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(54) **CORDLESS FABRIC VENETIAN WINDOW SHADE ASSEMBLY**

USPC 160/84.05, 84.01, 84.04, 84.08, 121.1,
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See application file for complete search history.

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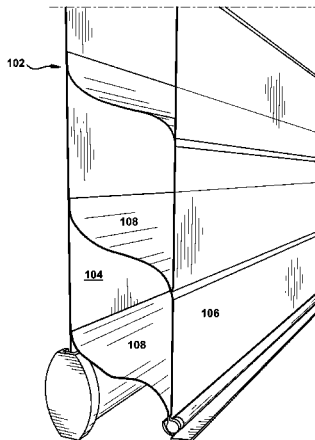
(57) **ABSTRACT**

- (52) **U.S. Cl.**
- CPC ... **E06B 9/26** (2013.01); **E06B 9/34** (2013.01);
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A fabric venetian window shade assembly including: a fabric venetian window shade including a pair of opposing first and second facings coupled by a plurality of vanes; an actuation system including: a roller configured to receive the fabric venetian window shade; a spring-loaded ratchet operatively coupled to the roller; a first weighted rail attached to a lower edge of the first facing; and a second weighted rail attached to a lower edge of the second facing, wherein the first weighted rail and the second weighted rail are separate.

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17 Claims, 8 Drawing Sheets



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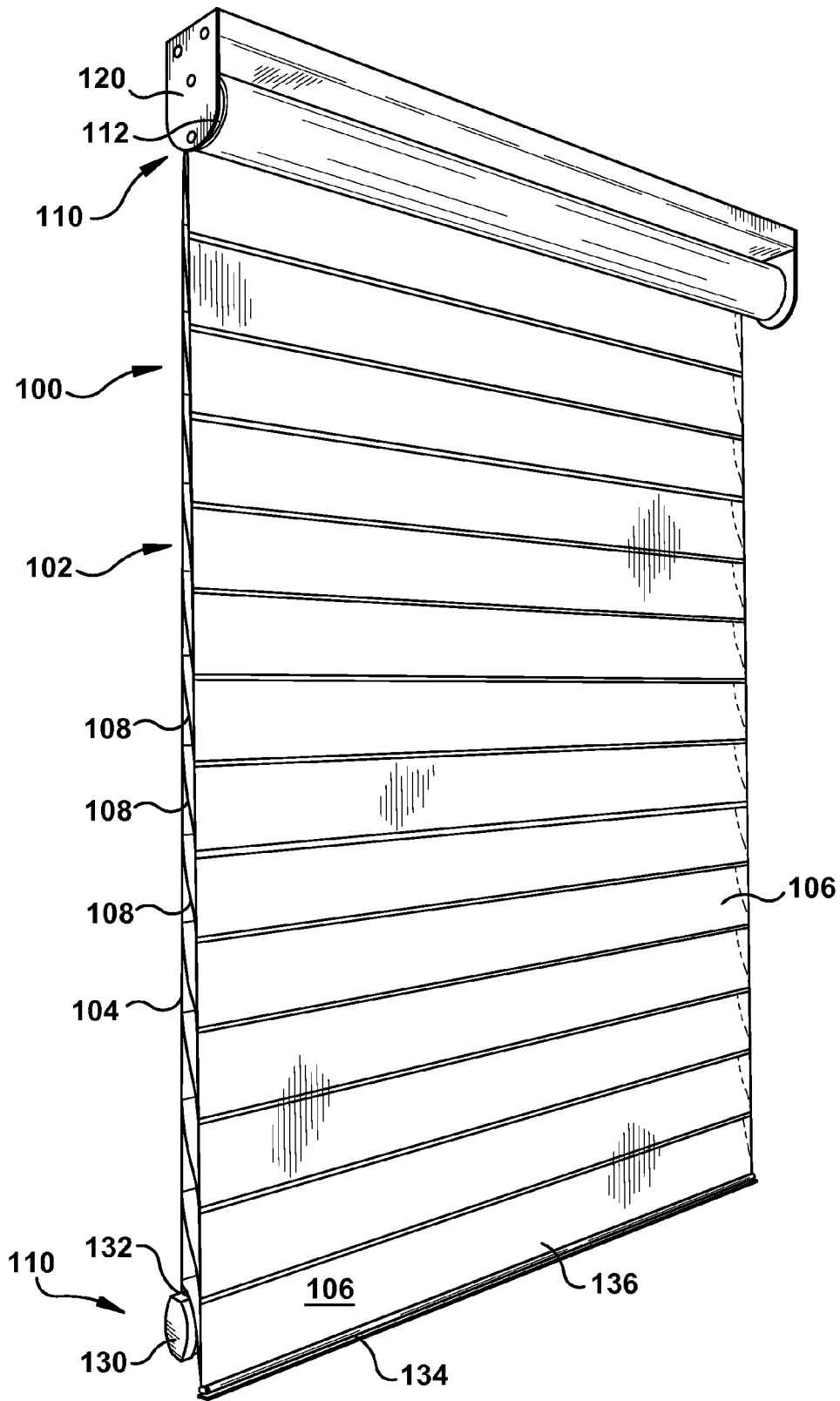


Fig. 1

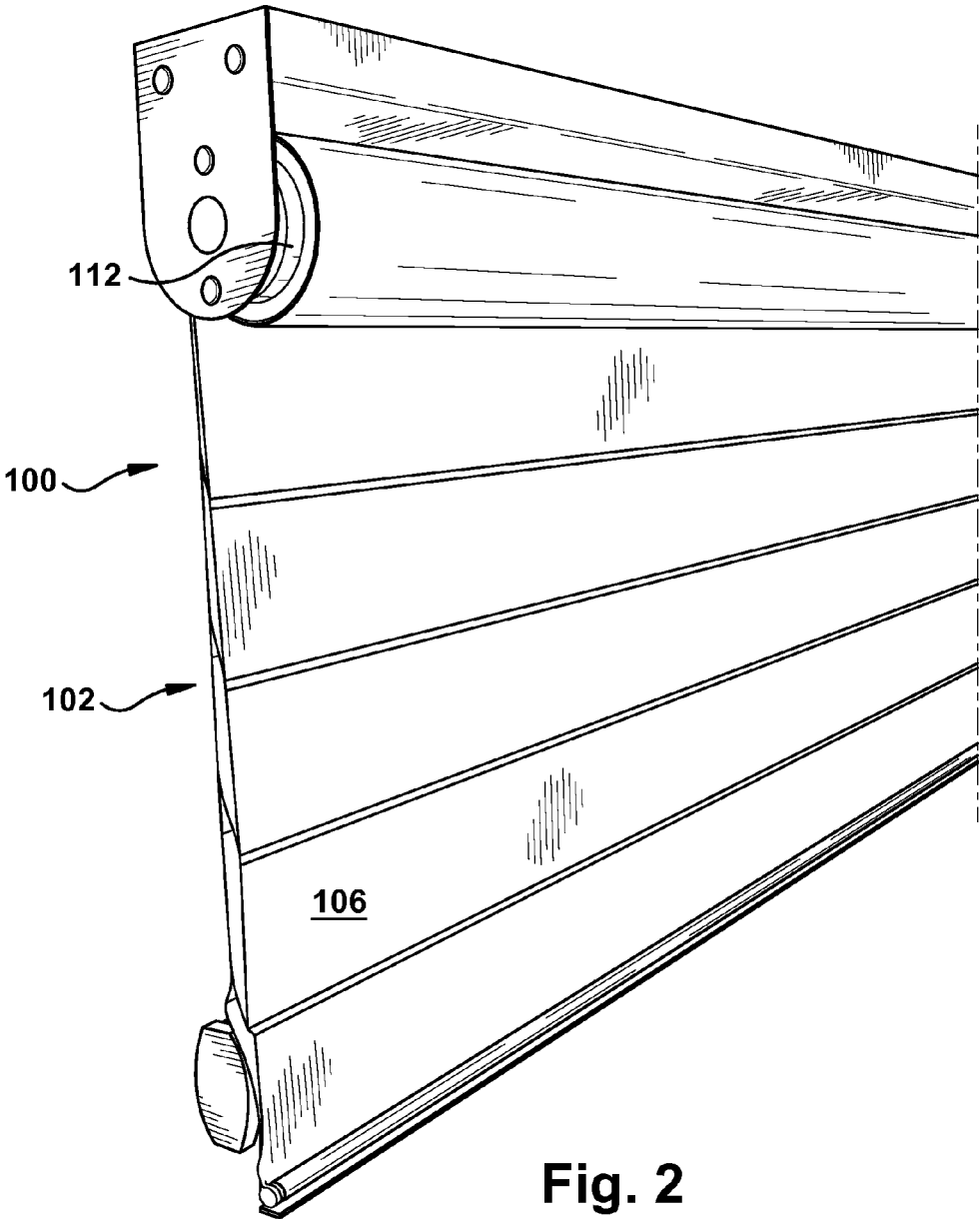


Fig. 2

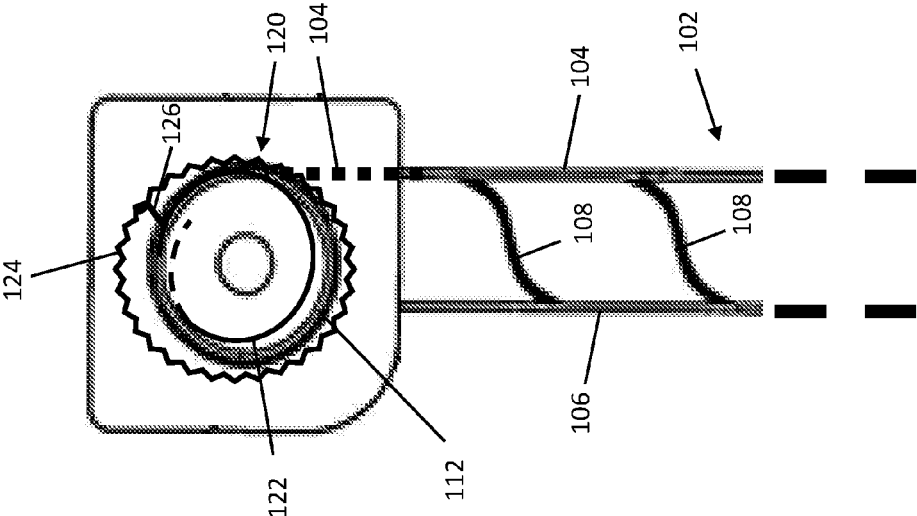


FIG. 2A

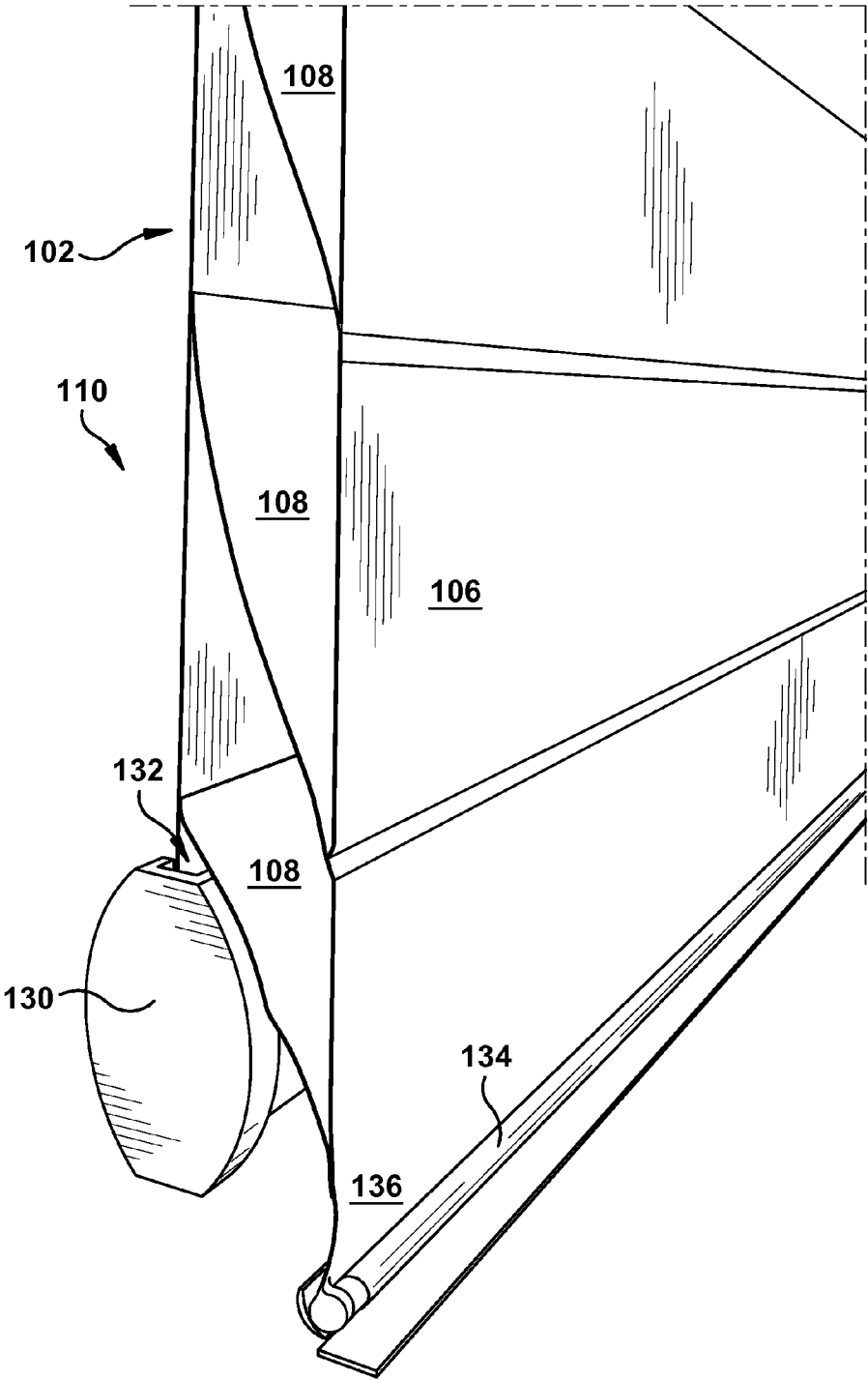


Fig. 3

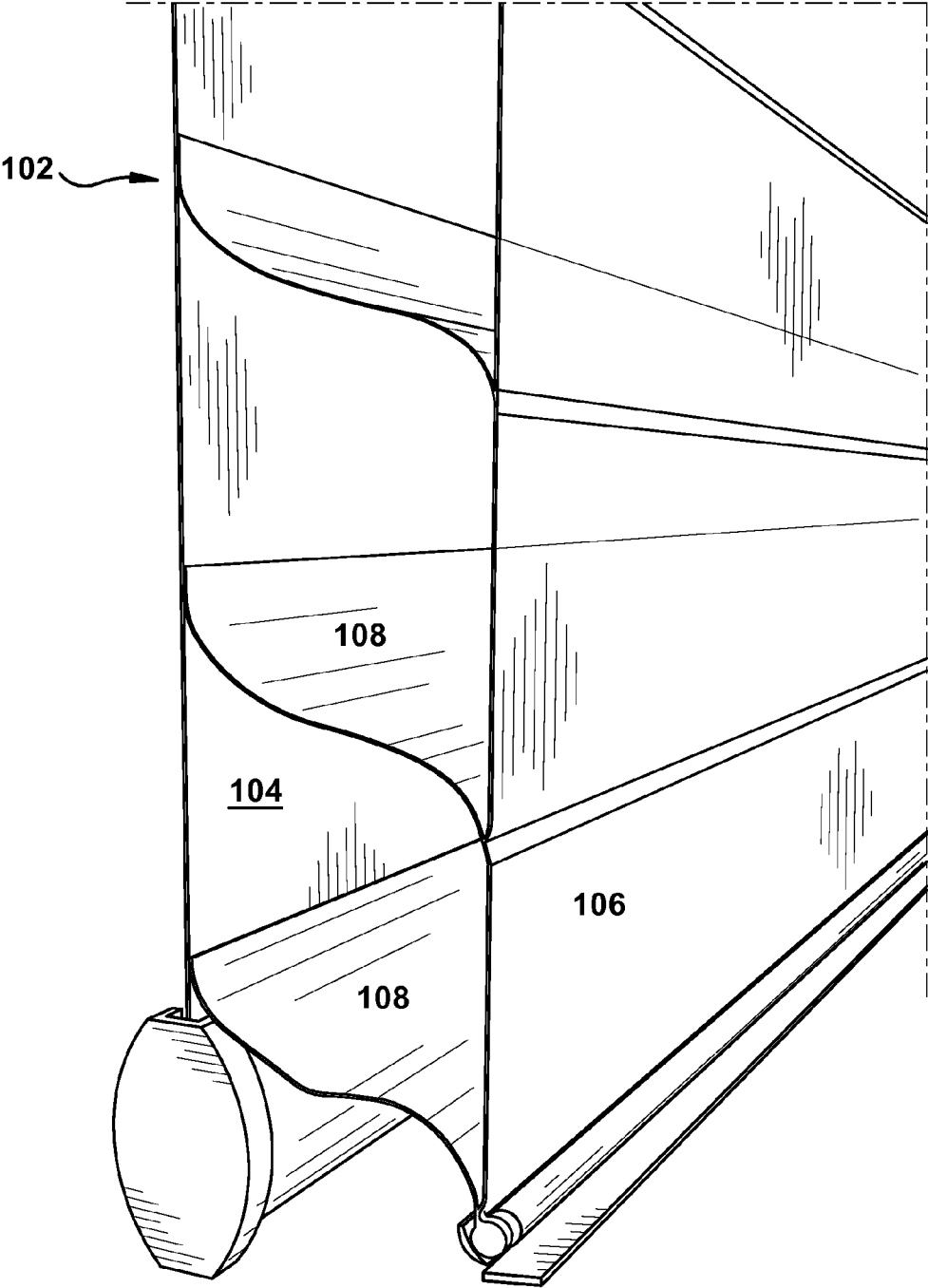


Fig. 4

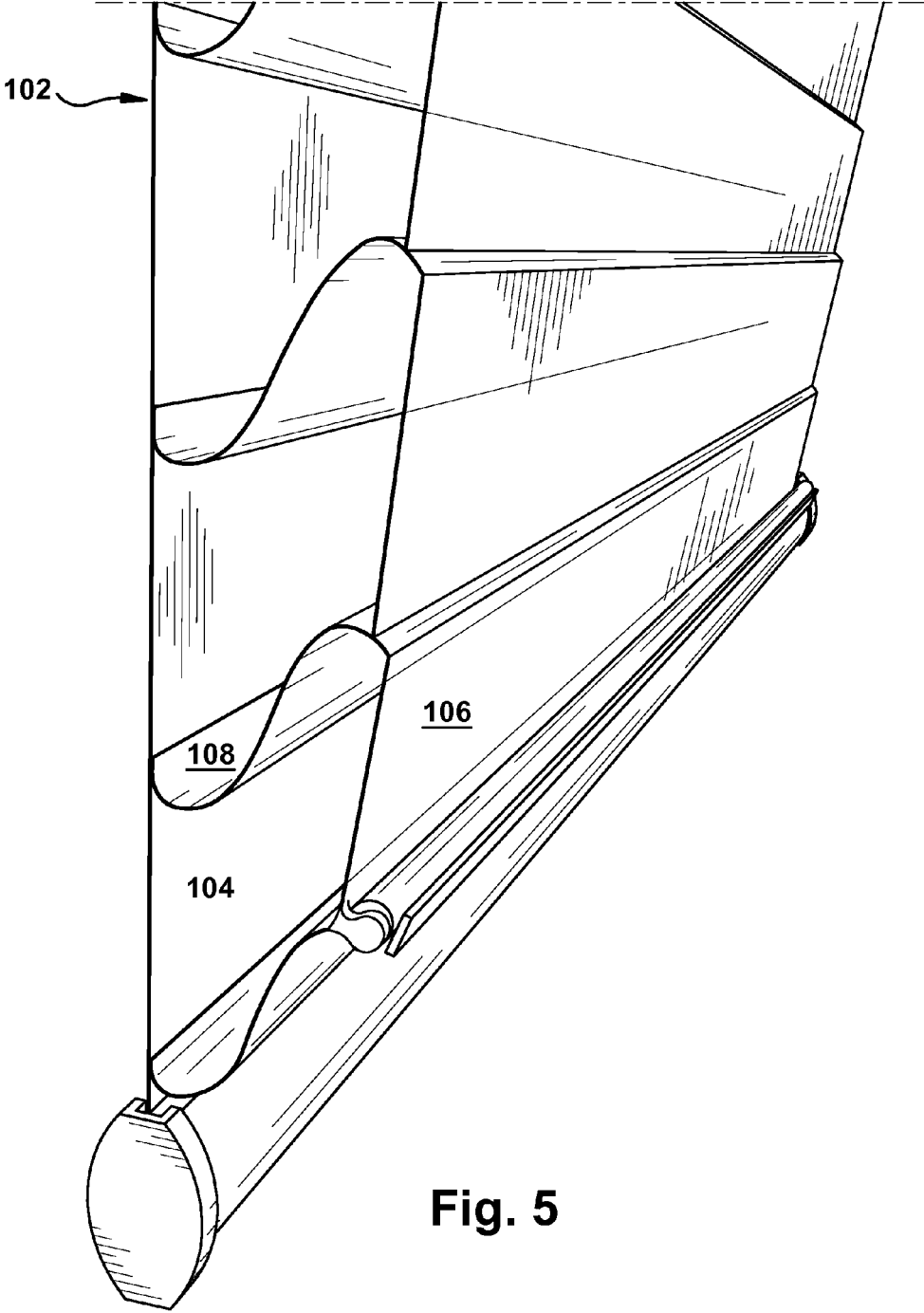


Fig. 5

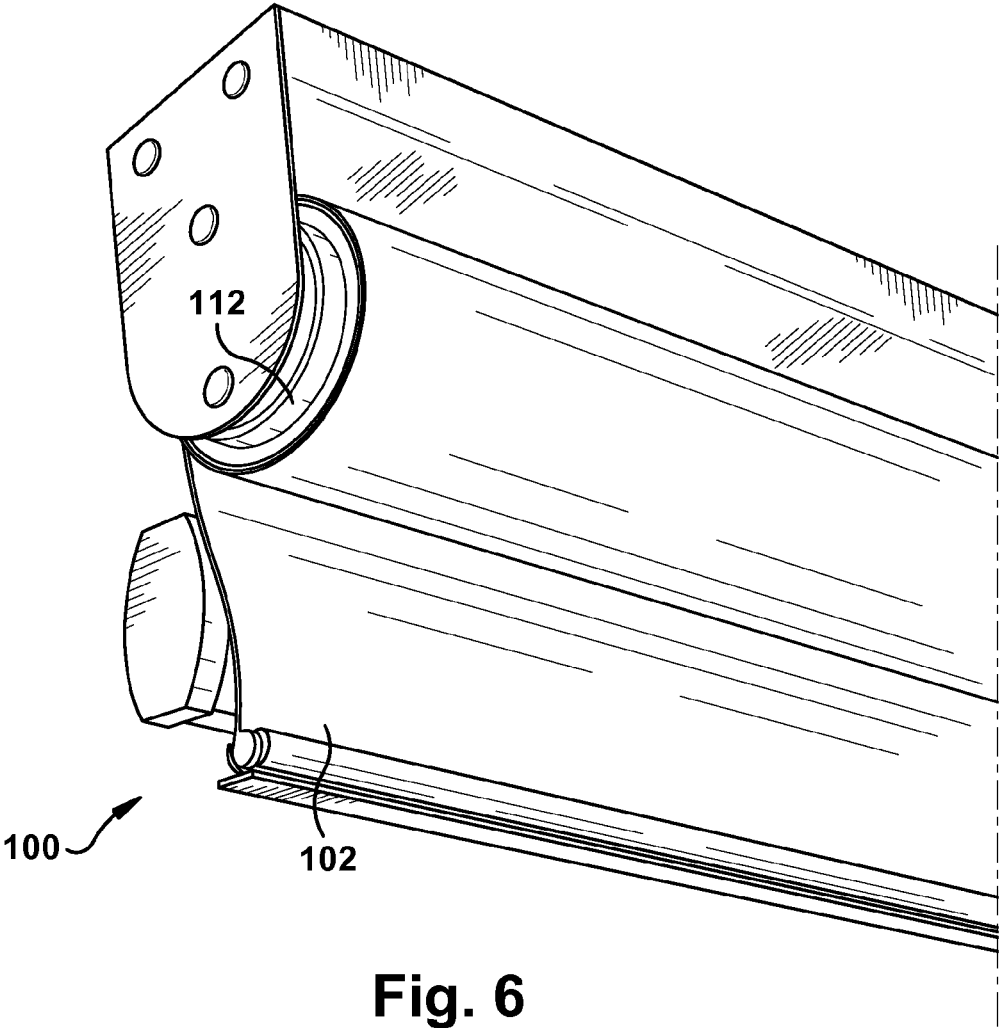


Fig. 6

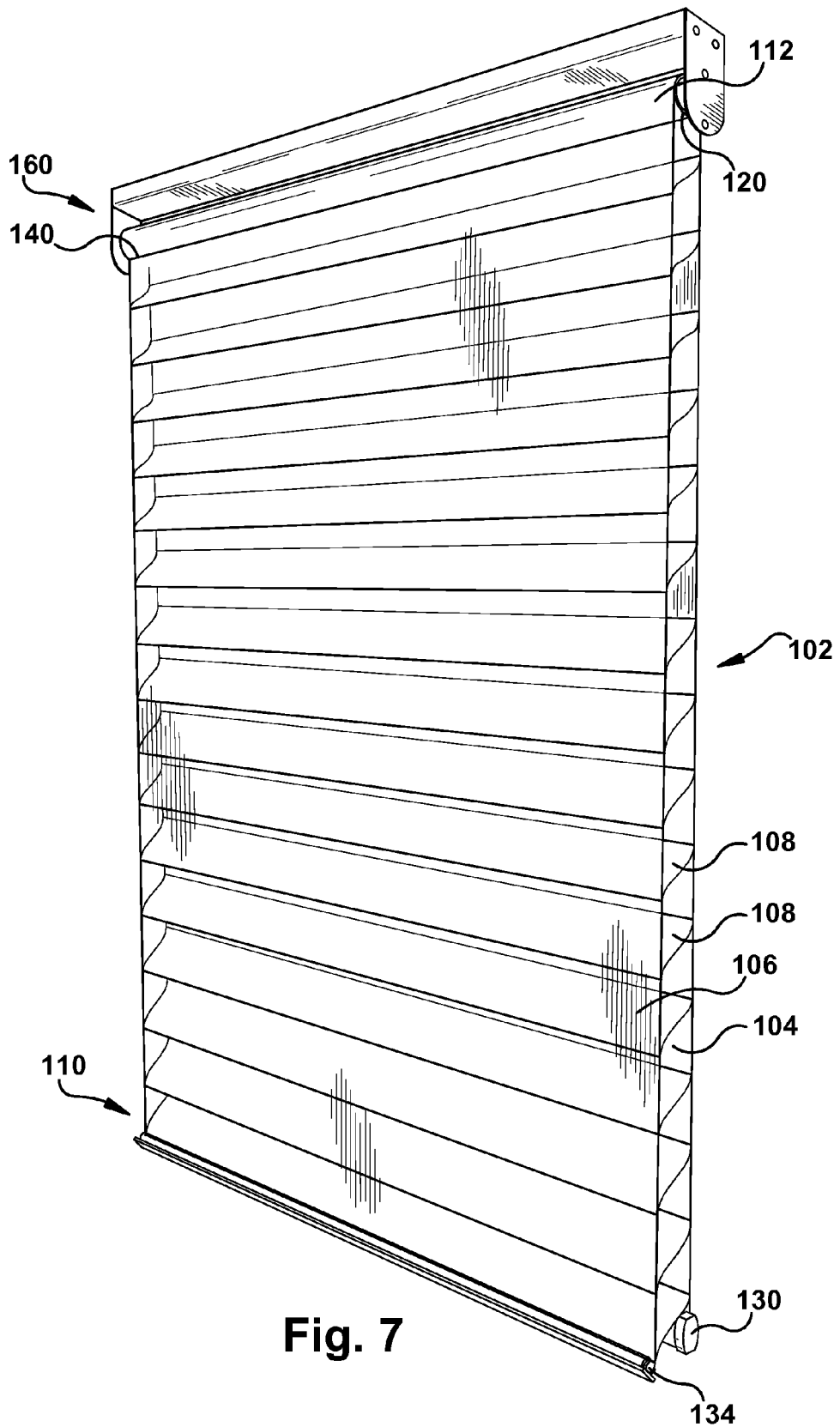


Fig. 7

CORDLESS FABRIC VENETIAN WINDOW SHADE ASSEMBLY

This application claims priority to previous U.S. Provisional Patent Application No. 61/867,470 filed Aug. 19, 2013, which is hereby incorporated by reference.

BACKGROUND

1. Technical Field

The present disclosure relates to window shades, and more particularly, to a cordless fabric venetian window shade assembly. An actuation system of the window shade assembly can include a spring-loaded ratchet system.

2. Background Art

Conventional venetian window shades include those as described in: U.S. Pat. No. 3,384,519 to Froget; FR1,521,488 to Demerson; U.S. Pat. Nos. 5,287,908, 5,313,999, 5,320,154, 5,394,922 and 5,456,304, all assigned to Hunter Douglas, Inc.; and U.S. Pat. No. 5,339,882 to Ren Judkins; U.S. Pat. No. 5,664,613 to Ralph Jelic, now assigned by acquisition to the present applicant's assignee Comfortex Window Fashions; U.S. Pat. No. 5,888,639 assigned to Newell Operating Co.; and U.S. Pat. Nos. 6,024,819; 6,171,424; 6,302,982; 6,377,384; 6,575,222; and 6,634,409 all assigned to the present application's assignee Comfortex Window Fashions, all of which are hereby incorporated by reference.

Conventional fabric venetian window shade assemblies may include a roller that is mounted to a headrail and headrail to the wall or window frame in conventional manner. The fabric venetian window shade itself comprises a first, back fabric facing or layer and a second, front fabric facing or layer. Each fabric facing is usually of high transparency. A plurality of vanes, typically of less translucent fabric, are attached at regular intervals to each fabric facing. The window shade is mounted to the roller such that when the roller is rotated to a first position, the two fabric facings hang from opposite sides of the roller, spaced apart and with the vanes extending between them in an orientation substantially perpendicular to both facings' planes, thus providing maximum view-through. When the roller is rotated in a first direction, it lowers the second, inner fabric facing (which may face internally toward the inside of the room where the shade is hung), and raises the other, first or 'outer' facing (which may face externally toward the window). The first effect of such rotation is to close the fabric vanes and bring the vanes and the two facings close together and parallel, to approximate a single quilted fabric. Further rotation of the roller in the same direction can then roll the flattened fabric onto the roller, lifting it from the window area as in a conventional roller shade. Unrolling the shade again reverses this process, with the flattened fabric first lowering to cover the window area, then, with a final partial turn of the roll, separating the first and second facings and tilting the vanes therebetween to provide view-through. Conventionally, this type of shade includes a single, rigid bottom rail connecting the lower, free ends of the facing fabrics. The single bottom rail acts to maintain the facings in smooth, level planes, by tension, and induces the vanes to flex as needed for their tilting by providing additional weight.

Most window shades (e.g., roller, cellular, pleated, or fabric-venetian) can be operated with a cord system, e.g., a cord lock with a pull cord, or a loop cord with a clutch and roller positioned at the top of the assembly. In particular, fabric venetians (sometimes called 'window shadings' or 'window shade assemblies') such as the Shangri-La™ by Comfortex or Silhouette™ by HunterDouglas, can provide specialty roller shades with multi-layered fabric that includes inner tiltable

fabric vanes. These assemblies may include a loop-cord and clutch system to perform a roll rotation which actuates the tiltable vanes once the shade has reached full extension. These clutch systems are typically fitted to the end of the roller, outboard of the fabric width. As a result, the assembly may include an unsightly and undesirable gap located between the edge of the fabric and window opening. This gap may be especially problematic to opaque, light-blocking shade styles because light can travel through the gap between the window and the shade fabric.

Conventional window shade assemblies with cords may also create significant safety hazards. For example, cords and cord loops of conventional window shade assemblies may entangle young children playing in an environment which includes the corded window shade assembly. Many alternative systems without cords and cord loops have been proposed, but most are significantly more expensive than existing window shade assemblies. Actuating the shade with motorized components can also potentially eliminate the presence of cords, in addition to providing other benefits such as remote control or timer-driven deployment, but these alternatives are also more expensive than conventional assemblies. In addition, systems which can fit in place of (i.e., substitute for) the manual clutch and cord-loop most commonly used on large (more costly) shades. The cost of these motors is often as much as that of the shade itself and so these have been restricted to only the most expensive of applications. Further, because the motors fit where clutches would otherwise go, they do not improve the side gap characteristic of the clutch systems.

In conventional roller shades, a spring-balanced ratchet is commonly used. The spring-balanced ratchet can allow the bottom of the shade to be gripped by a user, pulled downward to a length beyond the desired deployment position, and slowly released to set a ratchet that catches the roller against a torsion spring in the roller. The ratchet can be energized by the rotation of the roller when the shade is pulled out. Such an actuator is inexpensive, intuitive to use, and safe. It has not been previously used with fabric venetians because motorized alternatives are installed where existing cords and clutches would be used to pull the shade beyond the desired extension to set (or release) the ratchet. In a conventional roller shade (with simple, single-layer fabric), there is no barrier to providing more fabric length than the window height to enable such over-draw, even when the desired holding position is equal to the entire window height. However, in a fabric venetian shade, this is not possible, because the exact fabric length must be provided to precisely match the window height, so that the final rotation of the roller provides the vane tilting and does not puddle excess fabric on the sill in such configuration. Although it is possible (if the fabric is not too long) to grip the bottom rail and pull down on its back edge (attached to the outer facing) while pushing upward on the inner edge (attached to the inner facing) in order to effect the tilting of the vanes, after the shade fabric is fully extended, such a motion is uncomfortable and unnatural. This motion may be especially inconvenient after merely pulling downward initially for the main deployment. These conventional shades may also continue to include a large gap between the window and the window shade fabric.

BRIEF SUMMARY

A first aspect of the disclosure provides an actuation system for a fabric venetian window shade having a pair of opposing first and second facings coupled by a plurality of vanes, the actuation system comprising: a roller configured to

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receive the fabric venetian window shade; a spring-loaded ratchet operatively coupled to the roller; a first weighted rail attached to a lower edge of the first facing; and a second weighted rail attached to a lower edge of the second facing, wherein the first weighted rail and the second weighted rail are separate.

A second aspect of the disclosure provides a fabric venetian window shade assembly including: a fabric venetian window shade including a pair of opposing first and second facings coupled by a plurality of vanes; an actuation system including: a roller configured to receive the fabric venetian window shade; a spring-loaded ratchet operatively coupled to the roller; a first weighted rail attached to a lower edge of the first facing; and a second weighted rail attached to a lower edge of the second facing, wherein the first weighted rail and the second weighted rail are separate.

A third aspect of the invention includes an actuation system for a fabric venetian window shade having a pair of opposing first and second facings coupled by a plurality of vanes, the system comprising: a ratchet system operatively coupled to a roller to which the fabric venetian window shade is rollably attached, the ratchet system operable to position the fabric venetian window shade in a plurality of positions including: a retracted position in which the fabric venetian window shade is fully rolled onto the roller; a plurality of partially deployed, non-transparent positions in which the fabric venetian window shade is partially deployed from the roller and the first and second facings are substantially parallel with the plurality of vanes so the window shade is non-transparent; a fully deployed, non-transparent position in which the window shade is fully deployed from the roller and the first and second fabric faces and the plurality of vanes are substantially parallel so the window shade is non-transparent; and a plurality of fully deployed, at least partially transparent positions in which the fabric venetian window shade is fully deployed from the roller and the first and second fabric faces are not parallel with the plurality of vanes so the window shade is at least partially transparent.

The illustrative aspects of the present disclosure are designed to solve the problems herein described and/or other problems not discussed.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features of this disclosure will be more readily understood from the following detailed description of the various aspects of the disclosure taken in conjunction with the accompanying drawings that depict various embodiments of the disclosure, in which:

FIG. 1 shows a perspective view of a fabric venetian window shade assembly in a fully deployed, non-transparent position according to embodiments of the present disclosure.

FIG. 2 shows an enlarged perspective view of a fabric venetian window shade assembly in one of a plurality of partially deployed, non-transparent positions according to embodiments of the present disclosure.

FIG. 3 shows a perspective view of a fabric venetian window shade assembly in one of a plurality of fully deployed, at least partially transparent positions (mostly non-transparent) according to embodiments of the present disclosure.

FIG. 4 shows a perspective view of a fabric venetian window shade assembly in one of a plurality of fully deployed, at least partially transparent positions (mostly transparent) according to embodiments of the present disclosure.

FIG. 5 shows a perspective view of a fabric venetian window shade assembly in one of a plurality of fully deployed, at

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least partially transparent positions being activated for retraction to a retracted position according to embodiments of the present disclosure.

FIG. 6 shows a perspective view of a fabric venetian window shade assembly in a retracted position according to embodiments of the present disclosure.

FIG. 7 shows a perspective view of a fabric venetian window shade assembly in one of a plurality of fully deployed, at least partially transparent positions (mostly non-transparent) according to embodiments of the present disclosure.

It is noted that the drawings of the disclosure are not to scale. The drawings are intended to depict only typical aspects of the disclosure, and therefore should not be considered as limiting the scope of the disclosure. In the drawings, like numbering represents like elements between the drawings.

DETAILED DESCRIPTION

Embodiments of the present disclosure provide a cordless actuator assemblies for window shades. In particular, embodiments of the present disclosure combine the safety of cordless shades with a slip clutch for roller rotation beyond full-length deployment to tilt a set of internal fabric vanes. Embodiments of the present disclosure can also eliminate undesirable gaps between the shade edge and the window opening found in conventional, cord-based systems. This result is achieved with low cost and minimal installation volume (space), and can be a viable alternative for most cord-type fabric venetian shade actuators.

Embodiments of the invention include a fabric venetian window shade assembly and an actuation system therefor. As shown in FIG. 1, embodiments of the present disclosure implement an actuation system including a roller and a specialized ratchet for fabric venetian window shadings, including fabric venetian window shadings. In particular, embodiments of the present disclosure include a spring-loaded ratchet coupled to a roller for the window shade, and two separate weighted rails attached to one corresponding fabric facing. The weighted rails can increase the rigidity and weight of the assembly, such that the rails hold each facing taut when the window shade is unrolled from the roller. The position approximately where a conventional rail would attach to both facings still provides a net falling weight sufficient to actuate the vanes of the shade when the roller makes its last turn. However, the separation between the two weighted rails allows a user to grip the back (outer rail) alone and pull it downward for the entire actuation of the shade, whether during an unrolling of the shade fabric or the last, vane-tilting roller rotation.

As shown in FIG. 1 and discussed herein, a spring-loaded ratchet can be positioned inside of the roller to hold the fabric facings in any desired amount of deployment from the roller, and to retract the fabric back onto the roller. To improve the function and operability of the roller, embodiments of the present disclosure also include attaching the fabric to the roller only at or near the tangency of the inner facing that occurs when the vanes are in a substantially horizontal position (e.g., perpendicular to the facings for maximum transparency). As a result, a user can pull the outer (back) bottom weighted rail downward, past the normal maximum condition (i.e., vanes substantially horizontal, maximum transparency), with another downward pull to set or release the ratchet in the roller. A view-through (substantially transparent) position can be achieved comfortably with the shade extending through exactly the full length of the corresponding window height. The ratchet can also include stops spaced no farther

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apart than the roller rotation angle associated with an over-draw length to enable an over-pulling motion to set or release the ratchet. The spacing of stops can also vary depending on the width of the vanes and the diameter of the roller. In a particular embodiment, the ratchet can include multiple stops within a single complete rotation, thereby allowing the vanes to be set at intermediate angles between fully open (i.e., substantially transparent) and shut (i.e., an opaque setting which approximates a flattened fabric).

As shown in FIG. 1, a window shade assembly 100 according to embodiments of the present disclosure is shown. Window shade assembly 100 may be embodied as a fabric venetian window shade. A venetian window shade refers to a window shade composed of several horizontal shade bars. As examples, window shade assembly 100 can include one or more window shades 102 composed of wood, plastic, a fabric, a composite material, or any other currently known or later developed type of shading material (whether substantially transparent, translucent, or opaque). Window shade assembly 100 can include a first facing 104 and an opposing second facing 106 coupled by a plurality of vanes positioned therebetween. As shown by example in FIG. 1, first and second facings 104, 106 can be oriented in a substantially vertical position, with vanes 106 being substantially horizontal to join first and second facings 104, 106 to each other. In the example of FIG. 1, vanes 106 are positioned substantially parallel to the corresponding window in a “closed” position. Embodiments of the present disclosure include a structure and method for adjusting the position of first and second facings 104, 106, e.g., by rotationally positioning first and second facings 104, 106 to transmit or substantially prevent the passage of light through window shade assembly 100.

Turning to FIG. 2, an actuation system 110 can secure window shade assembly 100 to a surface of interest, such as a wall above a window and/or a window shade bracket mounted thereon. In embodiments of the present disclosure, actuation system 110 can include a roller 112 configured to retain window shade 102 in a retracted position, and from which window shade 102 can be unrolled to cover a corresponding area, window, etc. Roller 112 may have a diameter that is substantially identical to a width of each of plurality of vanes 108, (i.e., the distance of a side of vane 108 separating first and second facings 104, 106) but this is not necessary in all instances. Actuation system 110 can include a spring-loaded ratchet 120 located, e.g., within the brackets of the headrail assembly for window shade 102 and operably connected to roller 112. As is shown in FIG. 2-6, Spring-loaded ratchet 120 positions roller 112 and fabric venetian window shade 102 in a plurality of positions. As is discussed in further detail herein, FIG. 6 shows a retracted position in which fabric venetian window shade 102 is fully rolled onto roller 112. FIG. 2 shows one of a plurality of partially deployed, non-transparent positions in which fabric venetian window shade 102 is partially deployed from roller 112 and first and second fabric facings 104, 106 are substantially parallel with the plurality of vanes 108 so the window shade is non-transparent. In this position, shade 102 acts to block the highest amount of light possible for the amount of window that it is extended in front of, but does not fully cover the window. FIG. 1 shows a fully deployed, non-transparent position in which fabric venetian window shade 102 is fully deployed from roller 112 and first and second fabric faces 104, 106 and the plurality of vanes 108 are substantially parallel so the window shade is non-transparent. In this position, shade 102 can block the highest amount of light possible for the entire window where shade 102 is used.

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Referring to FIG. 2A, spring-loaded ratchet 120 can include a spring 122 which expands as window shade 102 is pulled from roller 112 until the withdrawn length of window shade 102 reaches or exceeds a setting length. At this point, a catch point of the ratchet element 124 of spring-loaded ratchet 120 can set with a tang 126 being positioned therein, thereby holding the withdrawn window shade 102 in place. A portion of spring 122 is shown in phantom to denote 122 extending laterally into or out of the plane of FIG. 2A. Through the setting of spring-loaded ratchet 120, window shade 102 can remain in place after being withdrawn from roller 112 as shown in FIG. 1. FIGS. 3, 4, 5 and 7, discussed in detail elsewhere herein, show a plurality of fully deployed, at least partially transparent positions in which fabric venetian window shade 102 is fully deployed from roller 112. These figures also show instances where first and second fabric faces 104, 106 are not parallel with plurality of vanes 108 so the window shade is at least partially transparent. As shown best in FIG. 7, in these positions, fabric venetian window shade 102 is attached to roller 112 at a single bond line 140 substantially at a tangency of one of the first and second fabric facings 104, 106 (104 as illustrated) only when the plurality of vanes are positioned substantially perpendicular to planes of the first and second fabric facings 104, 106. The diameter of roller 112 and a spacing of catches 124 of spring-loaded ratchet 120 can have predetermined values relative to the width of vanes 108. These predetermined values can be chosen to cause at least one catch and release setpoint of spring-loaded ratchet 120 to occur within a full rotation of roller 112. The ratchet element of spring-loaded ratchet 120 can also release when spring 122 is pulled to a predetermined distance after being set (i.e., over-draw). Actuation system 110 can therefore allow window shade 102 to return to roller 112 without the use of a cord loop, e.g., by releasing spring 122 and tang 124 spring-loaded ratchet 120.

As shown in FIG. 3, actuation system 100 may also include a first weighted rail 130 attached to a lower edge 132 of first, rear fabric facing 104; and a second weighted rail 134 attached to a lower edge 136 of the second fabric facing 106. As illustrated, first weighted rail 130 and second weighted rail 134 are separate. First weighted rail 130 may be larger than second weighted rail 134, e.g., in size and/or weight. This is in contrast to conventional systems that employ a single weighted rail for reasons described herein. A lower edge 132 of first facing 104 opposing actuation system 110 can include first weighted rail 130. First weighted rail 130 can include a shell composed of a different material from the remainder of window shade 102, such as a plastic, metal, ceramic, or composite material. The shell of first weighted rail 130 can increase the size and/or weight of first weighted rail 130 in addition to providing a grip for users of window shade assembly 100. First weighted rail 130, in contrast to rails of other window shade assemblies, can be coupled exclusively to lower edge 132 of first facing 104 (or alternatively lower edge 134 of second front facing 106) without being coupled to the other facing. Thus, a user of window shade assembly 100 can pull on first weighted rail 130 to retract window shade 102 into roller 112 and/or switch vanes 108 from being opened or closed without applying a force to second facing 106.

As shown in FIG. 3, a lower edge 134 of second facing 106 can include second weighted rail 136. Second weighted rail 136 can include a shell composed of a different material than window shade 102, e.g., a plastic, metal, ceramic, or composite material. The shell of second weighted rail 136 can provide an offsetting weight to first weighted rail 130 while providing another grip independent of first weighted rail 130. Second weighted rail 136 can be coupled exclusively to lower edge

134 of second facing **106** without being coupled to the other facing (e.g., first facing **104**). A user of window shade assembly **100** can pull second weighted rail **136** to unroll window shade **102** from roller **112** to set a catch point of spring-loaded ratchet **120**. Alternatively, first weighted rail **132** and second weighted rail **136** can perform opposite and/or additional functions from those described herein. First weighted rail **134** and second weighted rail **136** can be separate, distinct components, with different sizes. For example, second weighted rail **136** can be larger than first weighted rail **130**. Applying a force to first facing **104** via first weighted rail **130** can result in substantially no direct force to be applied to the opposing second facing **106**, and applying a force to second facing **106** via second weighted rail **136** can result in substantially no direct force to be applied to the opposing first facing **104**.

Referring to FIGS. 3 and 4 together, a mostly non-transparent position of window shade assembly **100** is shown in FIG. 3 and a mostly transparent position of window shade assembly is shown in FIG. 4. Applying a force to second weighted rail **136** can unroll window shade **102**, from window shade **102** being almost entirely on roller **112**, into a deployed or partially deployed position in which window shade **102** is unrolled from roller **112**. After window shade **102** is unrolled, vanes **108** can be oriented substantially in parallel with first and second facings **104**, **106**, such that window shade **102** is substantially opaque or translucent. A user can apply a force (e.g., pull) first weighted rail **130** to actuate spring-loaded ratchet **120** of actuation system **110**. Pulling first weighted rail **130** can set the ratchet element of spring-loaded ratchet **120**, and first facing **104** can move to a lower position in closer horizontal alignment with second facing **106**. The closer horizontal alignment can cause vanes **108** to be substantially perpendicular to the planes of first and second facings **104**, **106**, such that window shade assembly **100** is substantially translucent or transparent with respect to light passing there-through.

Turning to FIG. 5, applying a force to (i.e., pulling) first weighted rail **130** after vanes **108** are opened can release spring-loaded ratchet **120** (FIGS. 1, 2), compressing the spring element therein to pull window shade **102** back onto roller **112**. To release spring-loaded ratchet **120**, a user can apply a force to first weighted rail **130** to pull the ratchet element of spring-loaded ratchet **120** to a release position. The release position may correspond to, e.g., first weighted rail **130** being unrolled to a position below second weighted rail **136** (over-draw). As shown in FIG. 6, spring-loaded ratchet **120** can be released from its set position by the force applied to first weighted rail **130** to compress the spring element of spring-loaded ratchet **120**, pulling window shade **102** onto roller **112**. Thus, pulling first weighted rail **130** (FIG. 5) or second weighted rail **136** (FIG. 5) can perform different functions when window shade **102** is unrolled from roller **112**. For example, pulling first weighted rail **130** (FIG. 5) can retract window shade **102** into roller **112**, and pulling second weighted rail **136** (FIG. 5) can adjust the orientation of vanes **108** (FIG. 5) such that window shade **102** either substantially transmits or blocks light.

Turning now to FIG. 7, actuation system **110** with window shade **102** retracted onto roller **112** is shown. As shown in FIG. 6, window shade **102** can be attached to roller **112** at single bond line **140** positioned substantially at a tangency of first and/or second facings **104**, **106** when vanes **108** are positioned in a substantially perpendicular orientation to the planes of first and second facings **104**, **106**. From this position, a user can grip second bottom rail **136** protruding from roller **112** to extend window shade **102**. First bottom rail **130**, in this position, can be positioned between roller **112** and

second bottom rail **136**, with first bottom rail **130** resting on an external fixture (e.g., a bracket) to hold window shade **102** in place and position second bottom rail **136** below actuation system **110**.

Additional features of window shade assembly **100** in embodiments of the present disclosure are also shown in FIG. 7 and discussed herein. The diameter of roller **112** and the spacing of catches in spring-loaded ratchet **120** can be predetermined such that at least one catch and release setpoint of spring-loaded ratchet **120** is within a full rotation of roller **112**. Further embodiments of window shade assembly **100** can include multiple catch and release set points within actuation system **100**. Specifically, each catch and release setpoint of actuation system **110** can be create a different angling of vanes **108** relative to first and second facings **104**, **106** ranging from, e.g., a substantially parallel angling to a substantially perpendicular angling. Through multiple catch and release setpoints, spring-loaded bracket **120** can position roller **112** and window shade **102** in a plurality of positions. In a retracted position corresponding to one catch and release setpoint, window shade **102** can be fully rolled onto roller **112** (i.e., FIG. 6). In one of several partially deployed, non-transparent positions (i.e., FIG. 2) corresponding to respective catch and release setpoints. In each one of the partially deployed, non-transparent positions, window shade **102** can be partially deployed from roller **112** with first and second facings **104**, **106** being substantially parallel with vanes **108** and thereby causing window shade **102** to be non-transparent (i.e., translucent or opaque).

One catch and release setpoint of spring-loaded bracket **120** can correspond to a fully deployed, non-transparent position (i.e., shown in FIG. 1). This position may correspond to the last setpoint of actuation system **110** and may be positioned at a substantially full rotation of roller **112**. In the fully deployed, non-transparent position, window shade **102** can be fully deployed from roller **112** and the first and second faces **104**, **106** can be substantially parallel with vanes **108** such that window shade **102** is non-transparent (i.e., translucent or opaque). Another group of positions for window shade **102** can include several fully deployed, at least partially transparent positions (FIGS. 4, 5, 7). In a fully deployed, at least partially transparent position, window shade **102** can fully deployed from roller **102**, and first and second faces **104**, **106** can be non-parallel with vanes **108**. This position can allow light to pass through window shade **102** between vanes **108**. Window shade **102** can be switched between non-transparent and at least partially transparent positions, e.g., through a user applying a force to first bottom rail **130** to move first facing **104**.

In addition to window shade assembly **100**, embodiments of the present disclosure include window shade **102** with first and second facings **104**, **106** coupled with vanes **108** and actuation system **110** as shown in FIG. 7. In an embodiment, first facing **104** can be oriented to face a window, and second facing **106** can be oriented to face internally (i.e., into a room or particular space). Other embodiments of the present disclosure can relate to actuation system **110** of window shade assemblies **100** which include window shade **102**, first and second facings **104**, **106**, and vanes **108**. Spring-loaded ratchet **120** of actuation system **110** can be coupled to roller **112** at single bond line **140**, with window shade **102** being rollably attached to roller **112** and spring-loaded ratchet **120** being operable to position window shade **102** in any one of the several positions discussed herein (e.g., retracted positions, partially deployed non-transparent positions, a fully deployed non-transparent position, and/or fully deployed, partially transparent positions, etc.)

Whether provided in the form of a separate activation system or a complete assembly with an associated shading material, embodiments of the disclosure can provide a safe, convenient, cordless actuation system for window shades, as discussed herein and shown in the accompanying FIGS. 1-7. Advantages of the embodiments described herein include low manufacturing costs comparable or even less than manual clutch systems, a simple installation or removal process, an unobtrusive appearance, reliable use over long periods, and the reduced requirement for a side-gap between the shade material and a window, e.g., by omitting the use of a loop-cord and clutch system, as found in a conventional window shade assembly. Embodiments of the present invention also provide a safe and convenient, cordless actuation system for fabric, venetian shades on rollers. The system described herein has cost near to that of manual clutch systems, with easy installation and unobtrusive appearance, with reliable ease of use, and with reduced requirement for a side-gap between shade and window opening.

The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the disclosure. As used herein, the singular forms "a," "an," and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises" and/or "comprising," when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

The corresponding structures, materials, acts, and equivalents of all means or step plus function elements in the claims below are intended to include any structure, material, or act for performing the function in combination with other claimed elements as specifically claimed. The description of the present disclosure has been presented for purposes of illustration and description, but is not intended to be exhaustive or limited to the disclosure in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art without departing from the scope and spirit of the disclosure. The embodiment was chosen and described in order to best explain the principles of the disclosure and the practical application, and to enable others of ordinary skill in the art to understand the disclosure for various embodiments with various modifications as are suited to the particular use contemplated.

What is claimed is:

1. A cordless actuation system for a fabric venetian window shade having a pair of opposing first and second facings coupled by a plurality of vanes, the cordless actuation system comprising:

a roller configured to receive the fabric venetian window shade;

a spring-loaded ratchet operatively coupled to the roller;

a first weighted rail attached to a lower edge of the first facing and mechanically coupled to the spring-loaded ratchet through the first facing; and

a second weighted rail attached to a lower edge of the second facing and mechanically coupled to the roller through the second facing,

wherein the first weighted rail and the second weighted rail are separate, and wherein a downward force applied exclusively to the first weighted rail actuates the spring-loaded ratchet to adjust an angular orientation of the plurality of vanes relative to the pair of opposing first and second facings or releases the spring-loaded ratchet to retract the fabric venetian window shade.

2. The actuation system of claim 1, wherein the first weighted rail is larger than the second weighted rail.

3. The actuation system of claim 1, wherein the spring-loaded ratchet positions the roller and the fabric venetian window shade in a plurality of positions including:

a retracted position in which the fabric venetian window shade is fully rolled onto the roller;

a plurality of partially deployed, non-transparent positions in which the fabric venetian window shade is partially deployed from the roller and the first and second facings are substantially parallel with the plurality of vanes so the window shade is non-transparent;

a fully deployed, non-transparent position in which the fabric venetian window shade is fully deployed from the roller and the first and second fabric faces and the plurality of vanes are substantially parallel so the window shade is non-transparent; and

a plurality of at least partially transparent positions in which the fabric venetian window shade is fully deployed from the roller and the first and second fabric faces are not parallel with the plurality of vanes so the window shade is at least partially transparent.

4. The actuation system of claim 1, wherein the roller has a diameter that is substantially identical to a width of each vane of the plurality of vanes.

5. The actuation system of claim 1, wherein a diameter of the roller and a spacing of catches of the spring-loaded ratchet are configured in relation to a width of the plurality of vanes such that at least one catch and release setpoint of the ratchet occurs within a full rotation of the roller.

6. The actuation system of claim 5, wherein each catch and release setpoint provides a different angling of the plurality of the vanes relative to the first and second facings, a diameter of the roller and a spacing of catches of the spring-loaded ratchet are configured in relation to a width of the plurality of vanes such that at least one catch and release of the ratchet occurs within a full rotation of the roller.

7. A fabric venetian window shade assembly comprising:
a fabric venetian window shade including a pair of opposing first and second facings coupled by a plurality of vanes;

a cordless actuation system including:

a roller configured to receive the fabric venetian window shade;

a spring-loaded ratchet operatively coupled to the roller; a first weighted rail attached to a lower edge of the first facing and mechanically coupled to the spring-loaded ratchet through the first facing; and

a second weighted rail attached to a lower edge of the second facing and mechanically coupled to the roller through the second facing,

wherein the first weighted rail and the second weighted rail are separate, and wherein a downward force applied exclusively to the first weighted rail actuates the spring-loaded ratchet to adjust an amount of light transmission through the fabric venetian window shade or releases the spring-loaded ratchet to retract the fabric venetian window shade.

8. The fabric venetian window shade assembly of claim 7, wherein the first facing faces externally towards the window and the second facing faces internally.

9. The fabric venetian window shade assembly of claim 7, wherein the first weighted rail is larger than the second weighted rail.

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10. The fabric venetian window shade assembly of claim 7, wherein the spring-loaded ratchet positions the roller and the fabric venetian window shade in a plurality of positions including:

- a retracted position in which the fabric venetian window shade is fully rolled onto the roller;
- a plurality of partially deployed, non-transparent positions in which the fabric venetian window shade is partially deployed from the roller and the first and second facings are substantially parallel with the plurality of vanes so the window shade is non-transparent;
- a fully deployed, non-transparent position in which the fabric venetian window shade is fully deployed from the roller and the first and second fabric faces and the plurality of vanes are substantially parallel so the window shade is non-transparent; and
- a plurality of at least partially transparent positions in which the fabric venetian window shade is fully deployed from the roller and the first and second fabric faces are not parallel with the plurality of vanes so the window shade is at least partially transparent.

11. The fabric venetian window shade assembly of claim 7, wherein the roller has a diameter that is substantially identical to a width of each of the plurality of vanes.

12. The fabric venetian window shade assembly of claim 7, wherein a diameter of the roller and a spacing of catches of the spring-loaded ratchet are configured in relation to a width of the plurality of vanes such that at least one catch and release setpoint of the ratchet occurs within a full rotation of the roller.

13. The fabric venetian window shade assembly of claim 12, wherein each catch and release setpoint provides a different angling of the plurality of the vanes relative to the first and second facings, a diameter of the roller and a spacing of catches of the spring-loaded ratchet are configured in relation to a width of the plurality of vanes such that at least one catch and release of the ratchet occurs within a full rotation of the roller.

14. A cordless actuation system for a fabric venetian window shade having a pair of opposing first and second facings coupled by a plurality of vanes, the cordless actuation system comprising:

- a first rail attached to a lower edge of the first facing and mechanically coupled to the spring-loaded ratchet through the first facing;

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a second rail attached to a lower edge of the second facing and mechanically coupled to the roller through the second facing, wherein the first rail and the second rail are separate; and

a ratchet system operatively coupled to a roller to which the fabric venetian window shade is rollably attached, the ratchet system operable to position the fabric venetian window shade in a plurality of positions including:

- a retracted position in which the fabric venetian window shade is fully rolled onto the roller;
- a plurality of partially deployed, non-transparent positions in which the fabric venetian window shade is partially deployed from the roller and the first and second facings are substantially parallel with the plurality of vanes so the window shade is non-transparent;
- a fully deployed, non-transparent position in which the fabric venetian window shade is fully deployed from the roller and the first and second fabric faces and the plurality of vanes are substantially parallel so the window shade is non-transparent; and
- a plurality of at least partially transparent positions in which the fabric venetian window shade is fully deployed from the roller and the first and second fabric faces are not parallel with the plurality of vanes so the window shade is at least partially transparent;

wherein a downward force applied exclusively to the first rail actuates the ratchet system to adjust the plurality of vanes between the plurality of at least partially transparent positions or releases the spring-loaded ratchet to retract the fabric venetian window shade from one of the at least partially transparent positions to the retracted position, and wherein a downward force applied exclusively to the second rail actuates the roller to move the fabric venetian window shade from the retracted position to one of the plurality of partially deployed, non-transparent positions.

15. The actuation system of claim 14, wherein the first and second facings comprise a fabric.

16. The actuation system of claim 14, wherein each vane of the plurality of vanes comprises a fabric.

17. The actuation system of claim 14, further comprising a grip attached to the first rail, the grip operable to rotate the spring-loaded ratchet through the first facing and adjust an orientation of the plurality of vanes.

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