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Locking connector assembly

Abstract

A connector having a male component and a female component. The male component includes a midsection with switch mechanism. The female component includes a bearing surface bearing against the midsection of the male component in a first position of the bearing surface of the female component, and spaced from the midsection of the male component in other positions of the female component.

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References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
3449003	12/1968	Hunt	N/A	N/A
4042305	12/1976	Vincent	N/A	N/A
5579558	12/1995	Newman, Jr. et al.	N/A	N/A
6247199	12/2000	Petner	15/145	B25G 3/30
6595713	12/2002	Wilson	N/A	N/A
6688800	12/2003	Kresge	N/A	N/A
7540058	12/2008	Day	16/427	B25G 1/04
2010/0054852	12/2009	Snyder	N/A	N/A
2014/0197123	12/2013	McPhillips	N/A	N/A

FOREIGN PATENT DOCUMENTS

Patent No.	Application Date	Country	CPC
107895556	12/2017	CN	N/A
1166146	12/1963	DE	N/A
2236842	12/2009	EP	N/A

OTHER PUBLICATIONS

PCT Search Report and Written Opinion, Application No. PCT/US2020/052741, Dated: Dec. 11, 2020, 14 pages. cited by applicant

PCT Notification Concerning Transmittal of International Preliminary Report on Patentability and International Preliminary Report on Patentability, Application No. PCT/US2020/052741, dated Apr. 7, 2022, 10 pages. cited by applicant

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION (1) This application is a continuation of the U.S. application Ser. No. 18/318,413, filed on May 16, 2023 which is a continuation of U.S. application Ser. No. 16/582,402, filed on Sep. 25, 2019, now U.S. Pat. No. 11,686,412.

FIELD OF THE INVENTION

(1) The invention relates to a connection system and, more particularly, to a locking connector system for connecting a plurality of modular units.

BACKGROUND

(2) Decorative modular displays are commonly used in stage and set design. Generally, modular units are hung from a hanging support system using backdrop technology. A known modular display system uses a truss or theatre fly-system pipes to hang modular panels that clip together using rings or hooks to form a backdrop, which results in a decorative surface that is aesthetic while also increasing the range of available lighting effects. The backdrop is sized to fit the space required. In some circumstances, a floor support system may be used instead of a truss and/or backdrop. In the known floor support system, a temporary structure is set up from the floor, rather than suspended from the ceiling. The known floor support system includes metal pipes or tubes that connect to each other and the modular units hang from these metal pipes or tubes.

(3) When using pipes in the known floor support system, connecting pipes are commonly over tightened and damaged. Furthermore, known support systems include complex or permanent attachment mechanisms used to connect one modular unit to an adjacent modular unit. Such attachment restricts replacement of each modular unit and limits the flexibility of the entire display system. These known designs are expensive and require tedious, time-consuming labor in both assembly and dis-assembly. It has long been desired to have a modular display support system, or any structure, including furniture, deck legs, truss connectors, grids and frame, that can be quickly and securely constructed and deconstructed without sacrificing the structural integrity of the system. Further, there is a need for a connector system that is locking and deters movement of connected pieces when secured together and locked.

SUMMARY

(4) In view of the foregoing locking, a connector assembly, constructed in accordance with the present invention, is provided and includes a male component and a female component. The male component has a first tubular section, a second tubular section, and a midsection between the first tubular section and the second tubular section. The female component is connected to the second tubular section of the male component upon relative rotational movement between the male component and the female component and is disconnected from the second tubular section of the male component upon relative rotational movement between the male component and the female component in a direction opposite to the direction when the male component and the female component are being connected. The female component has a bearing surface bearing against the midsection of the male component in a first position of the bearing surface of the female component and is spaced from the midsection of the male component in other positions of the female component.

(5) A display system, constructed in accordance with the present invention, includes a base and a base insert having a flange above the base and a shank extending through the base. This display system also includes a locking connector assembly that has a male component and a female component. The male component of the locking connector assembly has a first tubular section, a second tubular section, and a midsection between the first tubular section and the second tubular section. The female component is connected to the second tubular section of the male component upon relative rotational movement between the male component and the female component and is disconnected from the second tubular section of the male component upon relative rotational movement between the male component and the female component in a direction opposite to the direction when the male component and the female component are being connected. The female component has a bearing surface bearing against the midsection of the male component in a first position of the bearing surface of the female component is spaced from the midsection of the male component in other positions of the female component. A display system, constructed in accordance with the present invention, further includes a pole having a first end connected to the locking connector assembly and a second end connected to the base insert. A display system, constructed in accordance with the present invention, also includes a display panel and a base insert

catch beneath the base aligned axially with the base insert and fixed to the base insert for anti-rotation.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

- (1) The invention will now be described by way of example with reference to the accompanying figures, of which:
- (2) FIG. 1 is a front view of a locking connector assembly constructed in accordance with the present invention after assembly.
- (3) FIG. 2A is a front view of the male component of a locking connector assembly constructed in accordance with the present invention.
- (4) FIG. 2B is a cross-section view of the female component of a locking connector assembly constructed in accordance with the present invention.
- (5) FIG. 3 is a perspective view of a portion of the male component of a locking connector assembly constructed in accordance with the present invention.
- (6) FIG. 4 is a perspective view, partially broken away, of the male component of a locking connector assembly constructed in accordance with the present invention.
- (7) FIG. 5 is a perspective view of the female component of a locking connector assembly constructed in accordance with the present invention.
- (8) FIG. 6 is an exploded perspective view of the male component of a locking connector assembly constructed in accordance with the present invention.
- (9) FIG. 7A is a cross-section view of the male component of a locking connector assembly constructed in accordance with the present invention in a first condition of operation of the locking connector assembly.
- (10) FIG. 7B is a cross-section view of the male component of a locking connector assembly constructed in accordance with the present invention in a second condition of operation of the locking connector assembly.
- (11) FIG. 8A is a second cross-section view of the male component of a locking connector assembly constructed in accordance with the present invention in the first condition of operation of the locking connector assembly.
- (12) FIG. 8B is a second cross-section view of the male component of a locking connector assembly constructed in accordance with the present invention in the second condition of operation of the locking connector assembly.
- (13) FIG. 9 is a perspective view of a display system constructed in accordance with the present invention.
- (14) FIG. 10 is a perspective view of a portion of a display system constructed in accordance with the present invention.
- (15) FIG. 11 is an exploded perspective view of portions of a display system constructed in accordance with the present invention.
- (16) FIG. 12 is a front view of a portion of a display system constructed in accordance with the present invention.
- (17) FIG. 13 is a perspective view of a base insert catch which is part of a display system constructed in accordance with the present invention.
- (18) FIG. 14A is a perspective view of a base insert for of the FIG. 13 base insert catch and which is part of a display system constructed in accordance with the present invention.
- (19) FIG. 14B is a side view of the FIG. 14A base insert catch.
- (20) FIG. 14C is a sectional view of the FIGS. 14A and 14B base insert catch.

DETAILED DESCRIPTION OF THE INVENTION

(21) The invention is explained in greater detail below with reference to embodiments of a modular display system. The invention, may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete and still fully convey the scope of the invention to those skilled in the art.

(22) Referring to FIGS. 1 through 8B, a locking connector assembly, constructed in accordance with the present invention, includes a male component **20** and a female component **22**. Male component **20** has a first tubular section **20a**, a second tubular section **20b**, and a midsection **20c** between first tubular section **20a** and second tubular section **20b**. Second tubular section **20b** of male component **20** has an external thread **20d** along the length thereof. For the embodiment of the present invention being described, external thread **20d** of second tubular section **20b** of male component **20** is a double helix.

(23) A locking connector assembly, constructed in accordance with the present invention, also includes a female component **22** connected to second tubular section **20b** of male component **20** upon relative rotational movement between the male component and the female component. Female component **22** also is disconnected from second tubular section **20b** of male component **20** upon relative rotational movement between the male component and the female component in a direction opposite to the direction when the male component and the female component are being connected. Female component **22** has an internal thread **22a** along the length thereof engaged with the external thread **20d** of the first tubular section of male component **20** upon relative rotational movement between the male component and the female component. For the embodiment of the present invention being described, internal thread **22a** of female component **22** is a double helix.

(24) Female component **22** has a bearing surface **22b** that bears against midsection **20c** of male component **20** in a first position of the bearing surface of the female component as shown in FIG. 1 and is spaced from the midsection of the male component in other positions of the female component until female component **22** is connected to male component **20** upon relative rotational movement between the male component and the female component.

(25) Bearing surface **22b** of female component **22** has at least one notch **22c** and can have additional notches such as a second notch **22c** spaced 180° from the first notch as shown in FIG. 5. As will be explained below, notches **22c** serve to lock female component **22** to male component **20** upon relative rotational movement between the male component and the female component.

(26) Midsection **20c** of male component **20** has a switch mechanism that includes a switch **24**, a resilient device **26**, and a catch **28**. Switch **24**, for example a pushbutton switch, is movable between a first, at rest, position and a second depressed position. As shown in FIGS. 6, 7A, and 7B, switch **24** can be secured in midsection **20c** of male component **20** by a pair of set fasteners **30** and **32**, such as bolts, screws, or other known fasteners.

(27) The resilient device **26**, such as a spring, compresses in response to movement of switch **24** from the first position of the switch to the second position of the switch. The resilient device **26** expands in response to movement of switch **24** from the second position of the switch to the first position of the switch.

(28) The resilient device **26** urges catch **28** to bear against bearing surface **22b** of female component **22** and enter the notch in the bearing surface of the female component first encountered upon relative rotational movement between male component **20** and female component **22**.

(29) Catch **28** is movable with switch **24** between: a first position outside a notch **22c** in bearing surface **22b** of female component **22** and bearing against the bearing surface of the female component and a second position in a notch in the bearing surface of the female component. For the embodiment of the present invention being described, catch **28** is integral with switch **24**. Catch **28** enters that notch **22c** that is encountered first upon relative rotational movement between male component **20** and the female component **22**.

(30) Referring to FIGS. 9 through 14C, a display system, constructed in accordance with the

present invention, includes a base **100** and a base insert **102**. Base insert **102** has a flange **102a** above base **100** and a shank **102b** extending through a through-hole opening **100a** in base **100**.

(31) A display system, constructed in accordance with the present invention, also includes a locking connector assembly **104**, such as the locking connector assembly described above in connection with FIGS. **1** through **8B**. Instead of repeating the entirety of the text above that is descriptive of this locking connector assembly, the above description of this connector is incorporated to the extent necessary to provide an understanding of how this locking connector assembly functions with the other components of a display system, constructed in accordance with the present intention, to produce the desired results. When the display system is assembled, the locking connector assembly is secured to base insert **102** by the threaded engagement of external thread **104a** of locking connector assembly and internal thread **102c** of base insert **102**.

(32) A display system, constructed in accordance with the present invention, also includes a pole **106**. When the display system is assembled, a first end **106a** of pole **106** is connected to locking connector assembly **104**, and a second end **106b** connected to the base insert **102**.

(33) A display system constructed in accordance with the present invention further includes a base insert catch **108** beneath base **100** and aligned axially with base insert **102** and fixed to base insert **102** for anti-rotation.

(34) A display system, constructed in accordance with the present invention, may also include a display panel (not shown).

(35) The foregoing illustrates some of the possibilities for practicing the invention. Many other embodiments are possible within the scope and spirit of the invention. It is, therefore, intended that the foregoing description be regarded as illustrative rather than limiting, and that the scope of the invention is given by the appended claims together with their full range of equivalents.

Claims

1. A locking connector assembly comprising: a male component having a midsection with a radially movable switch mechanism; and a female component rotatably engageable with the male component, the female component having a bearing surface bearing against the midsection of the male component in a first position of the bearing surface of the female component, and spaced from the midsection of the male component in other positions of the female component, the female component including at least one radial notch on the bearing surface, wherein: in a locked position the switch mechanism is engaged with the notch to prevent rotational or longitudinal displacement of the male and female components, and in an unlocked position, the switch mechanism is disengaged from the notch so as to allow rotational and longitudinal movement between the male and female components.
2. The locking connector assembly according to claim 1, wherein the female component is connected to one end of the male component upon relative rotational movement between the male component and the female component.
3. The locking connector assembly according to claim 2, wherein the female component is disconnected from the one end of the male component upon relative rotational movement between the male component and the female component in a direction opposite to the direction when the male component and the female component are being connected.
4. The locking connector assembly according to claim 1, wherein the male component has includes an external thread along one end thereof.
5. The locking connector assembly according to claim 4, wherein the female component has an internal thread along a length thereof engaged with the external thread upon relative rotational movement between the male component and the female component.
6. The locking connector assembly according to claim 5, wherein the external thread is a double helix and the internal thread of the female component is a double helix.

7. The locking connector assembly according to claim 6, wherein the bearing surface of the female component includes the notch.
 8. The locking connector assembly according to claim 7, wherein the bearing surface of the female component includes a plurality of notches.
 9. The locking connector assembly according to claim 1, wherein the female component has an internal thread along an entire length thereof.
 10. The locking connector assembly according to claim 9, wherein the bearing surface of the female component includes the notch, the notch extends through a portion of the internal thread.
 11. The locking connector assembly according to claim 9, wherein the bearing surface of the female component includes a plurality of notches.
 12. The locking connector assembly according to claim 11, wherein the plurality of notches include a first notch and a second notch, the second notch is spaced 180° from the first notch.
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