cords and thereby the slats.

[0035] This invention is, of course, not limited to the above-described embodiments which may be modified without departing from the scope of the invention or sacrificing all of its advantages. In this regard, the terms in the foregoing description and the following claims, such as "longitudinal", "right" and "left", have been used only as relative terms to describe the relationships of the various elements of the routing for a pair of tension cords in a window covering of the invention. For example, middle portions 14A, 16A, 114A, 116A , 214A, 216A of the tension cords 14, 16, 114, 116 , 214, 216 could be looped movably about a bottom pair of left and right, attachment members 18, 20, 118, 120, 218, 220, affixed above a window, and end portions 14A, 16A, 114A, 116A , 214A, 216A of the tension cords could be secured to a top pair of left and right, attachment members 22, 24, 122, 124, 222, 224, affixed above the window. Also, the tension cords 14, 16, 114, 116, 214, 216 could extend downwardly from the top attachment members 18, 20, 118, 120, 218, 220 to openings (not shown) in left and right ends of the top rail 26, 126, 226 of the blind 10, 110, 210. Moreover, the tension spring 38, 138, 238 could be placed in the bottom rail 56, 156, 256, but this is generally less desirable than putting the spring in the top rail 26, 126, 226. the tension spring 38, 138, 238 is preferably closer to the looped middle portions 14A, 16A, 114A, 116A , 214A, 216A of the tension cords than to their end portions 14A, 16A, 114A, 116A , 214A, 216A, but this is not necessary. Also, the single, longitudinally-extending tension spring 38, 138, 238 could, of course, be replaced by a plurality of smaller springs attached directly to one another. Furthermore, although the window covering 10, 110, 210 is preferably a Venetian blind, it could also be a pleated blind, a roller shade, etc. In this regard, it is preferred, when the window covering 10, 210 is a Venetian blind, that the upper and lower openings 52, 252 and 62, 262 in the left end 54, 254 of its bottom rail 56, 256 and the upper and lower openings 58, 258 and 64, 264 in the right end 60, 260 of the bottom rail each form a

single opening about the lateral middle or pivot point of the bottom rail. Thereby, the bottom rail 56, 256 can tilt with the slats 48, 248 of the blind. Likewise, it is preferred, when the window covering 10, 210 is a pleated blind, a roller shade, etc., that the upper and lower openings in the ends of its bottom rail 56, 256 are all separate openings, so that the bottom rail remains stable and does not tilt.

Claims

1. A routing for a pair of tension cords in a window covering with parallel, top and bottom rails that can be moved vertically along the tension cords, the tension cords: i) being connected by top and bottom pairs of attachment members to top and bottom portions of a window, ii) having middle portions which are attached to either the top or bottom pairs of attachment members, and iii) having end portions which are secured to the other of the top and bottom pairs of attachment members; the cord routing being **characterized in that** the middle portions are movably looped about the top or bottom pairs of attachment members and the tension cords are connected to each other by a single tension spring, whereby the tension cords are maintained in proper tension to keep the rails parallel when one or both rails are moved vertically along the tension cords.

2. The routing of claim 1 wherein the spring is in the top or bottom rail.

3. The routing of claim 2 wherein the spring is in the top rail, the middle looped portions of the tension cords are attached to the top attachment members, and one end of each tension cord is attached to each of the bottom attachment members.

4. The routing of claim 3 wherein the tension cords pass twice through the bottom rail.

5. The routing of claim 2 wherein the spring is in the bottom rail, the middle looped portions of the tension cords are attached to the bottom attachment members, one end of each tension cord is attached to each of the top attachment members, and the tension cords pass twice through the top rail.

6. The routing of claim 1 wherein the spring is between the top pair of attachment members, both ends of one tension cord are attached to one of the bottom attachment members and both ends of the other tension cord are attached to the other attachment member.

7. The routing of any one of claim 1-6 wherein the tension spring is closer to the looped middle portions of the tension cords than to the end portions of the tension cords.

8. The routing of any one of claim 1-7 wherein the window covering is a Venetian blind and means for tilting slats of the Venetian blind are provided at the top rail.

Fig.1.

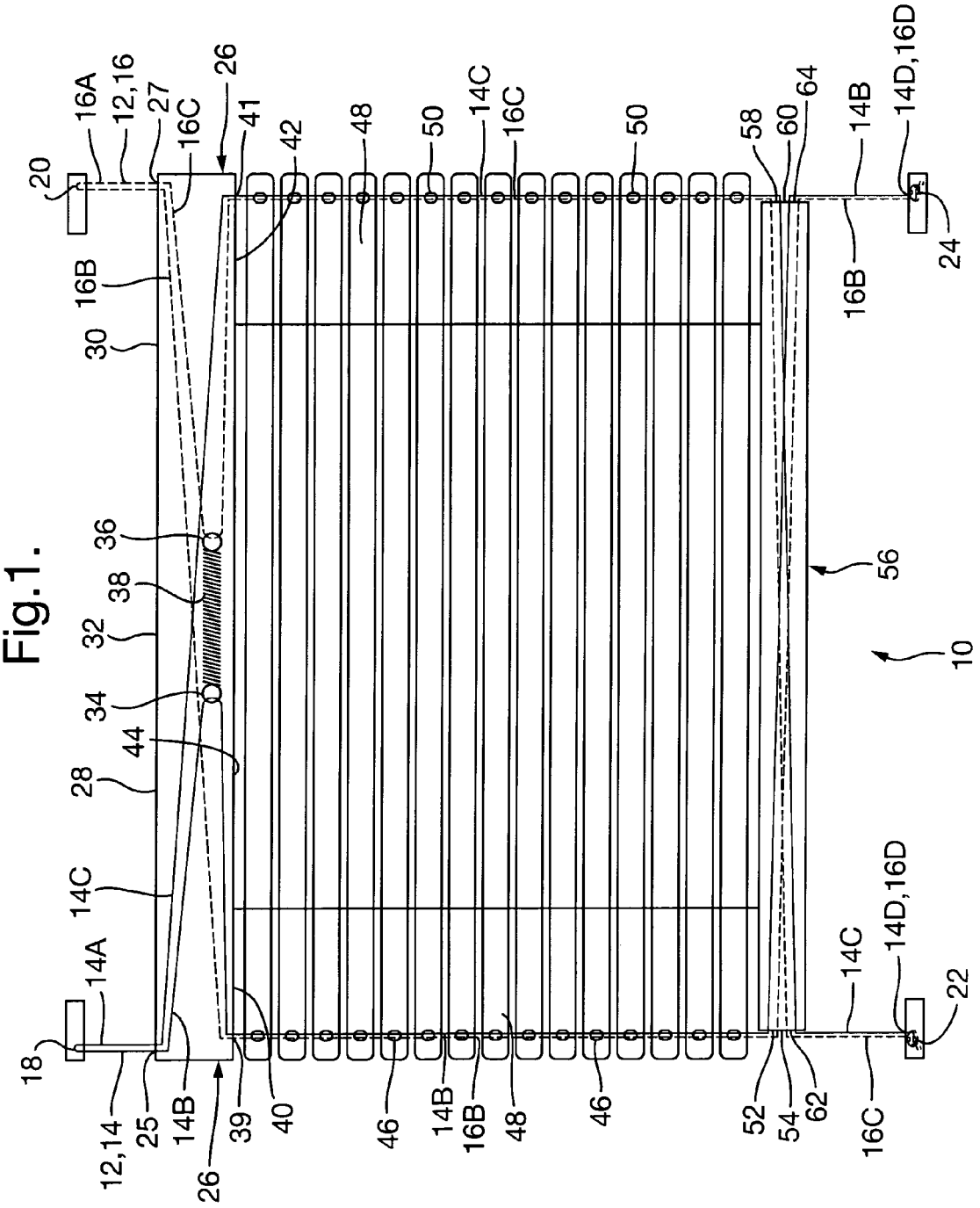
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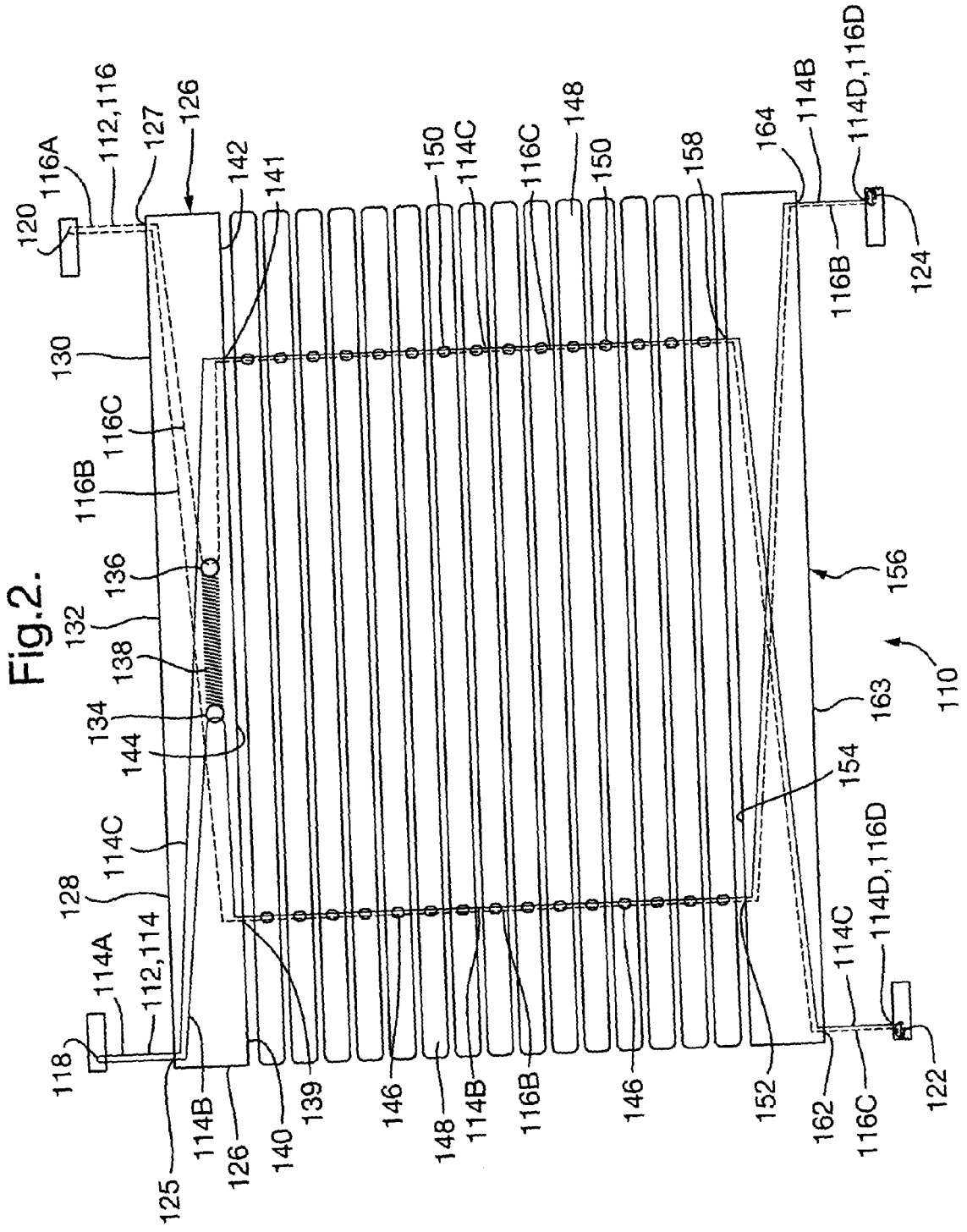
Fig.2.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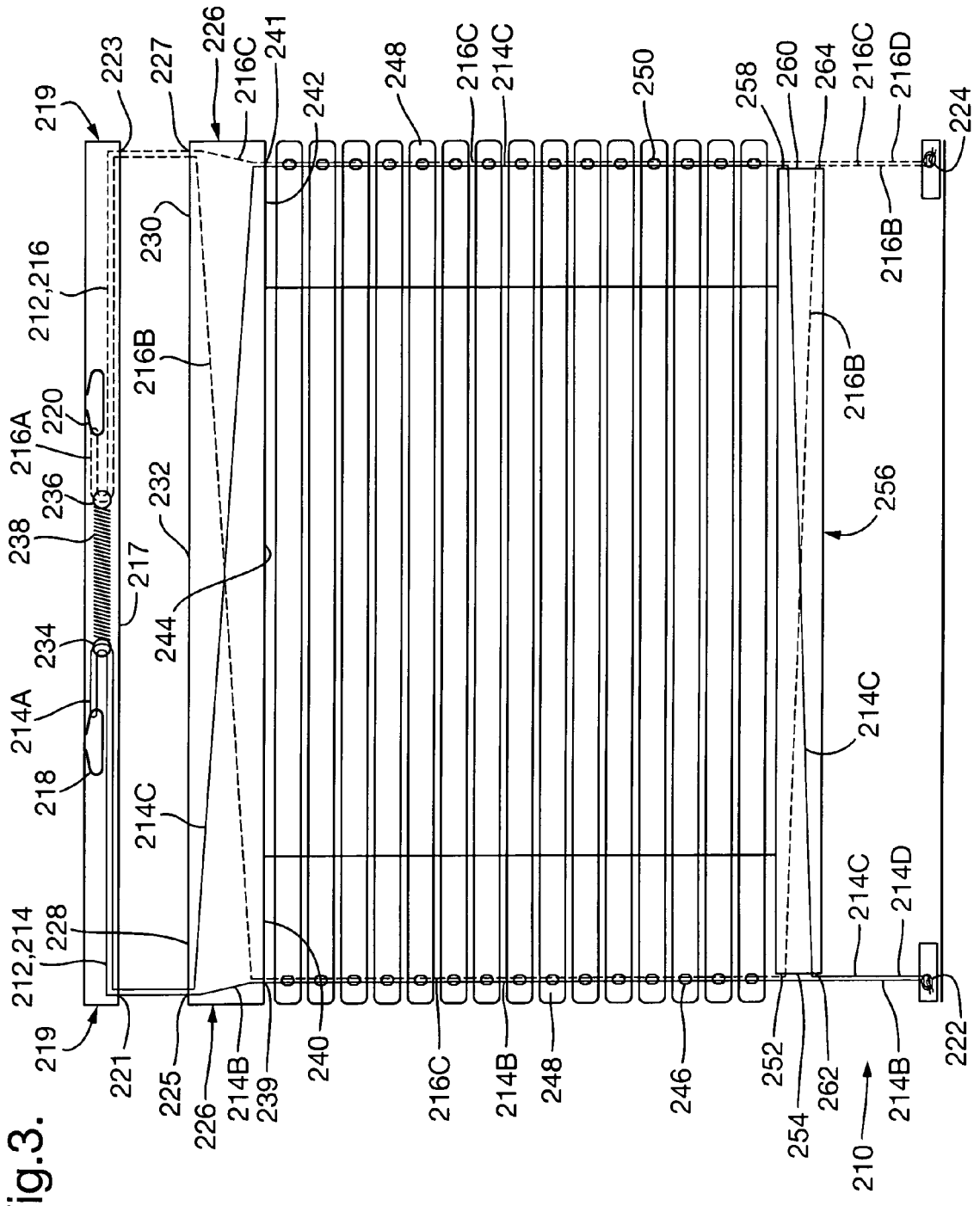
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Fig.3.

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EUROPEAN SEARCH REPORT

Application Number
EP 10 25 0160

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,P	WO 2009/065404 A1 (VKR HOLDING AS [DK]; HINDHEDE PER SOLSOE [DK]) 28 May 2009 (2009-05-28) * page 7, line 25 - page 8, line 10; figure 6 *	1-8	INV. E06B9/32 E06B9/327
A	US 4 733 711 A (SCHOEN SIEGFRIED [NL]) 29 March 1988 (1988-03-29) * column 4, line 53 - column 5, line 5; figure 8 *	1-8	

TECHNICAL FIELDS SEARCHED (IPC)

E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	30 April 2010	Kofoed, Peter

CATEGORY OF CITED DOCUMENTS

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