(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
14 September 2006 (14.09.2006)

PCT

(10) International Publication Number
WO 2006/096403 A2

(51) International Patent Classification:
A47H 5/00 (2006.01)

(21) International Application Number:
PCT/US2006/007247

(22) International Filing Date: 1 March 2006 (01.03.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
11/071,694 3 March 2005 (03.03.2005) US

(71) Applicant *(for all designated States except US)*: **SPRINGS WINDOW FASHIONS LLC** [US/US]; 7549 Graber Road, Middleton, Wisconsin 53562 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **STRAND, Toralf, H.** [NO/US]; 7 Downing Court, Exeter, New Hampshire 03833 (US). **MOISAN, Gerald, A.** [US/US]; 1905 LOFTSGORDON AVENUE, Apartment 2, Madison, Wisconsin 53704 (US).

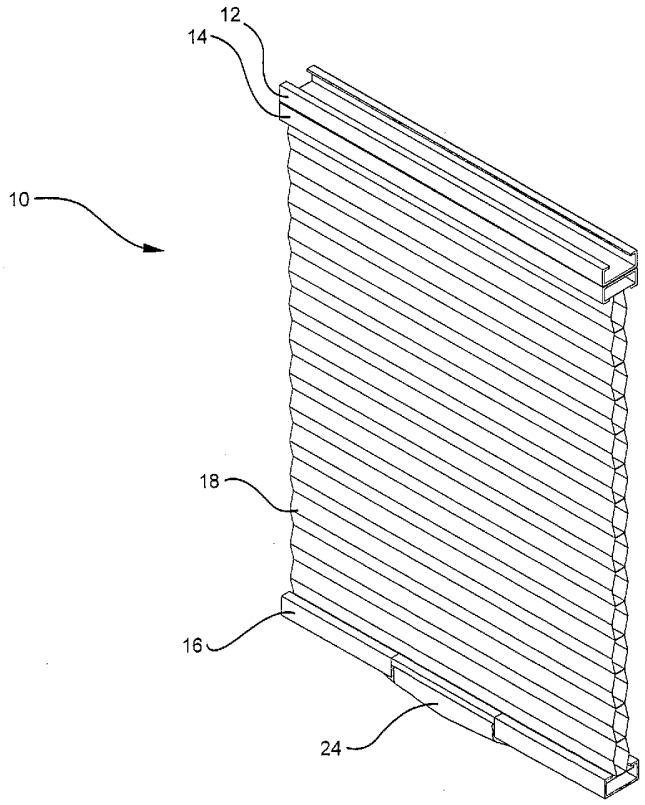
(74) Agents: **KOCUN, Kevin, M.** et al.; LERNER, DAVID, LITTENBERG, KRUMHOLZ & MENTLIK, LLP, 600 South Avenue West, Westfield, New Jersey 07090 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,

[Continued on next page]

(54) Title: BOTTOM UP TOP DOWN CORDLESS SHADE



(57) Abstract: A cordless bottom up top down window covering (10) is disclosed. The window covering (10) includes a headrail (12) , an intermediate rail (14), a bottom rail (16), at least one lift cord (20, 22) extending through each of the headrail (12) , intermediate rail (14) and bottom rail (16) , at least one post (26, 28) or unidirectional wheel (40) located in the intermediate rail (14), and a single lifting mechanism (24) operatively connected to the at least one lift cord (20, 22) . The lift cords (20, 22) are engaged with either the post (26, 28) or unidirectional wheel (40) .

WO 2006/096403 A2

FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

BOTTOM UP TOP DOWN CORDLESS SHADE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of the filing date of United States Application No. 11/071,694, filed on March 3, 2005, the disclosure of which is hereby incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] Bottom up top down (herein after "BUTD") window coverings are often employed in situations where it is desired to selectively cover/uncover different portions of a window (i.e. - top portions and bottom portions). The use of standard window coverings, whether typical Venetian blinds, cellular shades or the like, only allows for the covering of a window from the top of the window down. Therefore, the covering of the window using such standard window coverings always insures that either the entire window is uncovered, or at least a top portion of the window is covered. BUTD window coverings are made so that they can be raised and lowered from the top as well as from the bottom. Thus, a user can selectively cover or uncover either the top portion or bottom portion or some intermediate portion of a window.

[0003] Prior art BUTD window coverings include a headrail, an intermediate rail, and a bottom rails. A window covering material is often disposed between the intermediate rail and the bottom rail, and in certain BUTD window coverings, between the headrail and the intermediate rail. Prior art BTUD window coverings typically utilize one set of lift cords for the bottom rail, and another set of lift cords for the intermediate rail. These cords are operated independently of each other, and typically locked in place with cord locks. Thus, movement of the intermediate rail or the bottom rail requires the use of different mechanisms that each must be manipulated to engage or disengage the cord lock to hold or release the given rail. This setup typically causes confusion as to which lock operate. Similarly, where the mechanisms for engaging or disengaging the

cord locks are cords or chains, the abundance of the cords or chains creates a situation in which tangling is likely.

[0004] Therefore, there exists a need for a cordless or chainless BUTD window covering.

SUMMARY OF THE INVENTION

[0005] The present invention relates to window coverings and lifting mechanisms, more particularly, to bottom up top down window coverings incorporating the use of a spring motor.

[0006] A first aspect of the present invention is a bottom up top down window covering. The window covering according to this embodiment includes a headrail, an intermediate rail, a bottom rail, at least one lift cord extending through each of the headrail, intermediate rail and bottom rail, means for balancing and tensioning the at least one lift cord, and means for retracting the at least on lift cord. The means for balancing and tensioning the at least one lift cord may be posts or unidirectional wheels among other means. The means for retracting the at least one lift cord may be a spring motor or any other suitable means as is known in the art.

[0007] Another embodiment of the present invention is another bottom up top down window covering. The window covering according to this aspect includes a headrail, an intermediate rail, a bottom rail, at least one lift cord extending through each of the headrail, intermediate rail and bottom rail, at least one post located in said intermediate rail, and at least one spring motor operatively connected to the at least one lift cord. The at least one lift cord is frictionally engaged with the at least one post, and the at least one lift cord is capable of being retracted by the at least one spring motor.

[0008] The window covering according to the above embodiment may include a pair of lift cords, a pair of posts and a single spring motor located in the bottom rail for retracting the pair of lift cords. The intermediate rail may be moveable with respect to the headrail and the bottom rail. The frictional engagement of the lift cords with the posts is achieved by

wrapping each lift cord around a different post. The spring motor according to this embodiment may include a main body, a pair of cord spools rotatably mounted on the main body, each of the cord spools connected to one of the pair of cords, a drum rotatably mounted on a central portion of the main body, the drum in rotatable engagement with the pair of cord spools, and a pair of coil springs connected to the drum, the coil springs each being biased to rotate the drum which rotates the cord spools to wind the each of the cords onto one of the spools. The window covering may also include a locking mechanism to releasably secure the cords in position. Actuation of the locking mechanism allows movement of the bottom rail.

[0009] An upward force applied to the bottom rail of the window covering according to this embodiment may allow the intermediate rail to move downward. The intermediate rail may also be positioned by applying a force directly thereto. In certain configurations, the window covering may additionally include a centrally located pulley in the intermediate rail. The at least one lift cord may be wrapped around the pulley. Finally, the window covering may include shade material having two ends. One end of the shade material may be connected to the intermediate rail and the other end may be connected to the bottom rail.

[0010] Another embodiment of the present invention is another bottom up top down window covering. The window covering according to this embodiment includes a headrail, an intermediate rail, a bottom rail, at least one lift cord extending through each of the headrail, intermediate rail and bottom rail, at least one unidirectional wheel located in said intermediate rail, and at least one spring motor operatively connected to the at least one lift cord. The at least one lift cord is engaged with the at least one unidirectional wheel, and the at least one lift cord is capable of being retracted by the at least one spring motor.

[0011] Yet another embodiment of the present invention is another bottom up top down window covering. The window covering according to this embodiment includes a headrail, an intermediate

rail including a pulley, a bottom rail including at least one spring motor, and a pair of lift cords. Each lift cord is wrapped around the pulley. Each lift cord has an end connected to the headrail and an end operatively connected to the at least one spring motor, where the lift cords are capable of being retracted by the spring motor.

[0012] Another aspect of the present invention is a method of positioning a bottom up top down window covering. The method according to this aspect includes providing a window shade including a head rail, an intermediate rail, a bottom rail, at least one lift cord extending through each of the headrail, intermediate rail and bottom rail, means for balancing and tensioning the at least one lift cord, and at least one spring motor operatively connected to the at least one lift cord, wherein the at least one lift cord is capable of being retracted by the spring motor. The method also includes moving the bottom rail upwardly or downwardly, wherein movement of the bottom rail downwardly includes pulling the at least one lift cord away from the spring motor, and movement of the bottom rail upwardly includes lifting the bottom rail while the at least one lift cord is retracted by the spring motor. Finally, the method also includes the step of moving the intermediate rail.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] A more complete appreciation of the subject matter of the present invention and the various advantages thereof can be realized by reference to the following detailed description in which reference is made to the accompanying drawings in which:

[0014] Figure 1 is a perspective view of a bottom up top down window covering according to one embodiment of the present invention positioned such that substantially all of a window may be covered.

[0015] Figure 2 is a perspective view of the bottom up top down window covering according to Figure 1 positioned such that a top portion of a window may be uncovered while a lower portion is covered.

[0016] Figure 3 is a front view of the bottom up top down window covering according to Figure 1 positioned such that substantially all of a window may be uncovered.

[0017] Figure 4 is a perspective view of the bottom up top down window covering according to Figure 2, showing internal elements in phantom.

[0018] Figure 5 is a side cross-sectional view of the bottom up top down window covering according to Figure 2.

[0019] Figure 6A is a front cross-sectional view of the intermediate rail of the bottom up top down window covering according to Figure 2.

[0020] Figure 6B is a top cross-sectional view of the intermediate rail of the bottom up top down window covering according to Figure 2.

[0021] Figure 6C is a front cross-sectional view of the intermediate rail of a bottom up top down window covering according to an embodiment of the present invention having unidirectional wheels.

[0022] Figure 6D is a front cross-sectional view of the intermediate rail of a bottom up top down window covering according to an embodiment of the present invention having unidirectional wheels and a pulley.

[0023] Figure 6E is a front cross-sectional view of the intermediate rail of a bottom up top down window covering according to an embodiment of the present invention only having a pair of posts.

[0024] Figure 6F is a front cross-sectional view of the intermediate rail of a bottom up top down window covering according to an embodiment of the present invention only having a pulley.

[0025] Figure 7 is an exploded perspective view of a lifting mechanism for use with the bottom up top down window covering according to the present invention.

[0026] Figure 8 is a cross-sectional view of the lifting mechanism according to Figure 7.

[0027] Figure 9 is a perspective view of a portion of a locking device used in the lifting mechanism according to Figure 7.

[0028] Figure 10 is a cross-sectional view of the lifting mechanism according to Figure 7 showing the cooperation of the lifting mechanism with the lift cords.

[0029] Figure 11 is a partial cross-sectional view of the lifting mechanism according to Figure 7.

DETAILED DESCRIPTION

[0030] In describing the preferred embodiments of the subject matter illustrated and to be described with respect to the drawings, specific terminology will be used for the sake of clarity. However, the invention is not intended to be limited to any specific terms used herein, and it is to be understood that each specific term includes all technical equivalents which operate in a similar manner to accomplish a similar purpose.

[0031] Referring to the drawings, wherein like reference numerals represent like elements, there is shown in the Figures, in accordance with embodiments of the present invention, a bottom up top down cordless window covering designated generally by reference numeral 10. As shown in Figures 1-3, window covering 10 includes a head rail 12, an intermediate rail 14, and a bottom rail 16. A shade material 18 is disposed between intermediate rail 14 and bottom rail 16. In the embodiment shown in Figures 1-3, shade material 18 is a cellular material of a generally opaque nature. However, it is contemplated that many different types of shade material can be utilized. For example, certain embodiments might utilize pleated shades or Venetian blinds. Similarly, it is also contemplated that in certain embodiments an additional portion of shade material may be connected at some point between head rail 12 and intermediate rail 14. As is best shown in Figure 2, a pair of lift cords 20 and 22 are fixed in headrail 12, pass through intermediate rail 14, and are secured in bottom rail 16. This will be discussed further below.

Finally, a lifting mechanism 24 is associated with bottom rail 16.

[0032] Figures 1-3 show three of the many different positions that window covering 10 can be arranged in. Figure 1 shows window covering 10 in a position in which it may substantially cover an entire window. Figure 2 illustrates a position in which a top portion of a window may be uncovered, while a lower portion is covered. Figure 3 depicts window covering 10 in a fully open position, allowing for substantially all of a window to be uncovered. It is contemplated that window covering 10 may be positioned in various other manners that selectively cover or uncover top or bottom portions of a window. For example, window covering 10 can be positioned so that both a top portion and a bottom portion of a window may be uncovered, while a central portion is covered.

[0033] According to one preferred embodiment, Figures 4 and 5 illustrate the cooperation of lift cords 20 and 22 with the other elements of window covering 10. As shown in the figure, lift cords 20 and 22 are attached to headrail 12. It is contemplated that lift cords 20 and 22 may be fixed to headrail 12 in any fashion known in the art. For example, lift cords 20 and 22 may be tied off to a portion of headrail 12. Lift cords 20 and 22 exit headrail 12 through holes located therein. The cords then extend through a closed top of intermediate rail 14, through similar holes to those of head rail 12 and wrap around posts 26 and 28, as well as pulley 30. Finally, after exiting intermediate rail 14 through its open bottom, lift cords 20 and 22 run between shade material 18 (best shown in Figure 5) and extend into bottom rail 16, where they are operatively connected to lifting mechanism 24. This operative connection will be discussed further below. It is noted that the routing of lift cords 20 and 22 through headrail 12, intermediate rail 14 and bottom rail 16 may include fixing the cord ends to one of the rails, or simply allowing the cords to run through the rails. For example, as mentioned above, lift cords 20 and 22 can each be fixed to headrail 12. Additionally, eyelets 23 and cord guides

25 may be employed at the entrances and exits of the rails, respectively. For example, intermediate rail 14 may include eyelets 23 where lift cords 20 and 22 enter intermediate rail 14, and cord guides 25 where lift cords 20 and 22 exit intermediate rail 14.

[0034] As is best shown in Figures 6A 6B, posts 26 and 28 are rounded bodies that extend from the front of intermediate rail 14 to the rear. Lift cords 20 and 22 are wrapped around posts 26 and 28 so as to allow the posts, and hence intermediate rail 14, to slide along the cords. However, in a preferred embodiment, posts 26 and 28 are designed to create a frictional force upon the lift cords. This frictional force is derived from the cooperation of lift cords 20 and 22 with posts 26 and 28 respectively, with the hanging weight of bottom rail 16 imparting tension to the cords. In operation, this frictional force prevents intermediate rail 14 from moving under its own weight. Therefore, the movement and positioning of intermediate rail 14 may only be achieved in two different ways.

[0035] In a first way, a force may be directly applied to intermediate rail 14 by a user. Such force may be sufficient to overcome the frictional force provided by the cooperation of the posts and the lift cords. It is contemplated that the force applied directly to intermediate rail 14 may be applied in such a fashion so as to allow the raising or lowering of the rail. Additionally, in a second way, intermediate rail 14 can be lowered by lifting up the bottom rail 16, and therefore removing the hanging weight force, and thus lessening the tension on the cords. This lifting of bottom rail 16 dramatically decreases the frictional force between the posts and the lift cords, and allows intermediate rail 14 to descend along lift cords 20 and 22 under its own weight. Thus, absent a force applied directly to intermediate rail 14 or the lifting of bottom rail 16, intermediate rail 14 is designed to remain in place. It is contemplated that posts 26 and 28 can be constructed in a manner or of a specific material that increases the aforementioned frictional force. For example, posts 26 and 28 can be

constructed of a rubber material having a relatively high coefficient of friction.

[0036] As is also shown in Figures 6A and 6B, intermediate rail 14 of this embodiment includes a pulley 30, in addition to posts 26 and 28. Pulley 30 is substantially circular and further includes tracks 32 and 34 for receiving lift cords 20 and 22 respectively, and circular channel 36 for receiving a circular axel 38 coupled to intermediate rail 14. In the embodiment shown in Figures 6A and 6B, pulley 30 is freely rotatable and is situated in the center of intermediate rail 14. Lift cord 20 coming downward from headrail 12 is thread under post 26, around track 32, and back over post 26. Similarly, lift cord 22 coming downward from headrail 12 is thread under post 28, around track 34, and back over poster 28. This configuration allows for the aforementioned creation of a frictional force by posts 26 and 28, while pulley 30 ensures that intermediate rail 14 remains in a substantially parallel orientation, with respect to headrail 12 and bottom rail 16, during the raising and/or lowering of intermediate rail 14. In operation, pulley 30 rotates with the raising and lowering of intermediate rail 14. Pulley 30 requires lift cords 20 and 22 to move into and out of intermediate rail 14 at the same rate, giving even lift or lowering on both sides of the rail. The raising and/or lowering of intermediate rail 14 may be performed in a similar fashion to that disclosed above.

[0037] Figure 6C depicts another embodiment for keeping intermediate rail 14 in place. This embodiment is an intermediate rail 14 having unidirectional wheels or ratchets 40. Unidirectional wheel 40 may be any rotational device that allows rotation in a single rotational direction. For example, as shown in Figure 6C, wheel 40 includes angled fingers 42 that interact with catch 44. The uniform angled configuration of fingers 42 allow wheel 40 to freely rotate in a first direction, but catch 44 prevents rotation in a second and opposite direction. Intermediate rail 14, as shown in Figure 6C, includes two wheels 40, one that freely rotates in a clockwise direction, and one that freely rotates in a counterclockwise direction. These two

wheels 40 in turn allow for intermediate rail 14 to freely move in an upwards direction. However, wheels 40 prevent intermediate rail 14 from freely moving in a downward direction by providing a frictional force similar to that created by posts 26 and 28. Similarly, the downward motion of intermediate rail 14 is achieved like that disclosed above in the discussion relating to posts 26 and 28. Application of direct downward force upon intermediate rail 14 or lifting of bottom rail 16 will once again allow intermediate rail 14 to move in a downwardly fashion.

[0038] It is contemplated that different embodiments may include different combinations of the elements previously disclosed. For example, while the embodiment shown in Figures 6A and 6B depict an intermediate rail including a combination of posts and a pulley, other embodiments may include a combination of unidirectional wheels or ratchets and a pulley, like that shown in Figure 6D. In another embodiment, like that of Figure 6C, a window covering 10 may be provided that merely includes a pair of posts 26 and 28. This is shown in Figure 6E. It is also contemplated that a pulley can be utilized that provides for both a frictional force to be created and the uniform raising and lowering of the intermediate rail. For example, as shown in Figure 6F, a pulley could be utilized that rather than being capable of rotating, is fixed in a position. This may allow for the raising and lowering of the intermediate rail in a similar fashion to that disclosed above in the discussion relating to the posts or unidirectional wheels. In other words, the fixed pulley would act more like the aforementioned posts. Additionally, a pulley could be utilized that is similar to the aforementioned unidirectional wheels. This may allow for the easy raising of the intermediate rail, while providing a more difficult manner of lowering. Finally, it is noted that the various elements located in intermediate rail 14 can be situated in many different ways. For example, the locations of posts, wheels, and pulleys can be at any portion of intermediate rail 14.

[0039] Figure 7 shows an exploded view of a suitable lifting mechanism 24 for use with the present invention. Lifting

mechanism 24, as shown in the figures, is a spring motor in accordance with that disclosed and claimed in commonly owned U.S. Patent Application No. 10/452,170, the disclosure of which is hereby incorporated by reference herein. However, lifting mechanism 24 as shown in Figure 7 is only a single example of a suitable lifting mechanism. For example, other lift mechanisms are disclosed in U.S. Patent Nos. 5,904,198; 6,012,506; 6,024,154; 6,047,759; 6,056,036; 6,079,471; 6,095,222; 6,129,131; 6,129,181; 6,149,094; 6,289,965; 6,293,329; 6,325,131; 6,330,899; 6,491,084; 6,508,293; and 6,536,503 and U.S. Patent Publication Nos. 2002/0011315; 2002/0088562; 2002/0157796; and 2003/0070767, the disclosures of which are all hereby incorporated by reference herein. It is contemplated that any lifting mechanism, as is known in the art, may be utilized in conjunction with the present invention.

[0040] The lifting mechanism depicted in various views in Figures 7-11 is a spring motor assembly 112 which comprises a main body 124 and a top plate 125, a pair of cord spools 126, 128 rotatably mounted on the main body 124 and disposed between the main body and top plate 125. Cord spools 126 and 128 are generally cylindrical in shape, and each of the spools includes a bore 127 and 129. Cord spools 126 and 128 may be mounted on a pair of spindles or posts 130 and 132, and each of the spindles or posts is adapted to receive one of the spools 126 or 128 through their respective bores, 127 and 129 to allow the spools to freely rotate. It will be understood that the spools can be mounted to main body 124 by other suitable means. Each cord spool 126 and 128 is connected to one lift cord 20 or 22, as will be described in more detail below.

[0041] Spring motor assembly 112 further comprises a drum 134 rotatably mounted on a central portion of main body 124. Drum 134, like spools 126 and 128, may include a bore 135, as best seen in Figure 7. The central portion of main body 124 may further include a spindle 133 adapted to receive bore 135 of drum 134 to allow the drum to freely rotate on spindle 133.

[0042] According to one or more embodiments, drum 134 is in rotatable engagement with the pair of cord spools 126 and 128. Drum 134 is preferably in rotatable engagement with cord spools 126 and 128 via engagement surfaces such as gears associated with each of the spools and the drum. For example, spool 126 may include a gear 136, and spool 128 may include a gear 138, both of which engage with a gear 144 associated with drum 134. As shown in Figure 7, spool gears 136 and 138 are integral with spools 126 and 128, and drum spool gear 144 is a separate component from drum 134. This design facilitates assembly and disassembly of the lifting mechanism, however, it is understood that the various embodiments are not limited to this design. Thus, for example, spool gears 136 and 138 may be separate components that can be mounted on their respective spools 126 and 128, and drum gear 144 can be integral with drum 134. Of course, other variants are possible. All of the gears may be integral with their respective spools and drum, or all of the gears may be separate components from their respective spools and drum.

[0043] Mounting of drum gear 144 on drum 134 may be accomplished by providing complementary mating surfaces on the drum and the gear. For example, drum 134, may include a male hexagonal surface 140, as seen in Figure 7, and gear 144 may include a female hexagonal opening 142 adapted to be received on the male hexagonal surface. Alternatively, gear 144 may include a male hexagonal surface while the drum may include a hexagonal recess (not shown) adapted to receive the male surface on gear 144. Other mating surfaces for mounting gear 144 on drum 134 may be utilized.

[0044] According to one or more embodiments, spring motor assembly 112 further includes a pair of coil springs 146 and 148 disposed loosely around spindles 130 and 132, but without storage spools. Preferably, each coil spring 146 and 148 is located coaxially with each of cord spool 126 and 128. Thus, in certain embodiments, cord spools 126 and 128 are respectively disposed above the coil springs 146 and 148. Coil springs 146 and 148 are connected, on one end, to drum 134. When bottom rail 16 is in a

raised position, a major portion of the coil spring is wrapped around its respective spindle. When the bottom rail 16 is pulled down a portion of each spring is transferred onto drum 134. Springs 146 and 148 are attached to center drum 134 and configured in a way that when center drum 134 is rotated while bottom rail 16 is being lowered, both of springs 146 and 148 resist (or act opposite) such rotation. When window covering 10 is raised again by lifting bottom rail 16 and releasing a locking device (described below), coil springs 146 and 148 are biased to rotate drum 134, and the drum rotates cord spools 126 and 128 to wind cords 20 and 22, onto their respective spools. Thus, coil springs 146 and 148, do not directly drive cord spools 126 and 128, and they are not in contact with the cord spools. In other words, while the window covering is being raised, coil springs 146 and 148 are biased to rotate a member separate from the cord spools, and this member in turn rotates the cord spools. The coil springs are selected and biased with sufficient force so that cord spools 126 and 128 are driven with sufficient force by drum 134 to take up their respective cords 20 and 22 while the blind is being raised.

[0045] Preferably, coil springs 146 and 148 are releasably attached to drum 134. Drum 34 further includes spring engagement surfaces 150 and 152 (not shown), which are in the form of arcuate slots formed in drum 134. Preferably the drum is hollow, and each spring 146 and 148 has a partially narrowed end section 156 and 158. Springs 146 and 148 preferably have the same thickness and the width "w" of the spring is substantially the same over the length of the spring. In preferred embodiments, both ends of each spring 146 and 148 have the same width. Partially narrowed end sections 156 and 158 provide an engagement surface with spring engagement surfaces 150 and 152 of the drum. Thus, each spring 146 and 148 is engaged with drum 134 by inserting narrowed end sections 156 and 158 in one of the arcuate slots in drum 134 and then turning each end section 156 and 158 approximately 90 degrees to lock spring 146 and 148 to the drum. Of course, other means can be used to engage springs 146 and 148

and drum 134. For example, tabs, complementary spindles and openings and other means can be utilized to engage achieve the same result.

[0046] According to one or more embodiments, spring motor assembly 112 further includes a release device or locking mechanism 154 to releasably lock the cords in place and prevent the cords from winding onto the spools when bottom rail 16 is in a lowered position on a window. Preferably locking mechanism 154 is associated with main body 124. Main body 124 includes a pair of cord slots 160 and 162 (shown in Figure 8) that are wide enough to allow cords 20 and 22 to travel therethrough without binding when the cords are being released from or wound on their respective spools 126 and 128. As used herein, the term slot includes open passages or grooves and closed passages or holes. Locking mechanism 154 further comprises at least a first, and preferably a pair of locking arms 164 and 166, which are attached to locking handle 174, in sliding engagement with the a portion of main body 124.

[0047] As best shown in Figure 9, locking arms 164 and 166 each have a channel 170 and 172 through the arm for allowing cords 20 and 22 to travel therethrough freely when the cord is being released from or wound on the spool. As used herein, channel is not limited to an open passage through the locking arm, and it can include a closed passage through the locking arm. As shown in Figure 7, locking mechanism 154 includes a biasing mechanism including at least one spring 173 for moving locking arm channel 170 and 172 out of alignment with their respective cord slots 160 and 162 to releasably lock cords 20 and 22 in position. Preferably, the biasing mechanism includes a pair of springs 173. Thus, in the relaxed state locking mechanism 154 is in the biased and locked position and cord 20 is pinched by the out of alignment locking arm channel 170 and slot 160. Similarly, in the locked position, cord 22 is pinched by the out of alignment locking arm channel 172 and cord slot 162. When compressive force is applied to locking arms 164 and 166 through handle 174, cord channel 170 in locking arm 164 is brought into

alignment with cord slot 160 of main body 124. Similarly, cord channel 172 in locking arm 166 is brought into alignment with cord slot 162 in main body 124. Conveniently, locking arms 164 and 166 are part of a locking handle that can be compressed by gripping spring motor assembly 112 in the hand and squeezing locking handle 174 in the direction shown by arrows 175 in Figure 10. It will be appreciated that the size of the slots and channels will depend on the size of the cord used to fabricate the window covering, and a skilled artisan can select the proper size slot and channel.

[0048] In use, the cords 20, 22, are taken up on spools 126 and 128 when the cords are released from the pinched configuration by squeezing locking handle 174 and lifting up on bottom rail 16. Coil springs 146 and 148 rotate drum 134 and cause cord spools 126 and 128 to take up the cords as the bottom rail is being lifted. In one or more embodiments, the drum provides substantially uniform rotation for each spool 126 and 128, resulting in even lift of the window covering. Thus, when hand-operated locking mechanism 154 is released and it is desired to move bottom rail 16 upward, the tendency of springs 146 and 148 to return to their natural state causes center drum 124 to rotate in a direction that causes springs 146 and 148 to return to positions loosely surrounding posts 130 and 132. This causes center gear 144 to rotate, which in turn causes cord gears 136 and 138 to rotate, thus taking in lift cord.

[0049] Referring to Figures 7 and 11, spring motor assembly 112 further includes a pair of plugs 176 and 178 having respective openings 177 and 179 therethrough adapted to guide cords 20 and 22 from a horizontal orientation in bottom rail 16 to a substantially vertical orientation to guide cords 20 and 22 up through the shade material 18, intermediate rail 14, and headrail 12. Plugs 176 and 178 are preferably press fit in bottom rail 16, however, they may also be screw fit or adhesively attached to bottom rail 16.

[0050] Thus, according to one or more embodiments of the present invention, a lifting mechanism is provided in which two

springs are taken up by a central drum, which acts as a single output drum, providing a compact, powerful unit that provides even lift of the window covering. The two separate springs are positioned directly below the cord spools but not directly connected to the cord spools, which maximizes the use of space of the bottom rail. Thus, the lifting mechanism can replace a portion of the bottom rail and be an integral part of the rail. The locking mechanism can be concealed from view by positioning the locking mechanism to face the rear of the bottom rail. The lifting mechanism is compact in design, in part due to the fact that the locking mechanism includes two relatively thin arms that are inserted into the main body of the lifting mechanism, with cord channels or openings being located in those arms. Once again, it is contemplated that the aforementioned spring motor assembly 112 is only one example of a lifting mechanism 24 for use with bottom up top down window covering 10.

[0051] Intermediate rail 14 is situated such that the movement of bottom rail 16 in an upwards direction will, at a certain point, similarly move intermediate rail 14 in an upwards direction. Therefore, the operation of lifting mechanism 24 and the lifting of bottom rail 16 will allow for the winding of lift cords 20 and 22 and the upward movement of intermediate rail 14 upon contact of bottom rail 16. This operation of bottom rail 16 allows for the selective covering and uncovering of a window as in other window coverings that are known in the art. As discussed above, positioning of the remainder of window covering 10 may be accomplished by positioning intermediate rail 14. To move intermediate rail in a downward fashion, either a direct force may be applied by a user, or a slight lifting of the bottom rail may be done to remove the aforementioned frictional force. To move intermediate rail 14 in an upward fashion, either a direct upward force may be applied by a user, or lifting mechanism 24 may be actuated in conjunction with the lifting of bottom rail 16 until contact is made between the two rails.

[0052] Although the invention herein has been described with reference to particular embodiments, it is to be understood that

these embodiments are merely illustrative of the principles and applications of the present invention. It is therefore to be understood that numerous modifications may be made to the illustrative embodiments and that other arrangements may be devised without departing from the spirit and scope of the present invention as defined by the appended claims.

STATEMENT OF INDUSTRIAL APPLICABILITY

[0053] The present invention enjoys wide industrial applicability including, but not limited to, providing multi-purpose window coverings such as bottom up top down window shades, which may be used in home decorating and furnishing.

CLAIMS

1. A bottom up top down window covering comprising:

a headrail;

an intermediate rail;

a bottom rail;

at least one lift cord extending through each of said headrail, intermediate rail and bottom rail;

means for balancing and tensioning said at least one lift cord; and

means for retracting said at least one lift cord.

2. The bottom up top down window covering according to claim 1, wherein said intermediate rail is moveable with respect to said headrail and said bottom rail.

3. The bottom up top down window covering according to claim 1, wherein said means for balancing and tensioning said at least one lift cord is at least one post and said at least one lift cord is engaged with the at least one post.

4. The bottom up top down window covering according to claim 1, wherein said means for balancing and tensioning said at least one lift cord is at least one unidirectional wheel and said at least one lift cord is engaged with the at least one unidirectional wheel.

5. The bottom up top down window covering according to claims 3 or 4, wherein said means for balancing and tensioning said at least one lift cord further includes at least one pulley and said at least one lift cord is engaged with the at least one pulley.

6. The bottom up top down window covering according to claim 5, wherein said means for retracting said at least one lift cord is a spring motor.

7. The bottom up top down window covering according to claim 6, wherein said intermediate rail is moveable with respect to said headrail and said bottom rail.

8. The bottom up top down window covering according to claim 7, wherein said window covering includes a pair of lift cords, a single spring motor located in said bottom rail for retracting said pair of lift cords, a locking mechanism to releasably secure said pair of lift cords in position, and shade material connected between said intermediate rail and said bottom rail, wherein an upward force on said bottom rail allows said intermediate rail to move downward and wherein said intermediate rail can be positioned by applying a force directly thereto.

9. The bottom up top down window covering according to claim 1, wherein said means for balancing and tensioning said at least one lift cord is at least one pulley and said at least one lift cord is engaged with the at least one pulley.

10. A bottom up top down window covering comprising:

a headrail;

an intermediate rail;

a bottom rail;

at least one lift cord extending through each of said headrail, intermediate rail and bottom rail;

at least one post located in said intermediate rail, said at least one lift cord frictionally engaged with said at least one post; and

at least one spring motor operatively connected to said at least one lift cord, wherein said at least one lift cord is capable of being retracted by said at least one spring motor.

11. The bottom up top down window covering according to claim 10, wherein said intermediate rail is moveable with respect to said headrail and said bottom rail.

12. The bottom up top down window covering according to claim 11, wherein said at least one lift cord is wrapped around said at least one post.

13. The bottom up top down window covering according to claim 12, wherein said window covering includes a pair of lift cords, two posts, each lift cord wrapped around a different post, and a single spring motor located in said bottom rail for retracting said pair of lift cords.

14. The bottom up top down window covering according to claim 13, further comprising a pulley centrally located in said intermediate rail, said pair of lift cords engaged with the pulley.

15. The bottom up top down window covering according to claim 14, wherein said spring motor includes a main body; a pair of cord spools rotatably mounted on the main body, each of the cord spools connected to one of the pair of cords; a drum rotatably mounted on a central portion of the main body, the drum in rotatable engagement with the pair of cord spools; and a pair of coil springs connected to the drum, the coil springs each being biased to rotate the drum which rotates the cord spools to wind the each of the cords onto one of the spools.

16. The bottom up top down window covering according to claim 15, further comprising a locking mechanism to releasably secure the cords in position.

17. The bottom up top down window covering according to claim 16, wherein actuation of said locking mechanism allows movement of said bottom rail, an upward force on said bottom rail allows said intermediate rail to move downward, and wherein said intermediate rail can be positioned by applying a force directly thereto.

18. The bottom up top down window covering according to claim 17, further comprising shade material connected to said intermediate rail and said bottom rail.

19. A method of positioning a bottom up top down window covering comprising:

providing a window shade including a head rail, an intermediate rail, a bottom rail, at least one lift cord extending through each of said headrail, intermediate rail and bottom rail, means for balancing and tensioning said at least one lift cord, and at least one spring motor operatively connected to said at least one lift cord, wherein said at least one lift cord is capable of being retracted by the spring motor;

moving said bottom rail upwardly or downwardly, wherein movement of said bottom rail downwardly includes pulling said at least one lift cord away from said spring motor, and movement of said bottom rail upwardly includes lifting said bottom rail while said at least one lift cord is retracted by said spring motor; and

moving said intermediate rail.

20. The method according to claim 19, wherein said moving of said intermediate rail includes lifting up said bottom rail in order to lower said intermediate rail or applying a force directly thereto.

FIG. 1

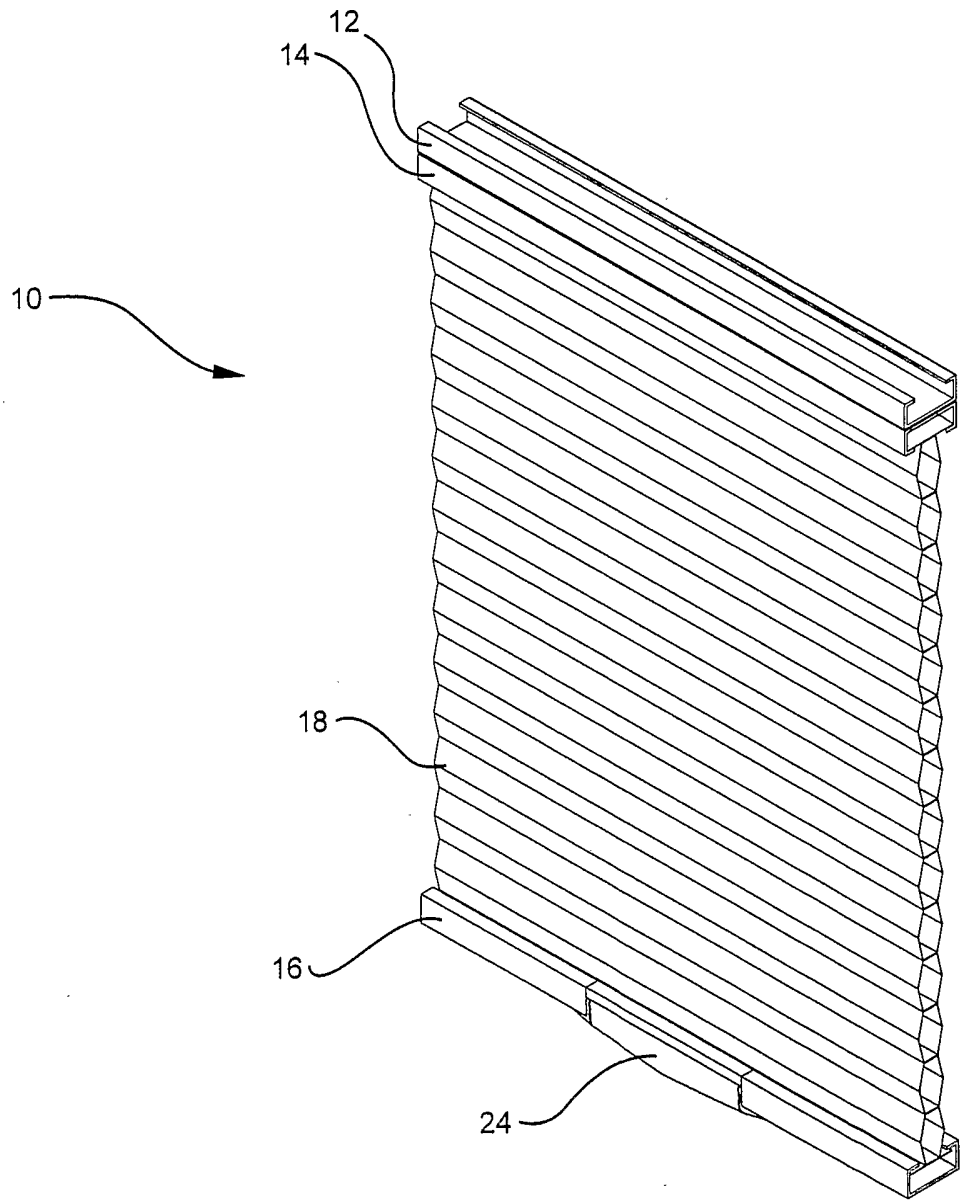


FIG. 2

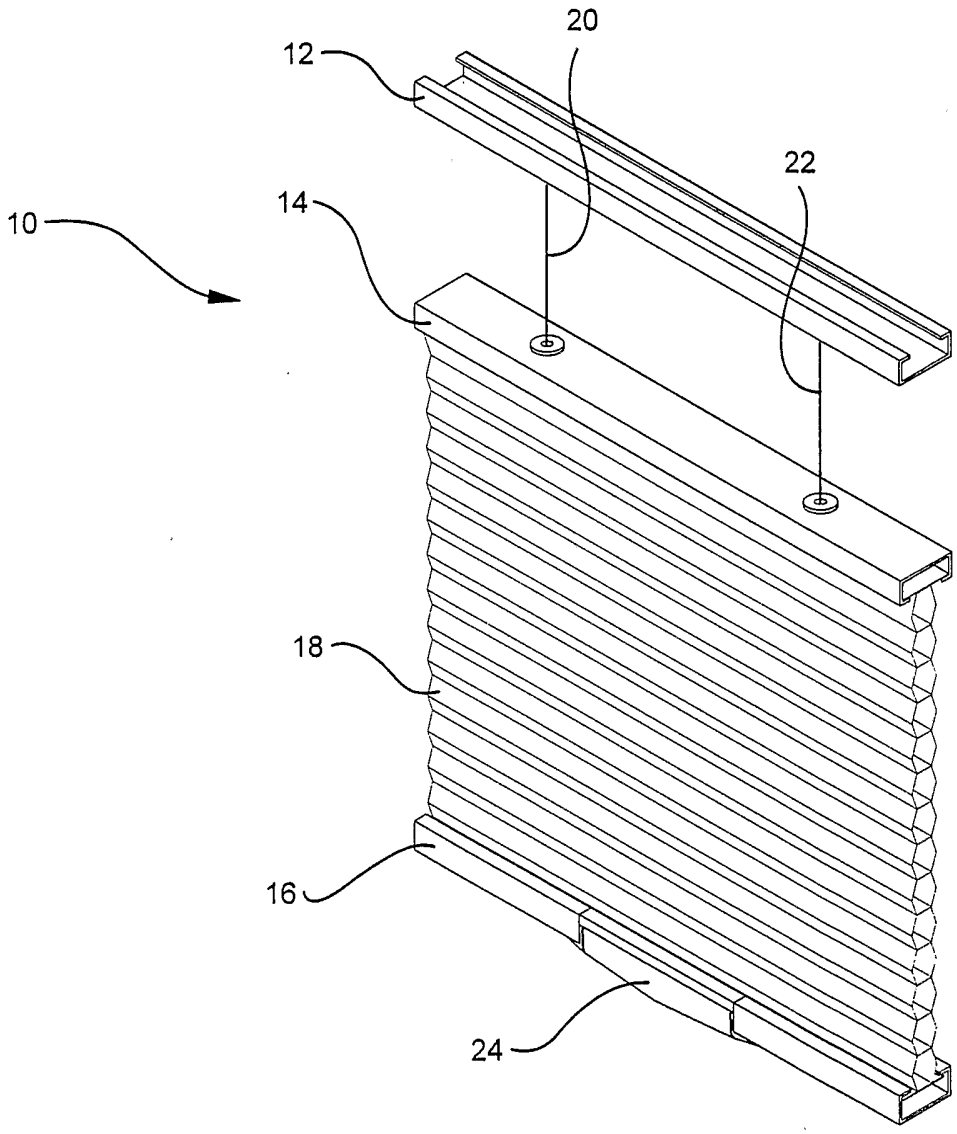


FIG. 3

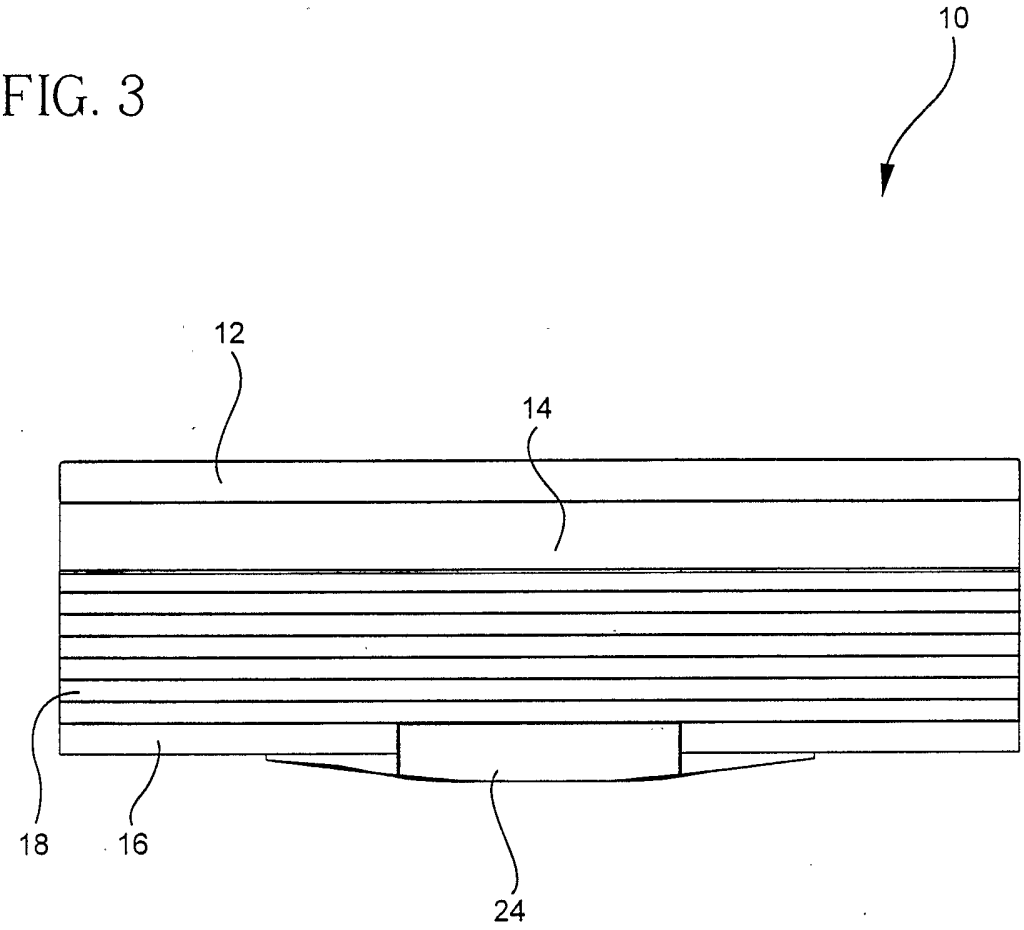


FIG. 4

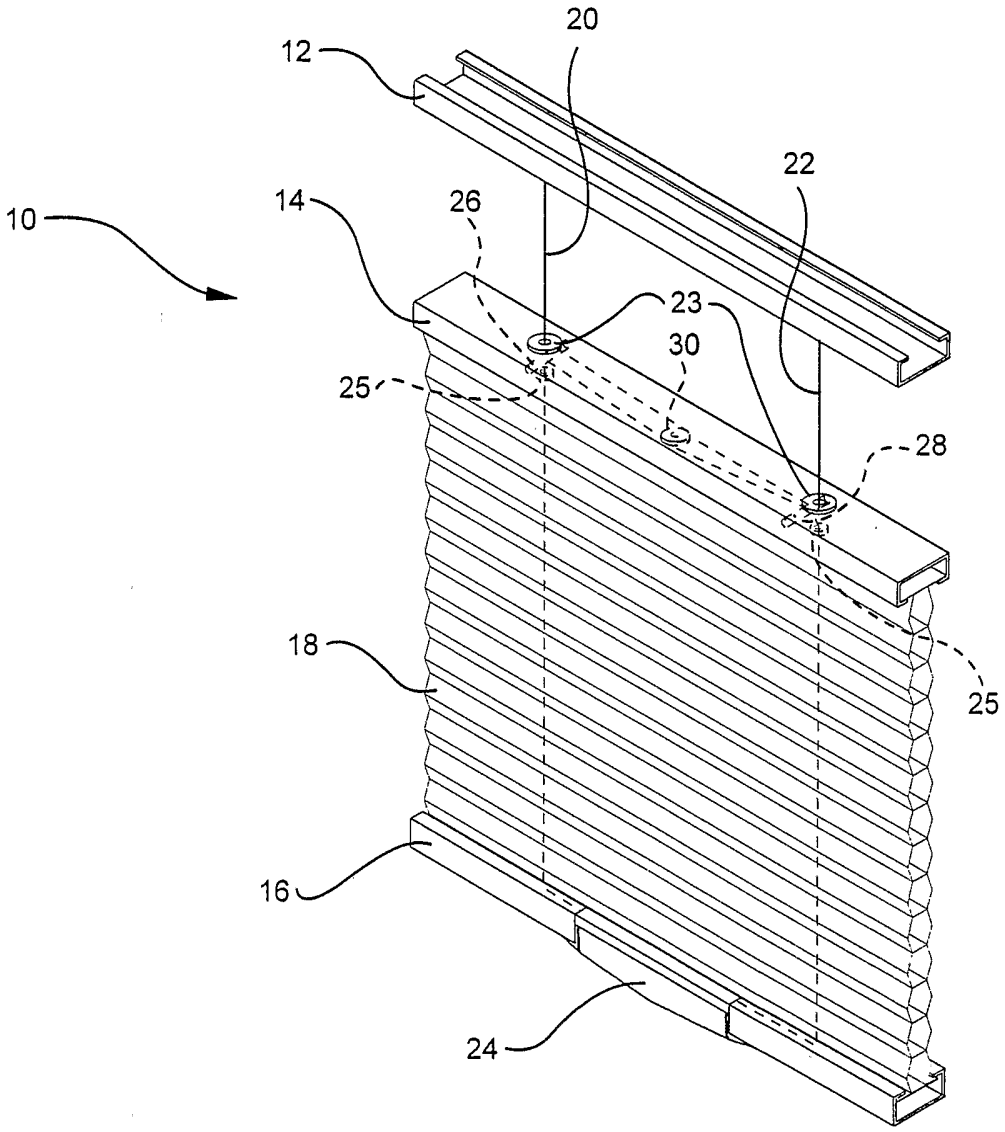
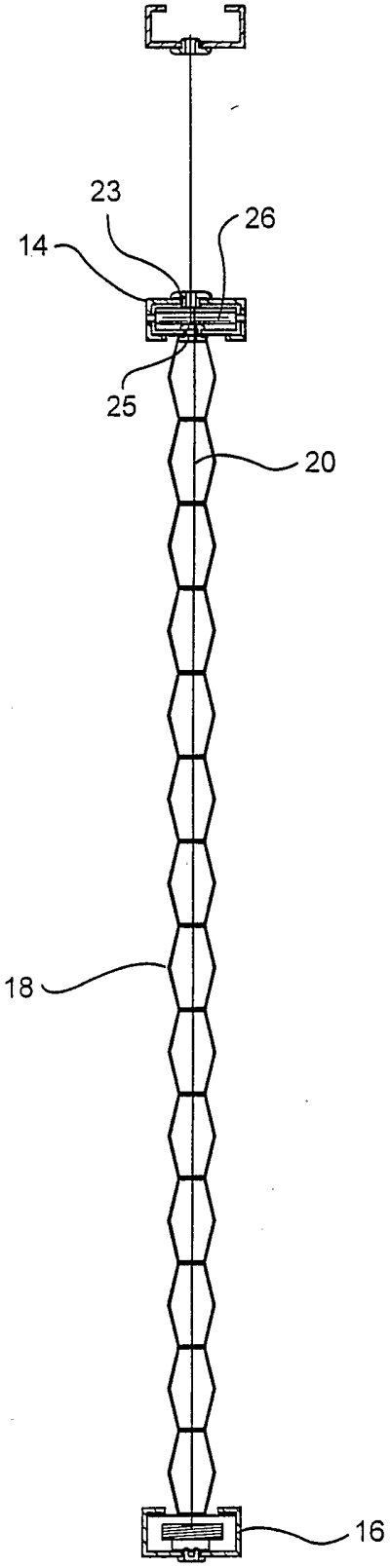


FIG. 5



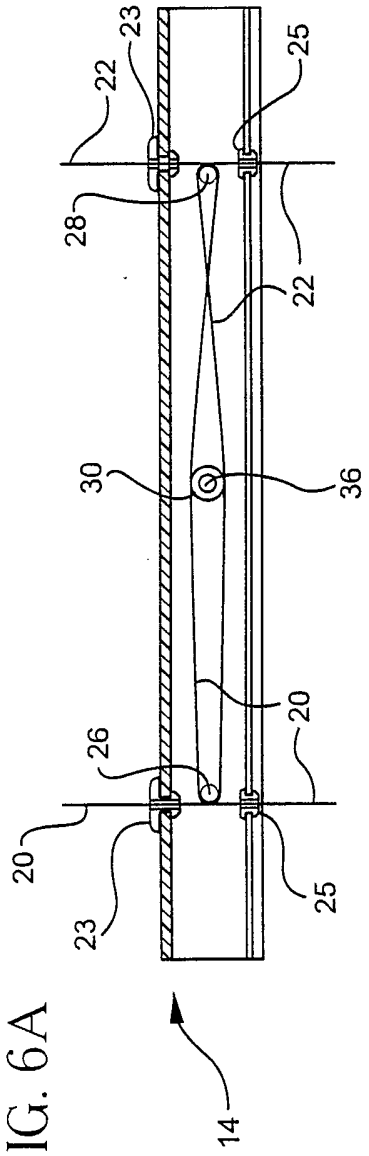


FIG. 6A

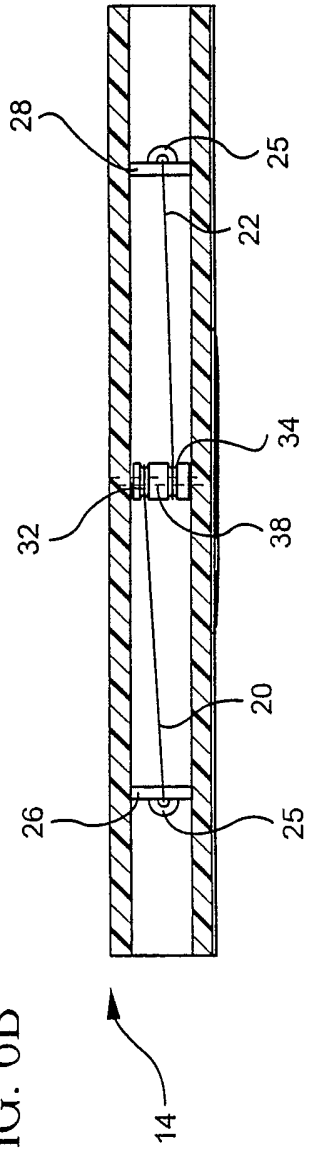


FIG. 6B

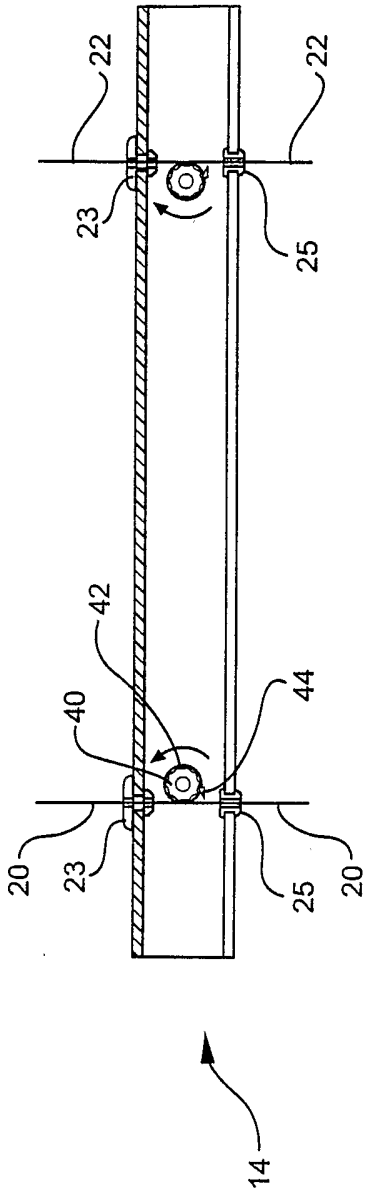

22
22
23
25
42
40
44
20
23
25
20
14

FIG. 6C

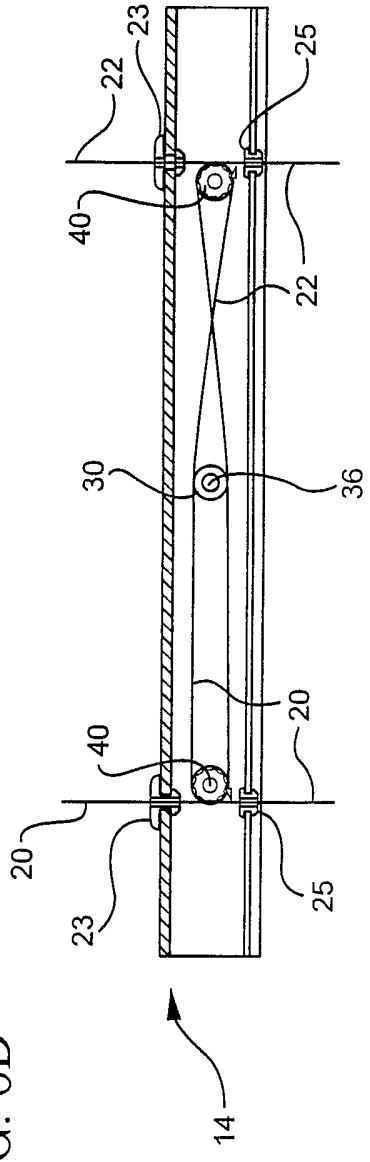

23
25
22
40
22
30
36
20
40
20
23
25
14

FIG. 6D

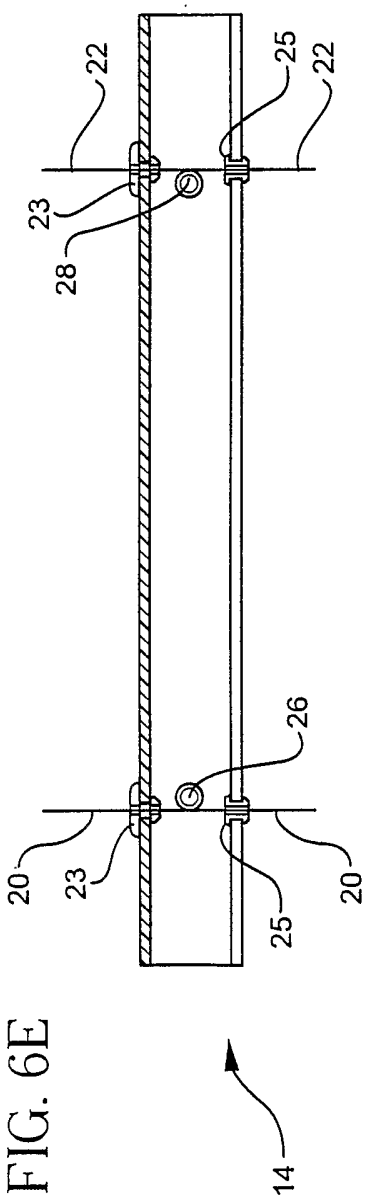


FIG. 6E

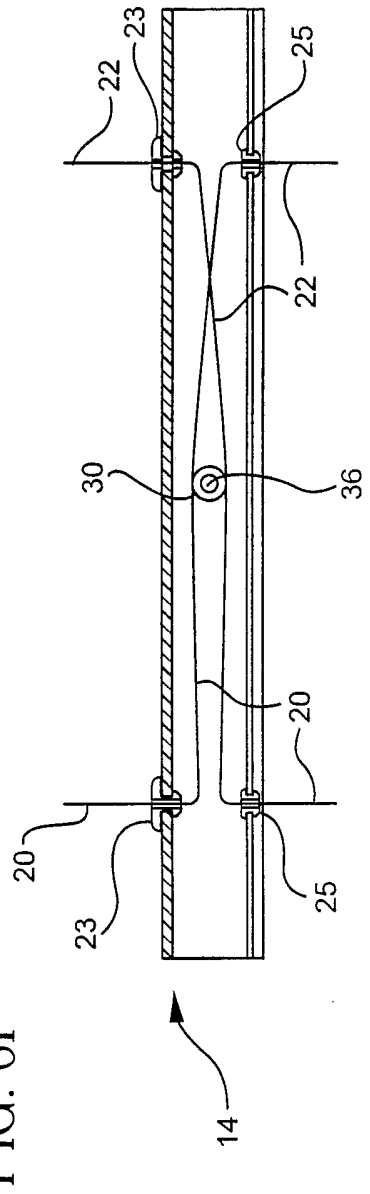


FIG. 6F

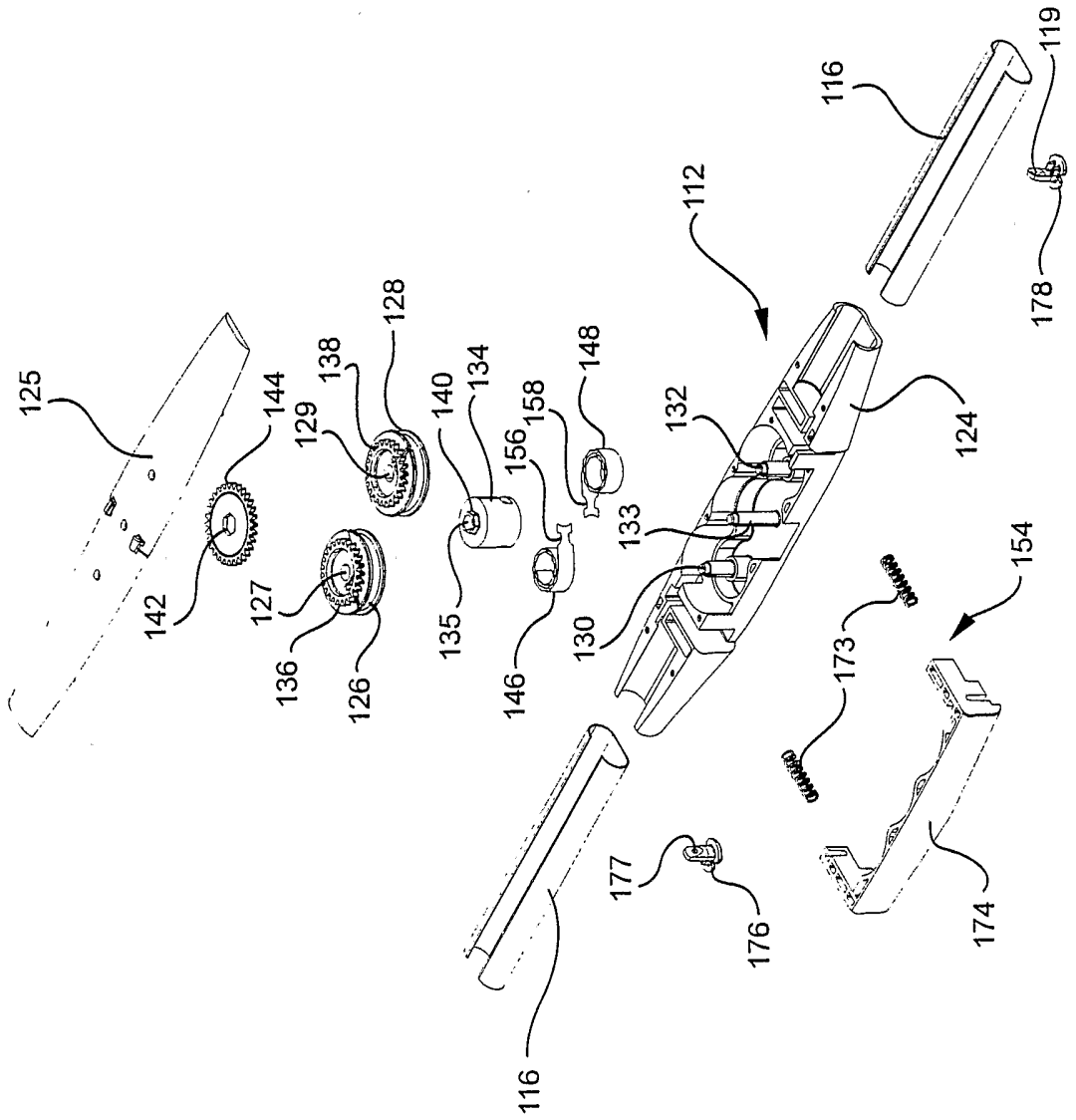

125
144
142
129
138
128
127
136
126
140
134
135
156
158
146
148
133
130
132
112
116
119
178
124
154
173
177
176
174
116

FIG. 7

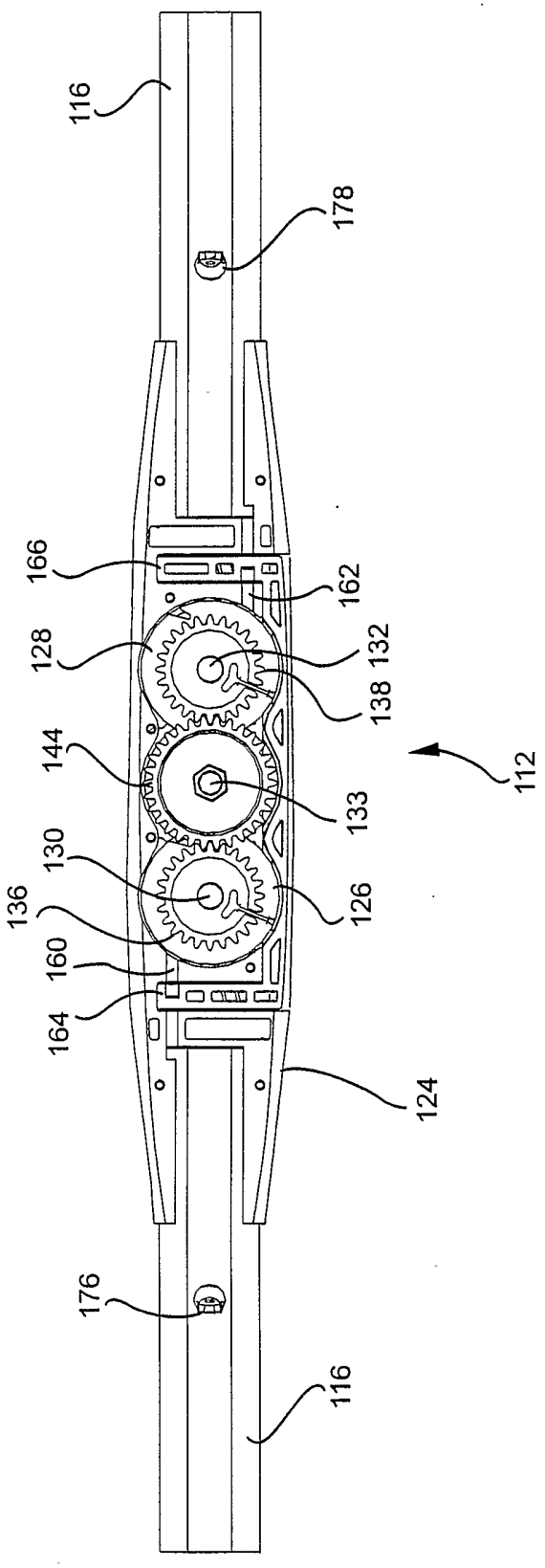

116
178
166
162
128
132
138
144
133
112
130
126
136
160
164
124
176
116

FIG. 8

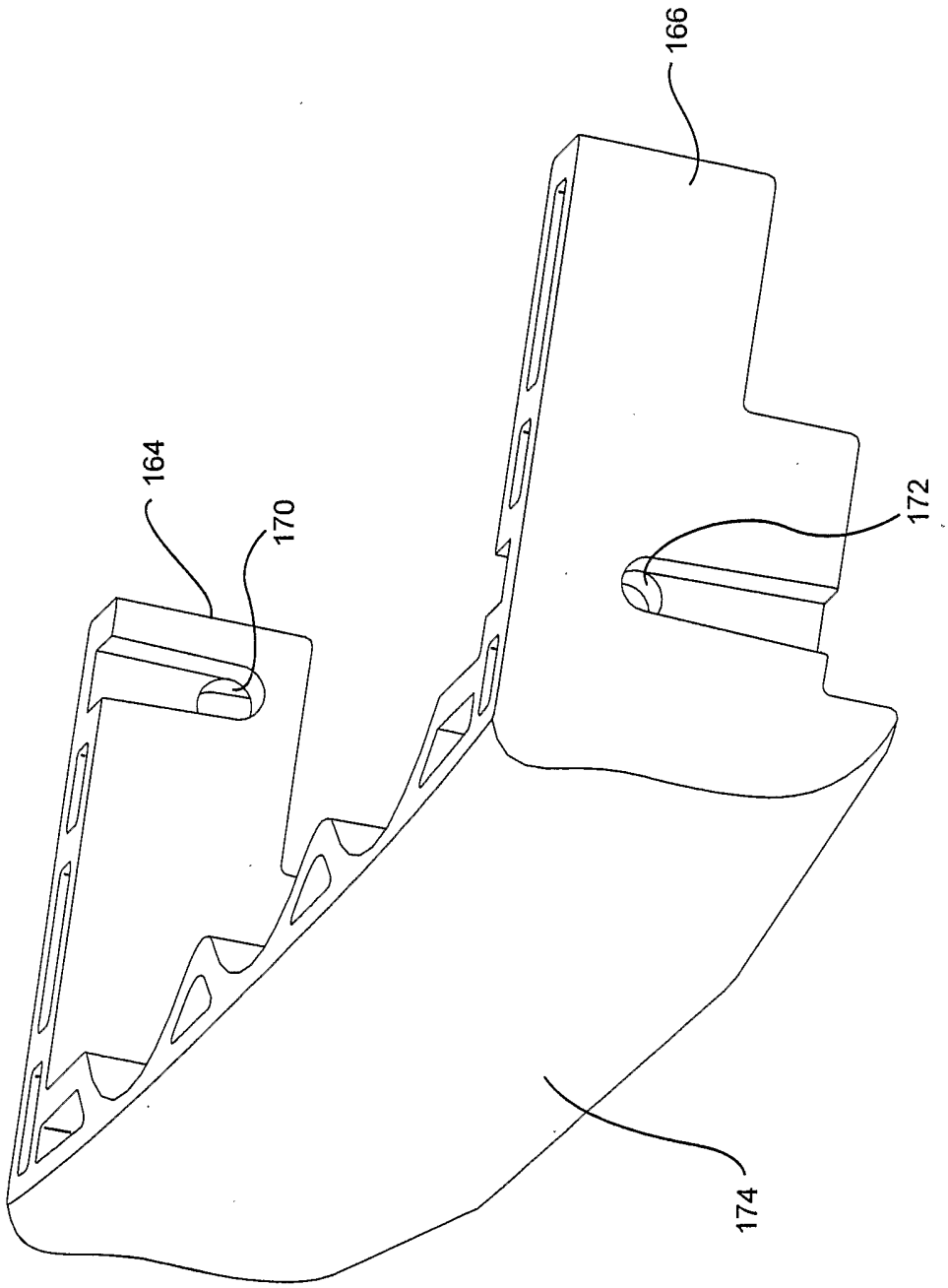


FIG. 9

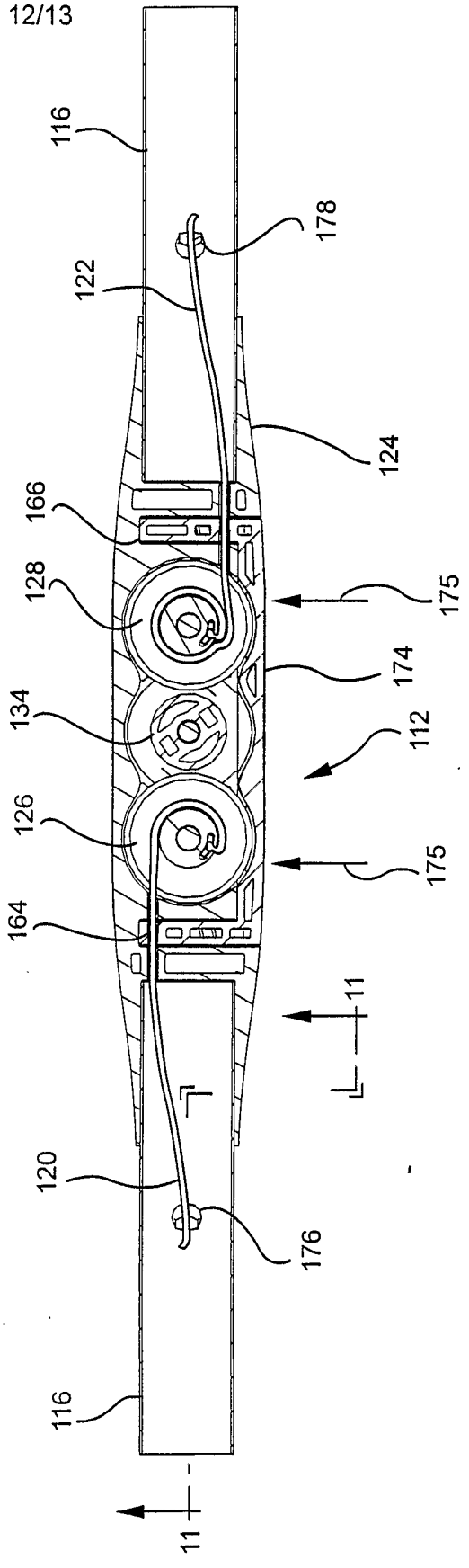

116
178
122
124
166
128
175
174
134
112
126
175
164
11
11
120
176
116

FIG. 10

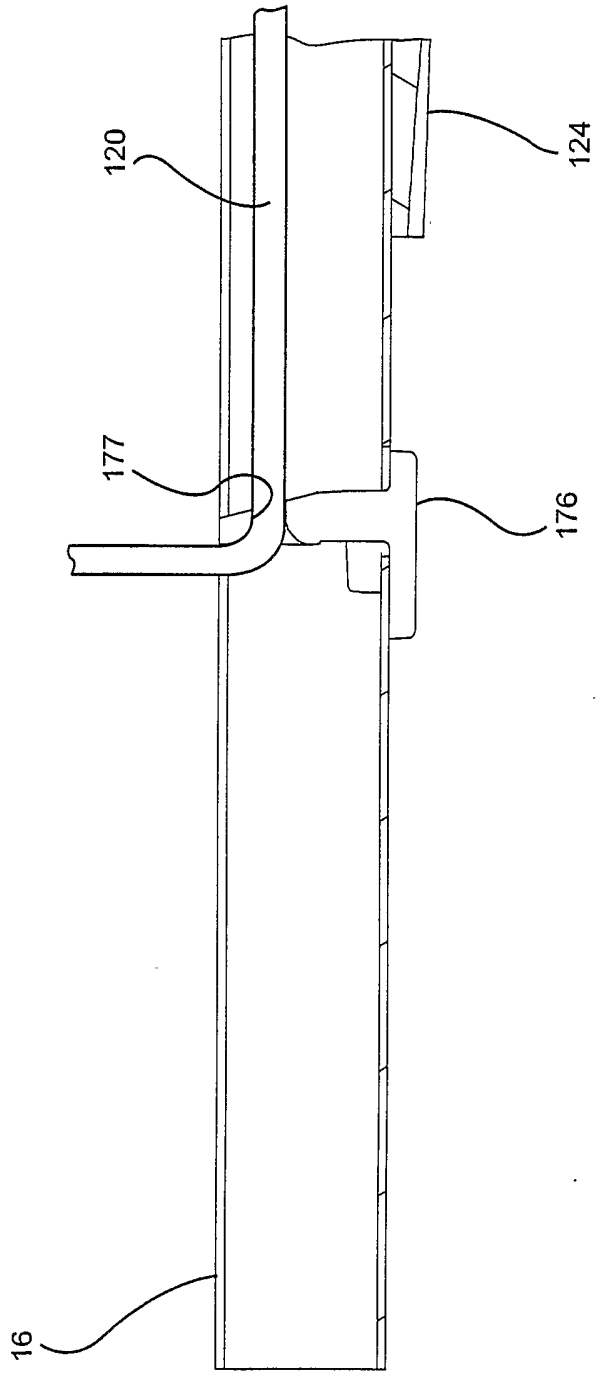


FIG. 11