United States Patent Application Publication 20250263924
Kind Code A1
Publication Date August 21, 2025
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SYSTEM AND METHOD FOR SECTIONAL CONSTRUCTION ASSEMBLY

Abstract

A fitting for a construction system for a glass panel having a mullion with at least one guide track disposed at least partially along at least one dimension of the mullion, a curved exterior face, and a guide channel extending along a length of the curved exterior face. The fitting may comprise an inner fitting, an outer fitting and a fastener couple the inner fitting to the outer fitting. The inner fitting may be configured to be slidably coupled to the curved exterior face of the mullion. The inner fitting may comprise an angular variation device, a panel support surface, and an arm extending between the angular variation device and the panel support surface. The fitting is selectively adjustable along the guide track while engaged to the guide track and a portion of the glass panel is received between the inner fitting and the outer fitting.

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Appl. No.: **18/582962**

Filed: **February 21, 2024**

Publication Classification

Int. Cl.: **E04B2/74** (20060101)

U.S. Cl.:

CPC **E04B2/7435** (20130101);

Background/Summary

BACKGROUND OF THE TECHNOLOGY

[0001] A variety of systems are used in the construction of buildings. Many of these systems employ a framework, such as in the case of conventional point-supported and conventional glass wall systems. In these systems, panes of glass are attached to, and supported by horizontal and vertical mullions. The shapes and configurations of the buildings are sometimes constrained since the vertical mullions need to be oriented perpendicular to the outside surfaces of the glass panels.

SUMMARY OF THE TECHNOLOGY

[0002] A system and method for the assembly and support of construction sections. The system may generally include a guide track disposed within a mullion and a fitting that is suitably adapted for supporting a construction section or glass panel. The fitting may be configured to hold and retain a construction section or glass panel once the fitting is engaged within the guide track of the mullion. The mullion may include an angular face that cooperates with a radial fitting to allow the glass panel to be oriented in a configuration that is not perpendicular with the axis of the mullion.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] A more complete understanding of the present technology may be derived by referring to the detailed description when considered in connection with the following illustrative figures. In the following figures, like reference numbers refer to similar elements and steps throughout the figures. For simplicity and clarity of illustration, elements in the figures are not necessarily drawn to scale.

[0004] FIG. **1** representatively illustrates an isometric assembled view of a construction assembly with a fitting attached to a mullion and supporting a glass panel in accordance with an exemplary embodiment of the present technology;

[0005] FIG. **2** representatively illustrates an isometric, exploded view of a construction assembly with a fitting and a mullion accordance with an exemplary embodiment of the present technology;

[0006] FIG. **3** representatively illustrates a top, cross-sectional view of a construction assembly with a fitting attached to a mullion and supporting a glass panel in accordance with an exemplary embodiment of the present technology;

[0007] FIG. **4** representatively illustrates an exploded plan view of a fitting in accordance with an exemplary embodiment of the present technology;

[0008] FIG. **5** representatively illustrates a plan view of an inner fitting with a portion removed for attachment to a mullion in accordance with an exemplary embodiment of the present technology;

[0009] FIG. **6** representatively illustrates a plan view of an inner fitting with a portion removed for attachment to a mullion in accordance with an exemplary embodiment of the present technology;

[0010] FIG. **7** representatively illustrates a top, cross-sectional view of an inner fitting attached to a conventional mullion by a spacer in accordance with an exemplary embodiment of the present technology;

[0011] FIG. **8** representatively illustrates a top, cross-sectional view of an inner fitting attached to a mullion body by a spacer in accordance with an exemplary embodiment of the present technology;

[0012] FIG. **9** representatively illustrates a top, cross-sectional view of a mullion in accordance with an exemplary embodiment of the present technology;

[0013] FIG. **10** representatively illustrates an isometric view of an angled hanger fitting attached to a mullion in accordance with an exemplary embodiment of the present technology;

[0014] FIG. **11** representatively illustrates a front view of an angled hanger fitting and fitting

attached to a mullion and supporting a glass panel in accordance with an exemplary embodiment of the present technology;
[0015] FIG. **12** representatively illustrates a cross-sectional, side view of and angled hanger fitting and fitting supporting a glass panel attached to a mullion with the mullion being attached to a floor in accordance with an exemplary embodiment of the present technology;
[0016] FIG. **13** representatively illustrates an isometric view of a hanger fitting attached to a mullion in accordance with an exemplary embodiment of the present technology;
[0017] FIG. **14** representatively illustrates a front view of a hanger fitting and fitting attached to a mullion and supporting a glass panel in accordance with an exemplary embodiment of the present technology;
[0018] FIG. **15** representatively illustrates a cross-sectional, side view of a hanger fitting and fitting supporting a glass panel attached to a mullion with the mullion being attached to a floor in accordance with an exemplary embodiment of the present technology;
[0019] FIG. **16** representatively illustrates an additional embodiment of an isometric, exploded view of a construction assembly with a fitting and a mullion accordance with an exemplary embodiment of the present technology;
[0020] FIG. **17** representatively illustrates an additional embodiment of a top, cross-sectional view of a construction assembly with a fitting attached to a mullion and supporting a glass panel in accordance with an exemplary embodiment of the present technology;
[0021] FIG. **18** representatively illustrates an additional embodiment of an exploded plan view of a fitting in accordance with an exemplary embodiment of the present technology; and
[0022] FIG. **19** representatively illustrates an additional embodiment of an isometric view of an angled hanger fitting attached to a mullion in accordance with an exemplary embodiment of the present technology.

DETAILED DESCRIPTION OF THE DRAWINGS

[0023] The present technology may be described in terms of functional block components and various processing steps. Such functional blocks may be realized by any number of components configured to perform the specified functions and achieve the various results. For example, the present technology may employ various types of mullions, guide tracks, fittings, hangers, fasteners, spacers, glass panels, walls, and the like, which may carry out a variety of functions. Further, the present technology may employ any number of components for a point supported construction system for supporting a glass panel.
[0024] Various representative implementations of the present technology may be applied to any system for construction. Certain representative implementations may include systems and methods tailored to a specific type of construction, such as point-supported glass wall systems.
[0025] In general point-supported glass wall systems utilize fittings connected with mullions to provide support for various types of construction sections. The fitting may be attached to a mullion and the construction section or glass panel is supported by the fitting. The mullions are generally oriented perpendicular to the exterior surface of the building/wall/glass panel which they support. As such, a standard mullion generally has a flat, planar surface that is generally perpendicular to the longitudinal centerline of the mullion and parallel to the exterior surface of the building/wall/glass panel that it supports. The fitting is attached to the flat, planar surface of the mullion and the exterior surface of the building/wall/glass panel supported by the fitting is oriented generally perpendicular to the longitudinal centerline of the mullion.
[0026] Referring now to FIGS. **1-3**, a construction system **100** generally comprises a mullion **105** and a fitting **110**. The mullion **105** is generally configured for engagement with the fitting **110** and provides support for a construction section and/or glass panel held in place by the fitting **110**. The mullion **105** may comprise any structural or design features that may be employed to allow for the attachment of the fitting(s) **110** for providing support and/or retention of construction sections. The construction sections may comprise wood, ceramic, glass, glass panels, polymer sheeting, bullet-

proof glass, synthetic paneling, and the like.
[0027] The mullion **105** may be fabricated using any method of manufacture known in the art and may include any number of suitable materials, such as aluminum, steel, graphite, composite and/or the like. In one embodiment, the mullion **105** may be fabricated from forged or extruded aluminum.
[0028] The mullion **105** may comprise a first end **120** that may be positioned towards the interior of a structure being constructed and a second end **125** configured to be coupled to the fitting **110**. A mullion body **130** is located between the first end **120** and the second end **125** of the mullion **105**.
[0029] The second end **125** of mullion **105** may comprise a guide track **135** and an exterior face **140**. The guide track **135** may be disposed along at least one dimension of the mullion **105**. The guide track **135** may be disposed along a substantially linear length of the mullion **105** and may be suitably adapted for adjustable engagement with the fitting **110**. The fitting **110** may be adjusted along the guide track **135** and substantially fixed in place at any point along the guide track **135**. The fitting **110** may be suitably configured to support any type of construction section, such as a pane of glass or glass panel **145**.
[0030] The guide track **135** may be positioned, for example, towards the exterior of a structure being constructed using the disclosed systems and methods, and may provide suitable anchor points for attachment of the fitting **110** that retains and supports a construction section/glass panel **145**. The structure of the mullion **105** allows it to support the weight of the construction section or glass panel **145** held by the fitting **110**. Additionally, the mullion **105** may permit translational or rotational motion in response to environmental effects, such as wind, rain and/or thermal expansion or contraction.
[0031] The mullion **105** generally comprises a structure having one or more void cavities **150** and a guide channel **155**. The cavity **150** may be of any volume or shape and may be disposed within any part of the mullion **105**. For example, the mullion **105** may comprise a plurality of cavities with intervening structures between the void cavities **150**, for example, in order to increase the load bearing strength of the mullion **105**.
[0032] The mullion **105** may connect with any suitable structures, systems and devices in any suitable manner to achieve any particular purpose. The mullion **105**, be configured for attachment to a surface such as a floor, wall and/or the like. The mullion **105** may be attached to any suitable surface in any suitable manner, and may be configured to support any structure, system, device or architectural element in any suitable manner. For example, the structure of the mullion **105** may comprise the guide track **135** that operates with the fitting **110** to provide attachment and support for glass panels **145**.
[0033] In general, the guide track **135** and guide channel **155** generally enable the fittings **130** to be connected to the mullion **105**. The guide track **135** may be fabricated from any material, whether now known or otherwise hereafter described in the art. The guide track **135** may comprise any shape, size or configuration and may include any number of sub-systems and/or design features to achieve any particular purpose.
[0034] The exterior face **140** of the mullion **105** may comprise a curved surface **160** configured to mate with the fitting **110**. The curved surface **160** may comprise an outer surface that is convex with respect to the exterior surface of the construction section or glass panel **145** to which the curved surface **160** faces. The guide channel **155** may extend the length or a portion of the curved surface **160** of exterior face **140** of the mullion **105**. As shown in FIG. **3**, the guide channel **155** may be aligned with the centerline **165** of the mullion **105**.
[0035] Referring now to FIG. **4**, the fitting **110** may include an inner fitting **170** and an outer fitting **175** that are coupled together with a fastener **180**. The inner fitting **170** and outer fitting **175** are configured to support the construction section and/or glass panel **145**. In various embodiments, the fastener may comprise a stud **185** and cap nut **190**. In one embodiment, the fastener may comprise a pair of studs **185** and a pair of cap nuts **190**. When installed, the stud(s) **185** may be received in a recess(es) **195** within the inner fitting **170** and project through an aperture(s) **200** in the outer fitting

175. The cap nut(s) **190** may then be coupled to the stud(s) **185** to assemble the fitting **110**, which can then support the glass panel **145**. The stud(s) **185**, cap nut(s) **190**, and recess(es) **195** may be threaded as understood by one of ordinary skill in the art.

[0036] The fitting **110** may comprise a pair of gaskets **205** configured to support the attachment of the glass panel **145** to the fitting **110**. The gaskets **205** may be located between the inner fitting **170** and the glass panel **145** and outer fitting **175** and the glass panel **145**. Upon installation the gaskets **205** serve to support the glass panel between the inner and outer fittings **170**, **175**. Installation occurs when a portion of the glass panel **145** is placed between the inner fitting **170** and outer fitting **175**. The gaskets **205** are located between the inner fitting **170** and the glass panel **145** and outer fitting **175** and the glass panel **145**. Typically, a portion of the glass panel **145** is installed on the fitting **110** and the fitting **110** is then attached to the mullion **105**.

[0037] The inner fitting **170** may comprise an angular variation device for altering the angle of the glass panel **145** with respect to the orientation of the mullion **105**. Standard fittings and mullions typically only allow the construction sections that are supported by the fitting to be oriented at a right angle or perpendicular to the mullion. The angular variation device allows the angle of the fitting (construction sections/glass panels) with respect to the mullion to be oriented at any angles selected during installation.

[0038] The inner fitting **170** may comprise a panel support surface **210**, a radial surface **215**, and an arm **220** located therebetween. The panel support surface **210** along with the gasket **205** engages with the glass panel **145** and/or construction section. The arm **220** comprises a first end that extends from the panel support surface **210** at a right angle and is oriented generally perpendicular to the panel support surface **210**. The arm **220** extends between the panel support surface **210** and the radial surface **215**. The arm **220** is oriented generally perpendicular to the radial surface **215**, which connects to the mullion **105**.

[0039] Referring to FIG. **3**, the radial surface **215** of the inner fitting **170** may be attached to the curved surface **160** of the exterior face **140** of the mullion **105** by fasteners **225**. The fasteners **225** may comprise at least one bolt **230** and nut **235** configuration. Once the fitting **110** is attached to the mullion **105**, the fitting **110** may still be moved with respect to the mullion **105**. The bolts **230** are received within the guide track **155** and the nuts **235** are coupled thereto within the guide channel. **135**. The fitting **110** is still movable with respect to the mullion **105** until the fasteners **225** are secured.

[0040] The orientation of the radial surface **215** and the curved surface **160** allow the fitting **110** to engage with the mullion **105** and rotate along an angle β to accommodate various wall plane angles, which is the angle β between the mullion centerline **165** and the plane of the glass panel **145**.

[0041] The radial surface **215** extends outwardly from the arm **220** to create an arc shape. The arc shape of the radial surface **215**, when installed, abuts and runs parallel to the curved surface **160** of the exterior face **140**. The arc shape of the radial surface **215** is convex with respect to the exterior surface of the construction section or glass panel **145** to which the curved surface **160** faces.

[0042] Referring to FIGS. **2** and **3**, once designed, excess material **240** beyond the edge **245** of the mullion **105** is trimmed away or removed. The excess material **240** may be removed during production in a factory. For installation of the fitting **110** to the mullion **105**, the inner fitting **170** is positioned on the exterior face **140** of the mullion **105** at desired angle beta, β. At least one hole **250** is drilled in the radial surface **215** of the inner fitting **170** such that the central lines of the at least one hole **250** aligns with the center line **165** of the guide channel **135**. The inner fitting **110** is then attached to the guide track **135** of the mullion and held in-place by fasteners **225** comprising the at least one bolt **230** and nut **235** configuration. The bolts **230** are received within the guide track **155** and the nuts **235** are coupled thereto within the guide channel **135**. In one embodiment, the inner fitting is held in place at the correct position along curved surface **160**, the bolt **230** and nut **235** configuration is tightened to clamp the inner fitting **110** to the guide channel.

[0043] Once the inner fitting **170** is attached to the guide track, the gaskets **205** are placed on the panel support surface **210** and the surface of outer fitting **175** that face the glass panel **145** and the outer fitting **175** is attached to the inner fitting **170** by fasteners **180**. The stud(s) **185** may be received in a recess(es) **195** within the inner fitting **170** and project through an aperture(s) **200** in the outer fitting **175**. The cap nuts **190** may then be coupled to the stud(s) **185** to assemble the fitting **110**, which can then support the glass panel **145**.
[0044] FIGS. **5** and **6** illustrate some examples of angles θ**1** and θ**2** in which the radial surface **215** of the inner fitting **170** may be oriented to achieve different configurations of the inner fitting **170** with respect to the exterior face **140** of the second end of the mullion. Referring now to FIGS. **16-18** an additional embodiment of a mullion **505** and an inner fitting **570** are shown. The mullion **505** is similar to the mullion **105** with the following exception. The mullion **505** may comprise an exterior face **540** with a curved surface **560** configured to mate with the fitting **110**. The curved surface **560** may comprise an outer surface that is convex with respect to the exterior surface of the construction section or glass panel **145** to which the curved surface **560** faces. The guide channel **155** may extend the length or a portion of the curved surface **560** of exterior face **540** of the mullion **105**.
[0045] The inner fitting **570** is similar to the inner fitting **170** with the following exception. The inner fitting **570** may comprise an angular variation device for altering the angle of the glass panel **145** with respect to the orientation of the mullion **505**. The inner fitting **570** may comprise a panel support surface **210**, a radial surface **515**, and an arm **220** located therebetween.
[0046] Referring to FIG. **17**, the radial surface **515** of the inner fitting **570** may be attached to the curved surface **560** of the exterior face **540** of the mullion **105** by fasteners **225**. The orientation of the radial surface **515** and the curved surface **560** allow the fitting **110** to engage with the mullion **105** and rotate along an angle β to accommodate various wall plane angles, which is the angle β between the mullion centerline **165** and the plane of the glass panel **145**.
[0047] The radial surface **515** extends outwardly from the arm **220** to create an arc shape. The arc shape of the radial surface **515**, when installed, abuts and runs parallel to the curved surface **560** of the exterior face **540**. The arc shape of the radial surface **515** is convex with respect to the exterior surface of the construction section or glass panel **145** to which the curved surface **560** faces.
[0048] Referring to FIGS. **16** and **17**, once designed, excess material **545** beyond the edge **245** of the mullion **505** is trimmed away or removed. For installation of the fitting **110** to the mullion **505**, the inner fitting **570** is positioned on the exterior face **540** of the mullion **505** at desired angle beta, β. At least one hole **250** is drilled in the radial surface **515** of the inner fitting **570** such that the central lines of the at least one hole **250** aligns with the center line **165** of the guide channel **135**. The inner fitting **570** is then attached to the guide track **135** of the mullion and held in-place by fasteners **225** comprising the at least one bolt **230** and nut **235** configuration. The bolts **230** are received within the guide track **155** and the nuts **235** are coupled thereto within the guide channel **135**.
[0049] Referring now to FIG. **7**, an additional embodiment of a mullion **255** is shown. The mullion **255** resembles a standard mullion with a mullion body **260**, an exterior face **265**, a guide track **270**, and a guide channel **272**. The guide track **270** and guide channel **272** are similar to those discussed above. A mullion body is located between the first end and the second end of the mullion. The second end of the mullion may comprise the exterior face **265** that is generally perpendicular to the centerline of the mullion **255**. A spacer **275** may be attached to the mullion **255** in a similar manner to the described above method utilizing a fastener **280** and the guide track **270** to couple the fitting **110** to the mullion **105**. The spacer **275** may comprise a flat surface **285**, a curved surface **290**, and a centrally located aperture **295** that receives the fastener **280**, which couples the spacer **275** to the guide track **270** of the mullion **255**. The inner fitting **170** is then attached to the guide track **272** of the mullion **255** and held in-place by fasteners **280** comprising at least one bolt and nut configuration. The bolts are received within the guide track **270** and the nuts are coupled thereto

within the guide channel **272**. The flat surface **285** of the spacer **275** is coupled to the exterior face **265** of the mullion **255**. The inner fitting **170** is then coupled to the spacer **275** by fasteners **300** that are received in threaded apertures **305** in the spacer **275**. The inner fitting **170** may be attached to the spacer **275** at any angle consistent with the installation procedure described above. The curved surface **290** of the spacer **275**, shown in FIG. **7** may comprise a concave shape. Alternatively, the curved surface may also be convex, as shown by the curved surface **560** of the exterior face **540** in FIGS. **16-17** and would mate with the radial surface **515** of the inner fitting **570**.

[0050] Referring now to FIG. **8**, an additional embodiment of a mullion **310** is shown. The mullion **310** may comprise a mullion body **315**, an exterior face **320**, a guide track **325**, and a guide channel **327**. The guide track **325** and guide channel **327** are similar to those discussed above. The mullion **310** may comprise a first end that may be positioned towards the interior of a structure being constructed and a second end. The mullion body **315** is located between the first end and the second end of the mullion. The second end of the mullion may comprise the exterior face **320**, which is generally perpendicular to the centerline of the mullion **310**. A spacer **330**, similar to spacer **275** described above, may be attached to the mullion **310** in a similar manner to the described above. The spacer **330** may comprise a flat surface **335**, a curved surface **340**, and a centrally located aperture **345** that receives a fastener (comprising a nut and bolt configuration), which couples the spacer **330** to the guide track **325** of the mullion **310**. The flat surface **335** of the spacer **330** is coupled to the exterior face **320** of the mullion **310**. The inner fitting **170** is then coupled to the spacer **330** by at least one fastener (not shown) that are received in treaded apertures **350** in the spacer **330**. The first end of the mullion **310** may be coupled to a block **355** by at least one fastener **360**. The least one fastener **360** may couple to the block **355** by a threaded aperture or may be screwed or otherwise secured to the block **355**. The block **355** may comprise any suitable material including but not limited to steel, aluminum, and non-metal materials such as wood.

[0051] The curved surface **340** of the spacer **330**, shown in FIG. **8** may comprise a concave shape. Alternatively, the curved surface may also be convex, as shown by the curved surface **560** of the exterior face **540** in FIGS. **16-17** and would mate with the radial surface **515** of the inner fitting **570**.

[0052] Referring now to FIG. **9**, an additional embodiment of a mullion **365** is shown. The mullion **365** may comprise a block **370** and a guide element **375** coupled therewith. The guide element **375** may comprise a guide track **380** and guide channel **385** that operate with the fitting **110** to provide attachment and support for glass panels (not shown). The guide track **380** and guide channel **385** of this embodiment are similar to the those discussed above.

[0053] The guide element **375** may comprise an exterior face **390** and an interior face **395**. The exterior face **390** of the guide element **375** of the mullion **365** may comprise a curved surface configured to mate with the fitting **110** (not shown). The curved surface **390** may comprise an outer surface that is concave with respect to the exterior surface of the construction section or glass panel **145** (not shown) to which the curved surface faces. Alternatively, the curved surface may also be convex, as shown by the curved surface **560** of the exterior face **540** in FIGS. **16-17** and would mate with the radial surface **515** of the inner fitting **570**. The guide channel **385** may extend the length or a portion of the curved surface of exterior face **390** of the mullion **365**. The interior face **395** of the guide element **375** may comprise a mounting surface configured to be attached to the block **370** by at least one fastener **400**. The least one fastener **400** may couple to the block **370** by a threaded aperture or may be screwed or otherwise secured to the block **370**.

[0054] Referring now to FIG. **10**, the construction system **100** may comprise an angled hanger fitting **405** to be used in conjunction with the fitting **110** described above to support a construction section in any manner. For example, the angled hanger fitting **405** may be provided for vertical support of a construction section and/or glass panel **145**. As seen in FIGS. **11** and **12**, the angled hanger fitting **405** may be utilized to support a construction section and/or glass panel **145** that is located below a floor, floor slab **410** or any other support section. In various embodiments, the

angled hanger fitting **405** may be used in conjunction with the fitting **110** to support a construction section and/or glass panel **145**. The shape of the angled hanger fitting **405** is similar to the fitting **110** above to allow the construction section and/or glass panel to be oriented at various angular positions.

[0055] The angled hanger fitting **405** may comprise an angular variation device for altering the angle of the glass panel **145** with respect to the orientation of the mullion **105**. Standard fittings and mullions typically only allow the construction sections that are supported by the fitting to be oriented at a right angle or perpendicular to the mullion. The angular variation device allows the angle of the fitting **100** and angled hanger fitting **405** (construction sections/glass panels) with respect to the mullion **105** to be oriented at any angle selected during installation. The installation of the angled hanger fitting **405** is similar to the installation of the fitting **110** discussed above.

[0056] The angled hanger fitting **405** may comprise a panel support **415**, a radial surface **420**, and a support arm **425** located therebetween. The panel support **415** engages and supports the glass panel **145** and/or construction section. The support arm **425** comprises a first portion **430** that extends outwardly from the radial surface **420** and a second portion **435** that extends downwardly to the panel support **415**. In one embodiment the support arm **425** is generally L-shaped. The panel support **415** is located generally horizontal and perpendicular to the second portion **435** of the support arm **425**. The support arm **425** extends between the panel support **415** and the radial surface **420**. The support arm **425** may be oriented generally perpendicular to the radial surface **420**, which connects to the mullion **105**.

[0057] The radial surface **420** of the angled hanger fitting **405** may be attached to the curved surface **160** of the exterior face **140** of the mullion **105** by at least one fastener **225**. The radial surface **420** may comprise a convex shape that aligns with and abuts the concave curved surface **160**. As such, curved surface **160** is concave with reference to the panel **145** and radial surface **420** is convex with reference to the curved surface **160** The fasteners **225** may comprise at least one bolt **230** and nut **235** configuration. Once the angled hanger fitting **405** is attached to the mullion **105**, the angled hanger fitting **405** may still be moved with respect to the mullion **105**. The bolts **230** are received within the guide channel **135** and the nuts **235** are coupled thereto within the guide track **155**. The angled hanger fitting **405** is still movable with respect to the mullion **105** until the fasteners **225** are secured.

[0058] Similar to the fitting **110** described above, the orientation of the radial surface **420** and the curved surface **160** allow the angled hanger fitting **405** to engage with the mullion **105** and rotate along an angle to accommodate various wall plane angles, which is the angle between the mullion centerline and the plane of the glass panel **145**.

[0059] The radial surface **420** extends outwardly from the support arm **425** to create an arc shape. The arc shape of the radial surface **420**, when installed, abuts and runs parallel to the curved surface **160** of the exterior face **140**.

[0060] Referring now to FIG. **19**, an additional embodiment of the angled inner fitting **510** is shown. The angled hanger fitting **510** is similar to the angled hanger fitting **405** with the following exception. The angled hanger fitting **510** may comprise a panel support **415**, a radial surface **520**, and a support arm **425** located therebetween. The radial surface **520** of the angled hanger fitting **510** may be attached to the curved surface **560** of the exterior face **540** of the mullion **105** by fasteners **225**. The orientation of the radial surface **515** and the curved surface **560** allow the fitting **110** to engage with the mullion **505** and rotate along an angle β to accommodate various wall plane angles, which is the angle β between the mullion centerline **165** and the plane of the glass panel **145**. The arc shape of the radial surface **515** is concave with respect to the exterior surface of the construction section or glass panel **145** to which the curved surface **560** faces.

[0061] Referring to FIGS. **11** and **12**, the fitting **110** and the angled hanger fitting **405** may be used to support a construction section and/or glass panel **145**. The angled hanger fitting **405** allows the construction section and/or glass panel **145** to extend below the floor **410** or any other construction

support (slab), which solves the problem of being able to extend the panel **145** past a slab even thought the slab may interrupt the mullion from being continuous. The installation of the angled hanger fitting **405** is the same as the installation of the other fitting described in detail above. The fitting **110** and the angled hanger fitting **405** shown in FIGS. **16-19** may also be used in the same manner as discussed above.

[0062] Referring now to FIGS. **13-15** a hanger fitting **440** is shown couple to a conventional mullion **445**. SEE FIG. **7**. The hanger fitting **440** is similar to the embodiment disclosed in FIGS. **10-12** with the exception of the radial surface. The hanger fitting **440** may comprise a panel support **450**, an attachment surface **455**, and a support arm **460** located therebetween. The panel support **450** engages with the glass panel **145** and/or construction section. The support arm **460** comprises a first portion that extends outwardly from the attachment surface **455** and a second portion that extends downwardly to the panel support **450**. In one embodiment the support arm **460** is generally L-shaped. The panel support **450** is located generally horizontal and perpendicular to the second portion of the support arm **460**. The support arm **460** extends between the panel support **450** and the attachment surface **455**. The support arm **460** may be oriented generally perpendicular to the attachment surface **455**, which connects to the mullion **445**.

[0063] The attachment surface **455** of the hanger fitting **440** may be attached to an exterior face **465** of the mullion **445** by at least one fastener **225**. The fasteners **225** may comprise at least one bolt **230** and nut **235** configuration. Once the hanger fitting **440** is attached to the mullion **445**, the hanger fitting **440** may still be moved with respect to the mullion **445**. The bolts **230** are received within a guide channel **470** and the nuts **235** are coupled thereto within a guide track **475**. The hanger fitting **440** is still movable with respect to the mullion **445** until the fasteners **225** are secured.

[0064] Referring to FIGS. **14** and **15**, the fitting **480** and the hanger fitting **440** may be used to support a construction section and/or glass panel. The hanger fitting **440** allows the construction section and/or glass panel **140** to extend below the floor **410** or any other construction support.

[0065] In a construction system according to various aspects of the present technology, mullions may be attached to the structure of a building to provide a framework for supporting construction sections. Suitably configured fittings may be attached to the mullions to provide point-supported or continuously supported retention of construction sections. Construction systems in accordance with various exemplary embodiments of the present technology may be used to build any type of structure, such as a point-supported glass wall, for example. The construction system may also be used to achieve various aesthetic benefits. For example, the panes of glass used to form a glass wall will generally be displaced away from the mullions, making it more difficult to see the mullions from an exteriorly disposed vantage point. Additionally, construction systems in accordance with the present technology may be used to achieve any structural benefit, whether now known or hereafter described in the art, such as the ability to construct a multi-story point-supported glass wall system using substantially vertically-aligned mullions without the need for horizontally-aligned mullions.

[0066] Constructs (i.e., construction designs) that may be realized via implementation of various embodiments of the present technology shall be understood to comprise anything that may be at least partially assembled from at least one or more component parts, such as, for example: a window; a wall; a partition; a frame; a panel; a covering; a dome; a door; a display case; a display wall; a display frame; a cubicle; a presentation display; a booth; an enclosure; a temporary habitat; a mobile home; a video device array; various architectural construction elements; and/or the like.

[0067] A ‘construction section’ shall be understood to comprise any component part of a construct surface, such as, for example, a pane of glass, a panel of wood, a sheet of drywall, a graphite board, Plexiglas, Lucite, a video device element, etc. Furthermore, a construction section may comprise any two-dimensional (e.g., substantially planar) or three-dimensional (e.g., polyhedral, spherical, hemispherical, elliptical, parabolic, etc.) geometry and/or any combination thereof.

[0068] In the foregoing description, the technology has been described with reference to specific exemplary embodiments. Various modifications and changes may be made, however, without departing from the scope of the present technology as set forth. The description and figures are to be regarded in an illustrative manner, rather than a restrictive one and all such modifications are intended to be included within the scope of the present technology. Accordingly, the scope of the technology should be determined by the generic embodiments described and their legal equivalents rather than by merely the specific examples described above. For example, the steps recited in any method or process embodiment may be executed in any appropriate order and are not limited to the explicit order presented in the specific examples. Additionally, the components and/or elements recited in any system embodiment may be combined in a variety of permutations to produce substantially the same result as the present technology and are accordingly not limited to the specific configuration recited in the specific examples.

[0069] Benefits, other advantages and solutions to problems have been described above with regard to particular embodiments. Any benefit, advantage, solution to problems or any element that may cause any particular benefit, advantage or solution to occur or to become more pronounced, however, is not to be construed as a critical, required or essential feature or component.

[0070] As used herein, the terms “comprises,” “comprising,” or any variation thereof, are intended to reference a non-exclusive inclusion, such that a process, method, article, composition or apparatus that comprises a list of elements does not include only those elements recited but may also include other elements not expressly listed or inherent to such process, method, article, composition or apparatus. Other combinations and/or modifications of the above-described structures, arrangements, applications, proportions, elements, materials or components used in the practice of the present technology, in addition to those not specifically recited, may be varied or otherwise particularly adapted to specific environments, manufacturing specifications, design parameters or other operating requirements without departing from the general principles of the same. Any terms of degree such as “substantially,” “about,” and “approximate” as used herein mean a reasonable amount of deviation of the modified term such that the end result is not significantly changed. For example, these terms can be construed as including a deviation of at least ±5% of the modified term if this deviation would not negate the meaning of the word it modifies.

[0071] The present technology has been described above with reference to an exemplary embodiment. However, changes and modifications may be made to the exemplary embodiment without departing from the scope of the present technology. These and other changes or modifications are intended to be included within the scope of the present technology.

Claims

1. A fitting for a construction system for a glass panel having a mullion with at least one guide track disposed at least partially along at least one dimension of the mullion, a curved exterior face, and a guide channel extending along a length of the curved exterior face, the fitting comprising: an inner fitting configured to be slidably coupled to the curved exterior face of the mullion, comprising: an angular variation device; a panel support surface; and an arm extending between the angular variation device and the panel support surface; an outer fitting; and a first fastener coupling the outer fitting to the inner fitting; wherein the fitting is selectively adjustable along the guide track while engaged to the guide track and a portion of the glass panel is received between the inner fitting and the outer fitting.

2. The construction system of claim 1, wherein an angular variation device comprises a radial surface configured to alter the angle of the glass panel with respect to a centerline of the mullion.

3. The construction section of claim 2, wherein the radial surface is convex with respect to an exterior surface of the glass panel.

4. The construction section of claim 3, wherein the radial surface is oriented parallel to the curved exterior face of the mullion when the inner fitting is coupled to the curved exterior surface of the mullion.
5. The construction system of claim 1, further comprising a gasket located between the panel support surface of the inner fitting and the glass panel and the outer fitting and the glass panel.
6. The construction system of claim 1, wherein the radial surface of the inner fitting comprises at least one aperture configured to couple the fitting to the mullion.
7. The construction system of claim 1, further comprising a second fastener coupling the inner fitting to the mullion, comprising: an interior piece positioned inside the guide track; and an exterior piece positioned outside of the guide track.
8. The construction section of claim 2, wherein the radial surface is concave with respect to an exterior surface of the glass panel.
9. The construction section of claim 8, wherein the radial surface is oriented parallel to the curved exterior face of the mullion.
10. A construction system for a glass panel, comprising: a mullion comprising: at least one guide track disposed at least partially along at least one dimension of the mullion; a curved exterior face; and a guide channel extending along a length of the curved exterior face; a fitting configured to be slidably coupled to the curved exterior face, comprising: an inner fitting comprising an angular variation device, a panel support surface, and an arm extending between the angular variation device and the panel support surface; an outer fitting; and a first fastener coupling the inner fitting to the mullion, comprising: an interior piece positioned inside the guide track; an exterior piece positioned outside of the guide track; a second fastener coupling the outer fitting to the inner fitting; wherein the fitting is selectively adjustable along the guide track while engaged to the guide track and a portion of the glass panel is received between the inner fitting and the outer fitting.
11. The construction system of claim 10, wherein an angular variation device comprises a radial surface configured to alter the angle of the glass panel with respect to a centerline of the mullion.
12. The construction section of claim 11, wherein the radial surface is convex with respect to an exterior surface of the glass panel.
13. The construction section of claim 12, wherein the radial surface is oriented parallel to the curved exterior face of the mullion when the inner fitting is coupled to the curved exterior surface of the mullion.
14. The construction section of claim 12, wherein the radial surface is concave with respect to an exterior surface of the glass panel.
15. The construction section of claim 14, wherein the radial surface is oriented parallel to the curved exterior face of the mullion when the inner fitting is coupled to the curved exterior surface of the mullion.
16. The construction system of claim 10, further comprising a gasket located between the panel support surface of the inner fitting and the glass panel and the outer fitting and the glass panel.
17. The construction section of claim 10 further comprising an angled hanger fitting configured to be slidably coupled to the curved exterior face of the mullion, comprising: an angular variation device; a panel support; a support arm connecting the angular variation device and the panel support surface; and a fastener coupling the angled hanger fitting to the mullion, comprising: an interior piece positioned inside the guide track; an exterior piece positioned outside of the guide track; wherein the angled hanger fitting is selectively adjustable along the guide track while engaged to the guide track and a portion of the glass panel is supported by the panel support.
18. The construction system of claim 17, wherein an angular variation device comprises a radial surface configured to alter the angle of the glass panel with respect to a centerline of the mullion.
19. An angled hanger fitting for a construction system for a glass panel having a mullion with at least one guide track disposed at least partially along at least one dimension of the mullion, a curved exterior face, and a guide channel extending along a length of the curved exterior face, the

fitting comprising: an angular variation device; a panel support; a support arm connecting the angular variation device and the panel support surface; and a fastener coupling the angled hanger fitting to the mullion, comprising: an interior piece positioned inside the guide track; an exterior piece positioned outside of the guide track; wherein the angled hanger fitting is selectively adjustable along the guide track while engaged to the guide track and a portion of the glass panel is supported by the panel support.