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LOCKING SYSTEM FOR TELECOMMUNICATIONS TRAY AND EQUIPMENT

Abstract

A locking system and a tray assembly for a telecommunications tray are provided. The locking system is attachable to a wall at a housing of the tray assembly. The locking system is configured to selectively inhibit movement of a tray base from an extended position and a retracted position. The locking system includes a member and a limiter attachable to a mount. The member is positioned in sliding arrangement relative to the limiter. The limiter includes a selectively deformable tab. The member is translatable along a first direction to apply a force from the member to the tab to position the tab in a locked position to align the at least a portion of the tab with the mount along the direction of travel. The member is translatable along a second direction to allow the tab to position in an unlocked position removing the tab from alignment with the mount.

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Background/Summary

PRIORITY STATEMENT

[0001] The present application claims the benefit of priority to Chinese patent application number 202410178528.1, filed Feb. 8, 2024, the disclosure of which is incorporated by reference herein in its entirety.

FIELD

[0002] The present disclosure relates generally to telecommunications equipment, and more particularly to equipment for fiber optic cables.

BACKGROUND

[0003] Trays and shelves are used for telecommunications to hold fiber optic cables in desired positions to mate with other cables. Each shelf contains individual pull-out trays. Each tray includes a plurality of adapters that cables plug into to form mated pairs. The trays are pulled outward from the shelf to a position to facilitate a user with manipulation of the cables. As cables are plugged into or unplugged from the adapters, the force of manipulating these trays can cause the tray to undesirably slide back into the shelf. Such undesirable backsliding causes loss of efficiency, time, and effort, as the tray must be moved back into the desired position for the user to perform tasks, administration, or manipulation at the tray.

[0004] A tray that can affix into a desired position would be beneficial and advantageous. Furthermore, mechanisms for affixing the tray into the desired position that limit space or interference with cables would be beneficial and advantageous.

BRIEF DESCRIPTION

[0005] Aspects and advantages of the invention will be set forth in part in the following description, or may be understood from the description, or may be learned through practice of the invention.

[0006] An aspect of the present disclosure is directed to a tray assembly for a telecommunications tray. The tray assembly includes a housing including a wall coupled to a mount. A tray base is in sliding arrangement relative to the mount. The tray base is configured to move between an extended position at least partially extending out of the housing and a retracted position into the housing. A locking system is coupled to the wall at the housing. The locking system is configured to selectively inhibit movement of the tray base from the extended position and the retracted position. The locking system includes a member extending along a direction of travel of the tray base. The locking system includes a limiter coupled to the mount. The member is positioned in sliding arrangement relative to the limiter. The limiter includes a selectively deformable tab. The member is translatable along a first direction to apply a force from the member to the deformable tab to position the deformable tab in a locked position to align the at least a portion of the deformable tab with the mount along the direction of travel of the tray base. The member is translatable along a second direction to allow the deformable tab to position in an unlocked position removing the deformable tab from alignment with the mount along the direction of travel of the tray base.

[0007] Another aspect of the present disclosure is directed to a locking system for a tray assembly. The locking system includes a member extending along a direction of travel of the tray assembly.

The member includes a recess. A limiter is attachable to a fixed structure at the tray assembly. The limiter includes an opening into which the member is extendable in sliding arrangement along the direction of travel of the tray assembly. The limiter includes a selectively deformable tab including a compliant, elastic material. The member is translatable along a first direction to allow the deformable tab to extend at least partially into the recess at the member to position the locking system in an unlocked position. The member is translatable along a second direction to apply a force from the member to the deformable tab to position the locking system in a locked position. [0008] These and other features, aspects and advantages of the present invention will become better understood with reference to the following description and appended claims. The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention.

Description

BRIEF DESCRIPTION OF FIGURES

[0009] A full and enabling disclosure of the present invention, including the best mode thereof, directed to one of ordinary skill in the art, is set forth in the specification, which makes reference to the appended figures, in which:

[0010] FIG. 1 depicts an exemplary embodiment of a mount system in accordance with aspects of the present disclosure;

[0011] FIG. 2 depicts an exemplary embodiment of a tray assembly in accordance with aspects of the present disclosure;

[0012] FIG. 3 depicts an exemplary embodiment of a locking system in accordance with aspects of the present disclosure;

[0013] FIG. 4A depicts an exemplary embodiment of the tray assembly including an embodiment of the locking system in an unlocked position in accordance with aspects of the present disclosure;

[0014] FIG. 4B depicts a detailed view at the tray assembly of FIG. 4A in accordance with aspects of the present disclosure;

[0015] FIG. 5A depicts an exemplary embodiment of the tray assembly including an embodiment of the locking system in a locked position in accordance with aspects of the present disclosure;

[0016] FIG. 5B depicts a detailed view at the tray assembly of FIG. 5A in accordance with aspects of the present disclosure;

[0017] FIG. 6A depicts an exemplary embodiment of the tray assembly in a closed position and the locking system in the unlocked position in accordance with aspects of the present disclosure;

[0018] FIG. 6B depicts a detailed view at the tray assembly of FIG. 6A in accordance with aspects of the present disclosure;

[0019] FIG. 7A depicts an exemplary embodiment of the tray assembly in a closed position and the locking system in the locked position in accordance with aspects of the present disclosure;

[0020] FIG. 7B depicts a detailed view at the tray assembly of FIG. 7A in accordance with aspects of the present disclosure;

[0021] FIG. 8A depicts an exemplary embodiment of the tray assembly in an open position and the locking system in the unlocked position in accordance with aspects of the present disclosure;

[0022] FIG. 8B depicts a detailed view at the tray assembly of FIG. 8A in accordance with aspects of the present disclosure;

[0023] FIG. 9A depicts an exemplary embodiment of the tray assembly in an open position and the locking system in the locked position in accordance with aspects of the present disclosure;

[0024] FIG. 9B depicts a detailed view at the tray assembly of FIG. 9A in accordance with aspects of the present disclosure;

[0025] FIG. 10A depicts an exemplary embodiment of the tray assembly in an open position and the locking system in the unlocked position in accordance with aspects of the present disclosure; [0026] FIG. 10B depicts a detailed view at the tray assembly of FIG. 10A in accordance with aspects of the present disclosure; [0027] FIG. 10C depicts a detailed view at the tray assembly of FIG. 10A in accordance with aspects of the present disclosure; [0028] FIG. 11A depicts an exemplary embodiment of the tray assembly in an open position and the locking system in the locked position in accordance with aspects of the present disclosure; [0029] FIG. 11B depicts a detailed view at the tray assembly of FIG. 11A in accordance with aspects of the present disclosure; [0030] FIG. 11C depicts a detailed view at the tray assembly of FIG. 11A in accordance with aspects of the present disclosure; [0031] FIG. 12A depicts an exemplary embodiment of the tray assembly in a closed position and the locking system in the unlocked position in accordance with aspects of the present disclosure; [0032] FIG. 12B depicts a detailed view at the tray assembly of FIG. 12A in accordance with aspects of the present disclosure; [0033] FIG. 12C depicts a detailed view at the tray assembly of FIG. 12A in accordance with aspects of the present disclosure; [0034] FIG. 13A depicts an exemplary embodiment of the tray assembly in a closed position and the locking system in the locked position in accordance with aspects of the present disclosure; [0035] FIG. 13B depicts a detailed view at the tray assembly of FIG. 13A in accordance with aspects of the present disclosure; [0036] FIG. 13C depicts a detailed view at the tray assembly of FIG. 13A in accordance with aspects of the present disclosure; [0037] FIG. 14A depicts an exemplary detailed view of the locking system in an unlocked position in accordance with aspects of the present disclosure; [0038] FIG. 14B depicts an exemplary detailed view of the locking system in a locked position in accordance with aspects of the present disclosure. [0039] FIG. 15A depicts an exemplary detailed view of the locking system in an unlocked position in accordance with aspects of the present disclosure; [0040] FIG. 15B depicts an exemplary detailed view of the locking system in a locked position in accordance with aspects of the present disclosure. [0041] Repeat use of reference characters in the present specification and drawings is intended to represent the same or analogous features or elements of the present invention.

DETAILED DESCRIPTION

[0042] Reference now will be made in detail to embodiments of the invention, one or more examples of which are illustrated in the drawings. Each example is provided by way of explanation of the invention, not limitation of the invention. In fact, it will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the scope or spirit of the invention. For instance, features illustrated or described as part of one embodiment can be used with another embodiment to yield a still further embodiment. Thus, it is intended that the present invention covers such modifications and variations as come within the scope of the appended claims and their equivalents.

[0043] The detailed description uses numerical and letter designations to refer to features in the drawings. Like or similar designations in the drawings and description have been used to refer to like or similar parts of the invention.

[0044] As used herein, the terms “first”, “second”, and “third” may be used interchangeably to distinguish one component from another and are not intended to signify location or importance of the individual components. The singular forms “a,” “an,” and “the” include plural references unless the context clearly dictates otherwise. The terms “coupled,” “fixed,” “attached to,” and the like

refer to both direct coupling, fixing, or attaching, as well as indirect coupling, fixing, or attaching through one or more intermediate components or features, unless otherwise specified herein. As used herein, the terms “comprises,” “comprising,” “includes,” “including,” “has,” “having” or any other variation thereof, are intended to cover a non-exclusive inclusion. For example, a process, method, article, or apparatus that comprises a list of features is not necessarily limited only to those features but may include other features not expressly listed or inherent to such process, method, article, or apparatus. Further, unless expressly stated to the contrary, “or” refers to an inclusive- or and not to an exclusive- or. For example, a condition A or B is satisfied by any one of the following: A is true (or present) and B is false (or not present), A is false (or not present) and B is true (or present), and both A and B are true (or present).

[0045] Terms of approximation, such as “about,” “generally,” “approximately,” or “substantially,” include values within ten percent greater or less than the stated value. When used in the context of an angle or direction, such terms include within ten degrees greater or less than the stated angle or direction. For example, “generally vertical” includes directions within ten degrees of vertical in any direction, e.g., clockwise or counter-clockwise.

[0046] Benefits, other advantages, and solutions to problems are described below with regard to specific embodiments. However, the benefits, advantages, solutions to problems, and any feature(s) that may cause any benefit, advantage, or solution to occur or become more pronounced are not to be construed as a critical, required, or essential feature of any or all the claims.

[0047] Referring now to the drawings, FIGS. **1-15** depict embodiments of a locking system **130** for a tray assembly **115** for a telecommunications closure, cassette, equipment, or tray **110**.

Embodiments of a mount system **100** may include the locking system **130**, the tray assembly **115**, and the tray **110**. However, it should be appreciated that embodiments of the locking system **130** may be included with various embodiments of trays or shelves. Additionally, or alternatively, embodiments of the locking system **130** and tray assembly **115** may be utilized with various equipment, including other telecommunications equipment, fiber optic equipment, closures, cassettes, or trays.

[0048] A lateral axis L and transverse axis T perpendicular to one another are provided for reference. Additionally, a vertical axis V may extend mutually orthogonal to the lateral axis L and transverse axis T. In various embodiments, the transverse axis T corresponds to a direction along which the locking system **130**, the tray assembly **115**, and/or the tray **110** may pull, push, extend, retract, insert, or remove, such as from a shelf. The lateral axis L may generally correspond to a major axis of extension of the cassette **110** at a shelf. However, it should be appreciated that the cassette **110** may be rotated or stacked along a minor axis, such as corresponding to a vertical axis.

[0049] The locking system **130** is coupled to a wall **114** at a housing **111**. The locking system **130** is configured to selectively inhibit movement of a tray base **120** from an extended position and a retracted position. The locking system **130** includes a member **132, 134** extending along a desired direction of travel of the tray base **120** (e.g., along the transverse axis T). The locking system **130** includes a limiter **140** coupled to a fixed structure at the housing **111**, such as a mount **118**. The member **132, 134** is positioned in sliding arrangement relative to the limiter **140**, such as in sliding arrangement along the desired direction of travel.

[0050] The limiter **140** includes a selectively deformable tab **144**. The member **132, 134** is translatable along a first direction along the direction of travel (e.g., along direction **147** in FIG. **12B**) to apply a force from the member **132, 134** to the deformable tab **144** to position the tab **144** in a locked position to align at least a portion of the tab **144** with the fixed structure along the direction of travel of the tray base **120**. The member **132, 134** is translatable along a second direction (e.g., opposite of the first direction, such as along direction **145** depicted in FIG. **13B**) to allow the tab **144** to position in an unlocked position removing the deformable tab **144** from alignment with the fixed structure along the direction of travel of the tray base **120**.

[0051] The locking system **130** may include a user interface tab **136** positioned at the member **132**,

134. The user interface tab **136** is configured to receive force to translate the member **132, 134** along a first direction or second direction along the direction of travel. The user interface tab **136** may provide a structure at which a user may push to translate the member **132, 134** to deform the tab **144**. For instance, translation of the tab **144** along the direction of travel of the tray base **120**, such as the transverse axis T, is depicted from FIG. 4A to FIG. 5A, from FIG. 6A to FIG. 7A, from FIG. 8A to FIG. 9A, from FIG. 10A to FIG. 11A, and from FIG. 12A to FIG. 13A. Deformation of the tab **144** aligns to a surface that prevents translation of the tray base **120**, such as depicted from FIG. 14A to FIG. 14B and from FIG. 15A to FIG. 15B. In various embodiments, the tab **144** is deformed to align at least a portion of the tab **144** with a fixed structure along the direction of travel of the tray base **120**. The fixed structure includes a fixed or non-moving portion of the housing **111**, such as a mount **118** or a sidewall **117** of the housing **111**.

[0052] In various embodiments, the deformable tab **144** includes an elastic, compliant material configured to position the locking system **130** in the unlocked position when the member **132, 134** is removed from the deformable tab **144**. The force from the member **132, 134** bends the deformable tab **144** to the locked position. For instance, FIG. 14A and FIG. 15A depict the tab **144** in an unforced position in which the tab **144** is recessed into the limiter **140**. FIG. 14B and FIG. 15B depict the tab **144** in a forced position in which the tab **144** is protruded to at least partially align with a fixed structure at the housing **111** along the direction of travel of tray base **120**. In various embodiments, the member **132, 134** contacts the tab **144** to push the tab **144** substantially along a direction perpendicular to the direction of travel, such as depicted at arrow **143** in FIG. 15B.

[0053] In some embodiments, the tray **110** may generally connect or rest at the tray rail **114**. The tray rail **114**, or plurality thereof, may be attached to a base wall **116** via the mount **118**. The sidewall **117** may extend from the base wall **116**, and a housing **111** may provide an exterior wall for housing a plurality of trays **110**. One or more trays **110** may extend or retract from the housing **111**, such as further described herein. For instance, the tray rail **114** may couple to the sidewall **117**. Rollers or roller pins may facilitate extension and retraction of the tray assembly **115** into or out of a shelf. For instance, a pushed-in, retracted, or closed state may position the tray **110** within the shelf. A pulled-out, extended, or open state may position the equipment at least partially extending out of the shelf. A door **112** may be articulated to selectively reveal or conceal one or more trays **110**. Embodiments of the locking system **130** depicted and described herein are configured to selectively lock and unlock the tray assembly **115** while in either the pushed-in/retracted state or pulled-out extended state.

[0054] The locking system **130** may include the user interface tab **136** at which the user may pull to translate the member to allow the tab **144** to return to an un-deformed position, such as depicted as translating along the transverse axis T from FIG. 5A to FIG. 4A, from FIG. 7A to FIG. 6A, from FIG. 9A to FIG. 8A, from FIG. 11A to FIG. 10A, and from FIG. 13A to FIG. 12A. Pulling the user interface tab **136** removes a force from application to the tab **144**, such as to allow the tab **144** to un-deform or restore to a non-obstructing position, such as depicted at FIG. 14A and FIG. 15A. As such, movement of the tray base **120** along the direction of travel (e.g., along the transverse axis T) is selectively obstructed and unobstructed to selectively inhibit and permit movement along the direction of travel.

[0055] Embodiments of the locking system **130** allow the tray **110** to be locked from movement in a closed position and an open position. As such, the locking system **130** may beneficially and advantageously limit tray movement, such as to prevent inadvertent or undesired cable manipulation or movement.

[0056] Referring to FIG. 3, in various embodiments, the locking system **130** may include the user interface tab **136** attached to the member **132, 134**, such as a rail, rod, platform, or wall. The member **132, 134** may generally extend co-directional to an axis of desired movement of the tray, such as along the transverse axis T. In some embodiments, the member includes a first portion **134**

and a second portion **132** and a stop wall **142** positioned between the portions **132**, **134**. The first portion **134** may form an end proximate to the user, such as at which the user interface tab **136** is positioned. The second portion **12** may form an end distal to the user, such as proximate to the tray rail **114** or positioned internal to the system **100**. The stop wall **142** may be positioned at the member **132**, **134** to limit or inhibit movement of the member **132**, **134**, such as along the transverse axis T.

[0057] The locking system **130** includes the limiter **140** at which the deformable tab **144** is positioned. In various embodiments, the tab **144** is formed of an elastic or selectively deformable material, such as to facilitate deformation between an unlocked position (e.g., depicted in FIG. **14A** and FIG. **15A**) and a locked position (e.g., depicted in FIG. **14B** and FIG. **15B**). The tab **144** may extend co-directional to the axis of desired movement of the tray, such as along the transverse axis T, and deform in a direction substantially perpendicular to the axis of desired movement (e.g., depicted along direction **143** in FIG. **15B**).

[0058] In various embodiments, the limiter **140** includes a wall, block, or body at which the tab **144** is formed. The limiter **140** is coupled or fastened (e.g., depicted at fastener **137** at FIG. **4B** and FIG. **5B**) to a sidewall or tray rail **114** of the housing **111**. In some embodiments, the limiter **140** is coupled to the member, such as at the second portion **132**. The limiter **140** forms a body at which the member, such as at the second portion **132**, is permitted to selectively contact the deformable tab **144**. For instance, the member **132**, **134** is coupled to the limiter **140** in sliding arrangement. In various embodiments, the limiter **140** includes an opening **149** through which the member **132** is extendable in sliding arrangement along the direction of travel to selectively contact the deformable tab **144**.

[0059] In some embodiments, the member **132** includes a first limiter **140A** and a second limiter **140B** separated from one another along the direction of travel of the tray base **120** (e.g., along transverse axis T). The first limiter **140A** is positioned to inhibit movement along a first direction (e.g., direction **147** in FIG. **12B**), and the second limiter **140B** is positioned to inhibit movement along a second direction (e.g., direction **145** in FIG. **13B**) opposite along the direction of travel from the first direction. For instance, the limiters **140** may be positioned adjacent to a fixed structure, such as mount **118**. Protrusion of the tab **144** in alignment with the fixed structure along the direction of travel inhibits movement of the tray base **120** along direction of travel.

[0060] In various embodiments, the deformable tab **144** includes a protrusion **148** configured to selectively extend into and out of alignment with the fixed structure (e.g., mount **118**) along the direction of travel (e.g., transverse axis T). The member **132** is configured to contact the protrusion **148** to position the deformable tab **144** in the locked position. The protrusion **148** extends substantially along a direction perpendicular to the direction of travel. When the member **132** contacts the deformable tab **144** at the protrusion **148**, the tab **144** is bent or otherwise moved to position the tab **144** in the locked position.

[0061] In some embodiments, the member **132** includes a recess **133** into which at least a portion of the deformable tab **144** is extendable. The recess **133** may generally form a depression, opening, or nadir into the member **132**. For instance, the recess **133** forms a void allowing the tab **144**, or the protrusion **148** thereof, to extend perpendicular to the direction of travel of the tray base **120**, such as depicted in FIG. **11C** at direction **141**. For instance, in an embodiment of operation, the tab **144** is extended into the recess **133** when the tab **144** is in the unlocked position. In still some embodiments, the protrusion **148** extends into the recess **133** when the tab **144** is in the unlocked position.

[0062] In an embodiment of operation, when the user pushes the member **132** along the first direction **147**, the member **132** moves relative to the tab **144** to remove the tab **144** from the recess **133**. The tab **144**, such as the protrusion **148**, contacts the member **132**, and the member **132** bends the tab **144** at least partially along the direction perpendicular to the direction of travel (e.g., depicted via arrow **143**) to align the tab **144** with the mount **118** along the direction of travel.

Alignment of the tab **144** and the mount **118** obstructs movement of the tray rail **118**, such as to lock the tray base **120** in either the retracted or extended position, as further described herein. [0063] In still an embodiment of operation, when the user pulls the member **132** along the second direction **145**, the member **132** moves relative to the tab **144** to position the tab **144**, such as the protrusion **148**, in the recess **133**. Positioning the tab **144** in the recess **133** removes the force deforming the tab **144** into alignment with the mount **118**, such as to remove the obstruction along the direction of travel and permit movement of the tray base **120**.

[0064] The tray assembly **115** may include a rod or rail **146** in sliding arrangement with a mount **118**. The tray base **120** may include the rail **146** extending along a direction of travel of the tray **110**, such as along the transverse axis T. The mount **118** includes a fastening interface at which the sidewall **117** is attachable to the mount **118**. The tray **110** or tray assembly **115** may include rollers or roller pins facilitating movement of the tray along the rail **146**, such as to position the tray **110** in a pushed-in state retracted into the housing **111** or a shelf, or a pulled-out state extending from or outside of the housing **111** or the shelf. For instance, FIG. **12A** and FIG. **13A** depict a plurality of trays **110** in an un-pulled or pushed-in state, and FIG. **10A** and FIG. **11A** depict one of a plurality of trays **110** in the pulled-out state.

[0065] Referring to FIGS. **6A-6B** and FIGS. **7A-7B**, in an exemplary operation of the tray assembly **115**, the tray assembly **115** is in a pushed-in state into a shelf or tray **110**. FIGS. **7A-7B** depict the locking assembly **130** pushed-in or locked position along the transverse axis T in contrast to the pulled-out position or unlocked position depicted in FIGS. **6A-6B**. In the pushed-in or locked position, such as depicted in detail in FIG. **7B**, the tab **144** at the locking system **130** is deformed. FIG. **14B** and FIG. **15B** further depict an exemplary deformation of the tab **144** at the limiter **140**, such as extending or protruding outward or substantially perpendicular to the direction of travel of the member **132**, **134** or tray **115** relative to the un-deformed state depicted in FIG. **14A** and FIG. **15A**. For instance, arrow **143** provides a reference direction substantially perpendicular along which the tab **144** is deformed. Arrow **143** may correspond substantially to the lateral axis L perpendicular to the axis of movement of the tray along the transverse axis T.

[0066] Referring to FIGS. **8A-8B** and FIGS. **9A-9B**, in an exemplary operation of the tray assembly **115**, the tray assembly **115** is in a pulled-out state extending from or outside a shelf or tray **110**. FIGS. **9A-9B** depict the locking assembly **130** pushed-in or locked position along the transverse axis T in contrast to the pulled-out position or unlocked position depicted in FIGS. **8A-8B**. In the pushed-in or locked position, such as depicted in detail in FIG. **9B**, the tab **144** at the locking system **130** is deformed, such as exemplarily depicted and described in regard to FIG. **14B** and FIG. **15B**.

[0067] Referring now to FIG. **10A** and FIG. **11A**, and further depicted in detail in FIG. **10B** and FIG. **11B**, respectively, in some embodiments, the locking system **130** includes a limit pin **138** extending from the member **134**. The limit pin **138** forms a detent along the direction of travel of the tray, such as along the transverse axis T. The limit pin **138** may include a member or head extending through a slot **139** extending through the member **134** along the direction of travel, such as extending along the transverse axis T. The limit pin **138** may be attached to a tray base **120**. The limit pin **138** attached to the tray base **120** may provide a point relative to the tray base **120** to limit relative movement of the locking system **130**.

[0068] For instance, referring to FIGS. **10A-10C** and FIGS. **11A-11C**, the tray is positioned in a pulled or extended state from the shelf. Referring to FIGS. **10A-10C**, the limit pin **138** is in a first position, such as at a distal end at the slot **139**, corresponding to an unlocked position of the locking system **130**. In an exemplary embodiment of operation of the locking system **130**, the user may press or push the user interface tab **136** along the transverse axis T to translate the locking system **130** from an unlocked state (depicted in FIGS. **10A-10C** and FIG. **14A** and FIG. **15A**) to a locked state (depicted in FIGS. **11A-11C** depicted in FIG. **14B** and FIG. **15B**). Referring to FIGS. **11A-11C**, the limit pin **138** is in a second position, such as at a proximal end at the slot **139**,

corresponding to the locked position of the locking system **130**. In an exemplary embodiment of operation of the locking system **130**, the user may pull the user interface tab **136** along the transverse axis T to translate the locking system **130** from the locked state to the unlocked state. [0069] In another instance, referring to FIGS. **12A-12C** and FIGS. **13A-13C**, the tray is positioned in an un-pulled or retracted state into the shelf. Referring to FIGS. **12A-12C**, the limit pin **138** is in a first position, such as at a distal end at the slot **139**, corresponding to an unlocked position of the locking system **130**. In an exemplary embodiment of operation of the locking system **130**, the user may press or push the user interface tab **136** along the transverse axis T to translate the locking system **130** from an unlocked state (depicted in FIGS. **12A-12C** and FIG. **14A** and FIG. **15A**) to a locked state (depicted in FIGS. **13A-13C** depicted in FIG. **14B** and FIG. **15B**). Referring to FIGS. **13A-13C**, the limit pin **138** is in a second position, such as at a proximal end at the slot **139**, corresponding to the locked position of the locking system **130**. In an exemplary embodiment of operation of the locking system **130**, the user may pull the user interface tab **136** along the transverse axis T to translate the locking system **130** from the locked state to the unlocked state. [0070] Embodiments of the locking system provided herein may beneficially and advantageously provide inhibits on movement of the tray. Embodiments provided herein provide selective locking and unlocking of the tray in extended or retracted positions, such as to inhibit undesired movement while in either the extended or retracted positions.

[0071] Embodiments provided herein may provide benefits over friction fits between rails and restrictor blocks. For instance, friction fits may hold the tray in certain positions, but the friction may be too easily overcome by force of insertion or removal of telecommunications equipment (e.g., a patch cord from an adapter). Various forces during manipulation, maintenance, or other work at the trays may be large enough to overcome the force of the friction fit and allow for undesired movement of the tray.

[0072] Embodiments of the locking system **130** may allow for one or more trays to be locked closed, such as to prevent manipulation of the cables when in position. Still various embodiments of the locking system **30** may allow for one or more trays to be locked open, such as to facilitate greater access to cables during insertion or removal of telecommunications equipment (e.g., patch cords). Embodiments of the locking system **130** may be configured such that forces corresponding to insertion or removal of cables cannot overcome the locking system, such as may prevent inadvertent and undesired movement of the tray and cables.

[0073] Further aspects of the disclosure are provided in one or more of the following clauses:

[0074] 1. A tray assembly for a telecommunications tray, the tray assembly including a housing including a wall coupled to a mount; a tray base in sliding arrangement relative to the mount, the tray base configured to move between an extended position at least partially extending out of the housing and a retracted position into the housing; and a locking system coupled to the wall at the housing, the locking system configured to selectively inhibit movement of the tray base from the extended position and the retracted position, the locking system including a member extending along a direction of travel of the tray base, the locking system including a limiter coupled to the mount, wherein the member is positioned in sliding arrangement relative to the limiter, the limiter including a selectively deformable tab, wherein the member is translatable along a first direction to apply a force from the member to the deformable tab to position the deformable tab in a locked position to align the at least a portion of the deformable tab with the mount along the direction of travel of the tray base, and wherein the member is translatable along a second direction to allow the deformable tab to position in an unlocked position removing the deformable tab from alignment with the mount along the direction of travel of the tray base.

[0075] 2. The tray assembly of any one or more clauses herein, wherein the deformable tab includes an elastic, compliant material configured to position in the unlocked position when the member is removed from the deformable tab, and wherein the force from the member bends the deformable tab to the locked position.

[0076] 3. The tray assembly of any one or more clauses herein, wherein the deformable tab includes a protrusion configured to contact the member to position the deformable tab in the locked position, and wherein the protrusion is configured to align with the mount along the direction of travel of the tray base to position the deformable tab in the locked position.

[0077] 4. The tray assembly of any one or more clauses herein, wherein the deformable tab includes a protrusion configured to bend substantially perpendicular to the first direction or second direction to position the deformable tab in the unlocked position.

[0078] 5. The tray assembly of any one or more clauses herein, wherein the limiter forms a body at which the member is permitted to selectively contact the deformable tab.

[0079] 6. The tray assembly of any one or more clauses herein, wherein the deformable tab includes a protrusion, and wherein the member is configured to contact the protrusion to position the deformable tab in the locked position.

[0080] 7. The tray assembly of any one or more clauses herein, wherein the limiter forming the body forms an opening through which the member is extendable along the direction of travel to selectively contact the deformable tab.

[0081] 8. The tray assembly of any one or more clauses herein, wherein the member includes a recess, and wherein the deformable tab is extended into the recess when the deformable tab is in the unlocked position.

[0082] 9. The tray assembly of any one or more clauses herein, wherein the deformable tab includes a protrusion extending substantially perpendicular to the first direction or the second direction, wherein the protrusion extends into the recess when the deformable tab is in the unlocked position.

[0083] 10. The tray assembly of any one or more clauses herein, wherein the locking system includes a limit pin extending from the member, the limit pin forming a detent along the direction of travel.

[0084] 11. The tray assembly of any one or more clauses herein, wherein the limit pin is positioned in a slot at the member and extending along the direction of travel of the tray base, and wherein an extension of the slot along the direction of travel and the limit pin extending from the slot limits movement of the member along the direction of travel.

[0085] 12. The tray assembly of any one or more clauses herein, wherein the limit pin is affixed to the tray base and extending through the slot at the member.

[0086] 13. The tray assembly of any one or more clauses herein, wherein the locking system includes a user interface tab positioned at the member, the user interface tab configured to receive the force to translate the member along the first direction or the second direction.

[0087] 14. The tray assembly of any one or more clauses herein, the tray base including a rail extending along the direction of travel in sliding arrangement with the mount.

[0088] 15. The tray assembly of any one or more clauses herein, wherein the member includes a first limiter and a second limiter separated from one another along the direction of travel of the tray base, wherein the first limiter is positioned to inhibit movement along the first direction, and wherein the second limiter is positioned to inhibit movement along the second direction opposite along the direction of travel from the first direction.

[0089] 16. A locking system for a tray assembly, the locking system including a member extending along a direction of travel of the tray assembly, the member including a recess; a limiter attachable to a fixed structure at the tray assembly, wherein the limiter includes an opening into which the member is extendable in sliding arrangement along the direction of travel of the tray assembly, the limiter including a selectively deformable tab including a compliant, elastic material, wherein the member is translatable along a first direction to allow the deformable tab to extend at least partially into the recess at the member to position the locking system in an unlocked position, and wherein the member is translatable along a second direction to apply a force from the member to the deformable tab to position the locking system in a locked position.

[0090] 17. The locking system of any one or more clauses herein, wherein the deformable tab includes an elastic, compliant material configured to position in the unlocked position when the member is removed from the deformable tab, and wherein the force from the member bends the deformable tab to the locked position.

[0091] 18. The locking system of any one or more clauses herein, wherein the deformable tab includes a protrusion configured to contact the member to position the deformable tab in the locked position.

[0092] 19. The locking system of any one or more clauses herein, wherein the protrusion is configured to align with the fixed structure along the direction of travel of the tray base to position the deformable tab in the locked position.

[0093] 20. The locking system of any one or more clauses herein, wherein the member includes a first limiter and a second limiter separated from one another along the direction of travel of the tray base, wherein the first limiter is positioned to inhibit movement along the first direction, and wherein the second limiter is positioned to inhibit movement along the second direction opposite along the direction of travel from the first direction.

[0094] 21. A tray assembly for a telecommunications tray, including the locking system of any one or more clauses herein.

[0095] This written description uses examples to disclose the invention, including the best mode, and also to enable any person skilled in the art to practice the invention, including making and using any devices or systems and performing any incorporated methods. The patentable scope of the invention is defined by the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they include structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal languages of the claims.

Claims

1. A tray assembly for a telecommunications tray, the tray assembly comprising: a housing comprising a wall coupled to a mount; a tray base in sliding arrangement relative to the mount, the tray base configured to move between an extended position at least partially extending out of the housing and a retracted position into the housing; and a locking system coupled to the wall at the housing, the locking system configured to selectively inhibit movement of the tray base from the extended position and the retracted position, the locking system comprising a member extending along a direction of travel of the tray base, the locking system comprising a limiter coupled to the mount, wherein the member is positioned in sliding arrangement relative to the limiter, the limiter comprising a selectively deformable tab, wherein the member is translatable along a first direction to apply a force from the member to the deformable tab to position the deformable tab in a locked position to align the at least a portion of the deformable tab with the mount along the direction of travel of the tray base, and wherein the member is translatable along a second direction to allow the deformable tab to position in an unlocked position removing the deformable tab from alignment with the mount along the direction of travel of the tray base.
2. The tray assembly of claim 1, wherein the deformable tab comprises an elastic, compliant material configured to position in the unlocked position when the member is removed from the deformable tab, and wherein the force from the member bends the deformable tab to the locked position.
3. The tray assembly of claim 2, wherein the deformable tab comprises a protrusion configured to contact the member to position the deformable tab in the locked position, and wherein the protrusion is configured to align with the mount along the direction of travel of the tray base to position the deformable tab in the locked position.

4. The tray assembly of claim 2, wherein the deformable tab comprises a protrusion configured to bend substantially perpendicular to the first direction or second direction to position the deformable tab in the unlocked position.
5. The tray assembly of claim 1, wherein the limiter forms a body at which the member is permitted to selectively contact the deformable tab.
6. The tray assembly of claim 5, wherein the deformable tab comprises a protrusion, and wherein the member is configured to contact the protrusion to position the deformable tab in the locked position.
7. The tray assembly of claim 5, wherein the limiter forming the body forms an opening through which the member is extendable along the direction of travel to selectively contact the deformable tab.
8. The tray assembly of claim 5, wherein the member comprises a recess, and wherein the deformable tab is extended into the recess when the deformable tab is in the unlocked position.
9. The tray assembly of claim 8, wherein the deformable tab comprises a protrusion extending substantially perpendicular to the first direction or the second direction, wherein the protrusion extends into the recess when the deformable tab is in the unlocked position.
10. The tray assembly of claim 1, wherein the locking system comprises a limit pin extending from the member, the limit pin forming a detent along the direction of travel.
11. The tray assembly of claim 10, wherein the limit pin is positioned in a slot at the member and extending along the direction of travel of the tray base, and wherein an extension of the slot along the direction of travel and the limit pin extending from the slot limits movement of the member along the direction of travel.
12. The tray assembly of claim 10, wherein the limit pin is affixed to the tray base and extending through the slot at the member.
13. The tray assembly of claim 1, wherein the locking system comprises a user interface tab positioned at the member, the user interface tab configured to receive the force to translate the member along the first direction or the second direction.
14. The tray assembly of claim 1, the tray base comprising a rail extending along the direction of travel in sliding arrangement with the mount.
15. The tray assembly of claim 1, wherein the member comprises a first limiter and a second limiter separated from one another along the direction of travel of the tray base, wherein the first limiter is positioned to inhibit movement along the first direction, and wherein the second limiter is positioned to inhibit movement along the second direction opposite along the direction of travel from the first direction.
16. A locking system for a tray assembly, the locking system comprising: a member extending along a direction of travel of the tray assembly, the member comprising a recess; a limiter attachable to a fixed structure at the tray assembly, wherein the limiter comprises an opening into which the member is extendable in sliding arrangement along the direction of travel of the tray assembly, the limiter comprising a selectively deformable tab comprising a compliant, elastic material, wherein the member is translatable along a first direction to allow the deformable tab to extend at least partially into the recess at the member to position the locking system in an unlocked position, and wherein the member is translatable along a second direction to apply a force from the member to the deformable tab to position the locking system in a locked position.
17. The locking system of claim 16, wherein the deformable tab comprises an elastic, compliant material configured to position in the unlocked position when the member is removed from the deformable tab, and wherein the force from the member bends the deformable tab to the locked position.
18. The locking system of claim 16, wherein the deformable tab comprises a protrusion configured to contact the member to position the deformable tab in the locked position.
19. The locking system of claim 18, wherein the protrusion is configured to align with the fixed

structure along the direction of travel of the tray base to position the deformable tab in the locked position.

20. The locking system of claim 16, wherein the member comprises a first limiter and a second limiter separated from one another along the direction of travel of the tray base, wherein the first limiter is positioned to inhibit movement along the first direction, and wherein the second limiter is positioned to inhibit movement along the second direction opposite along the direction of travel from the first direction.
