TELESCOPING LACER BAR FOR ELECTRONICS STORAGE RACK

Inventors: Robert Schluter, Kinnelon, NJ (US);
           Nico Corbo, Blakeslee, PA (US);
           John Franetovich, Glenwood, NJ (US)

Correspondence Address:
DRINKER BIDDLE & REATH
ATTN: INTELLECTUAL PROPERTY GROUP
ONE LOGAN SQUARE
18TH AND CHERRY STREETS
PHILADELPHIA, PA 19103-6996 (US)

Assignee: Middle Atlantic Products, Inc.

Filed: Nov. 30, 2005

Related U.S. Application Data

Provisional application No. 60/633,221, filed on Dec. 3, 2004.

ABSTRACT

An adjustable length lacer bar assembly having first and second elongated members is adapted for use with an electronics storage rack having first and second columns. The second member is telescopically received by the first member. The first and second members are respectively connectable to the first and second columns. The first and second members respectively include first and second tabs. In a first embodiment, the first and second mounting tabs are oriented substantially parallel to the direction of telescoping motion, and in a second embodiment, the first and second mounting tabs are oriented substantially perpendicular to the direction of telescoping motion.
FIG. 5
TELESCOPING LACER BAR FOR ELECTRONICS STORAGE RACK

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present application claims priority from U.S. Provisional Application No. 60/635,221, filed Dec. 3, 2004, which is incorporated herein in its entirety.

FIELD OF THE INVENTION

[0002] The present invention relates to storage racks used for storage of electronic components.

BACKGROUND OF THE INVENTION

[0003] It is known to provide fixed length lacer bars as an accessory to storage racks used for storage of electronic components. For example, Middle Atlantic Products, Inc. of Riverdale, N.J. provides a variety of fixed length lacer bars adapted for horizontal installation between vertical columns of an electronics storage rack. Electrical cables to and from the electronic components stored in the rack are secured to the lacer bars to reduce undesirable loads transferred by the cable to the cable connector and to improve tidiness and management of the cables within the rack. The lacer bars generally include a plurality of pre-openings, facilitating connection of the cables to the lacer bar using conventional connectors such as plastic cable ties.

[0004] It is further known to provide adjustable depth four-column electronics storage racks, such as that disclosed in U.S. Pat. No. 6,655,533 (Guebre-Tsadik). The invention of the '533 patent is disclosed to be adjustable in depth between 450 mm and 1050 mm (a range of approximately 17.7 inches to 41.3 inches).

[0005] In view of the adjustable depth storage racks such as those disclosed in the '533 patent, a need exists for adjustable length lacer bars adapted for use with adjustable depth storage racks. In most cases, the size of electronic equipment that must be rear hung determines the spacing between the front and rear vertical columns of an enclosure. Since there is no standard for these depths, which vary greatly, the use of telescoping lacer bars increases the flexibility of cable management and accessory installation within the enclosure.

SUMMARY OF THE INVENTION

[0006] In a first aspect, the invention is an adjustable length lacer bar assembly for use with an electronics storage rack having first and second columns. The lacer bar assembly comprises a first elongated member having a first end and a second end, and a second elongated member having a first end and a second end. The first end of the second member is telescopically received by the second end of the first member such that the lacer bar assembly is adjustable in length. The first end of the first member is connectable to the first column and the second end of the second member is connectable to the second column.

[0007] The electronics rack preferably has third and fourth columns. A first lacer bar assembly is connectable to the first and second columns, a second lacer bar assembly is connectable to the third and fourth columns, and a third lacer bar is connectable to the first and second lacer bar assemblies.

[0008] According to one embodiment, the first member includes a first tab proximate the first member first end, and the second member includes a second tab proximate the second member second end. The first and second tabs each define at least one hole adapted for receipt of a fastener for respectively connecting the first and second members to the first and second columns.

[0009] The first and second members move telescopically relative to one another in an axial direction. The first and second tab holes each have a central axis perpendicular to the hole. The central axes of the holes may extend substantially perpendicular to the axial direction or, alternatively, substantially parallel to the axial direction.

[0010] According to one embodiment, the first member comprises a generally rectangular frame defining a central opening and the second member has a generally rectangular body defining a plurality of slots and holes. Alternatively, each of the first and second members may have a body defining a plurality of slots and holes.

[0011] The length of the lacer bar assembly has a retracted configuration wherein the second member is telescopically received by the first member such that the second member substantially overlaps the first member and a total length of the lacer bar assembly is substantially equal to a length of the first member. The length of the lacer bar assembly has an extended configuration wherein the second member is extended away from the first member and the total length of the lacer bar assembly is substantially equal to the length of the first member plus a length of the second member. The lacer bars may be supplied in various sizes, having various retracted and extended lengths. Preferably, the retracted length ranges between 16 to 36 inches and the extended length ranges between 26 to 50 inches.

[0012] In a further aspect, the invention is an adjustable length lacer bar assembly for use with an electronics storage rack. The lacer bar assembly comprises a first elongated member having a first end, a second end and a first tab proximate the first end. A second elongated member has a first end, a second end and a second tab proximate the second end. The first end of the second member is telescopically received by the second end of the first member such that the lacer bar assembly is adjustable in length. Each of the first and second tabs defines a fastener hole having a central axis perpendicular to the hole. The first and second members move telescopically relative to one another in an axial direction. The central axis of the fastener hole of each of the first and second tabs is substantially perpendicular to the axial direction.

[0013] In yet a further aspect, the invention is an adjustable length lacer bar assembly for use with an electronics storage rack. The lacer bar assembly comprises a first elongated member having a first end, a second end, and a first tab proximate the first end. A second elongated member has a first end, a second end and a second tab proximate the second end. The first end of the second member is telescopically received by the second end of the first member such that the lacer bar assembly is adjustable in length. Each of the first and second tabs defines a hole having a central axis perpendicular to the hole. The first and second members move telescopically relative to one another in a direction. The central axis of the fastener hole of each of the first and second tabs is substantially parallel to the axial direction.
BRIEF DESCRIPTION OF THE DRAWINGS

[0014] For the purpose of illustrating the invention, there are shown in the drawings forms of the invention which are presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentality shown. In the drawings:

[0015] FIG. 1 is an upper perspective view of a telescoping lacer bar assembly in accordance with a first preferred embodiment of the present invention, shown having a first overall length.

[0016] FIG. 2 is an upper perspective view of the telescoping lacer bar assembly of FIG. 1, shown having a second overall length.

[0017] FIG. 3 is an upper perspective view of the telescoping lacer bar assembly of FIG. 1, shown having a third overall length.

[0018] FIG. 4 is an upper perspective view of a telescoping lacer bar assembly in accordance with a second preferred embodiment of the present invention.

[0019] FIG. 5 is a perspective view of a portion of an electronic storage rack showing the telescoping lacer bars of FIGS. 1 and 4 connected to the rack.

DETAILED DESCRIPTION OF THE INVENTION

[0020] Referring to the drawings, where like numerals identify like elements, there is illustrated in FIGS. 1-3 and 5 a first embodiment of an adjustable length lacer bar assembly (or “lacer bar”) which is generally identified by the reference numeral 10. The lacer bar 10 comprises a first elongated member 20 and a second elongated member 40. The lacer bar 10 has an overall length L1, which is adjustable between a retracted position (not illustrated) and an extended position (not illustrated). In moving between the retracted and extended positions, the first and second elongated members 20, 40 move telescopically relative to one another in an axial direction T.

[0021] The lacer bar 10 is intended for use with an electronics storage rack 100 (see FIG. 5) having at least a first column 101 and a second column 102. Preferably, the electronics storage rack 100 also includes a third column 103 and a fourth column (not illustrated). The first through fourth columns include a plurality of attachment holes 104. The columns are secured together by structural members 105. The lacer bar 10 is not intended as a primary structural element of the electronics rack 100. That is, the electronics rack 100 is a stable structure without any lacer bar 10 being connected to the electronics rack 100. While the lacer bar 10 does increase the lateral and torsional stability of the electronic rack 100 when connected to the electronics rack 100, the primary function of the lacer bar 10 is to provide a convenient structure to facilitate management of cables connected to and from electronic components (not illustrated) and to add additional mounting points for accessories (for example, power distribution components (not illustrated)) stored within the electronics rack 100. The lacer bar 10 also allows intermediate columns (not illustrated) to be installed within the electronics rack 100, without interfering with adjustment of the lacer bars 10.

[0022] The first elongated member 20 has a first end 22 and a second end 24. Preferably, the first member 20 includes a first tab 26 proximate the first member first end 22. The first tab 26 has at least one hole 28. The first tab hole 28 has a central axis 30 perpendicular to the hole 28. The hole 28 is preferably formed in the tab 26 such that its central axis 30 extends in a direction substantially perpendicular to the axial direction T. The first member 20 is connected to the first column 101 by fasteners that are installed through the hole 28 and through an attachment hole 104 in the column. Preferably, the first member 20 is formed as a generally rectangular frame 32 with at least one central opening 34.

[0023] Similarly, the second elongated member 40 has a first end 42 and a second end 44. Preferably, the second member 40 includes a second tab 46 near the second end 44 of the second member. The second tab 46 has at least one hole 48. The hole 48 has a central axis 50 perpendicular to the hole 48. The hole 48 is preferably formed in the tab 46 such that its central axis 50 extends in a direction substantially perpendicular to the axial direction T. The second member 40 is connectable to the second column 102 by fasteners installable through the at least one hole 48 and through an attachment hole 104 in the column. Preferably, the second member 40 has a generally rectangular body 52.

[0024] The body 52 of the second member preferably includes a plurality of connector holes and slots 54. The holes and slots 54 provide a convenient mechanism for attaching various items to the second member 40. For example, with particular reference to FIG. 5, a power strip 60 may be mounted to one or more of the lacer bar assemblies 10. The power strip 60 is mounted to the second member 40 through the use of one or more of the connector holes and/or slots 54. Additionally, a mounting plate 62 may be mounted to the second members 40 of one or more lacer bars 10 for providing additional mounting locations. Still further, conventional cable ties may be threaded through a hole or slot 54 and wrapped around one or more cables 64 to secure the cables 64 to the second member 40, and/or cable clips 65 can be attached to the lacer bar 10, such as by being snapped into the holes.

[0025] The first end 42 of the second member 40 is telescopically received by the second end 24 of the first member 20 such that the overall length L of the lacer bar assembly 10 is adjustable. In the retracted configuration (not illustrated) the second member 40 is telescopically received by the first member 20 such that the second member 40 substantially overlaps the first member 20 and the overall length L of the lacer bar assembly 10 is substantially equal to a length L1 of the first member 20. In the extended configuration (not illustrated) the second member 40 is extended away from the first member 20 and the overall length L of the lacer bar assembly 10 is substantially equal to the first member length L1 plus a length L2 of the second member. FIGS. 1-3 illustrate three preferred versions of the lacer bar assembly 10 having three different overall lengths L1, L2, and L3, in which the first member length L1 is provided in three lengths L11, L12, and L13, and the second member length L2 is provided in three lengths L21, L22, and L23. Preferably, L11 is 13.75 inches, L12 is 18.25 inches and L13 is 33.25 inches and L21 is 13.75 inches, L22 is 18.25 inches and L23 is 33.25 inches. Accordingly, the preferred retracted lengths are approximately 16, 20, and 36 inches while the preferred extended lengths are approximately 26,
36, and 50 inches, respectively for the versions shown in FIGS. 1-3. Of course, the first and second members 20 and 40 may be provided in a wide range of lengths.

[0026] With particular reference now to FIG. 4, there is shown a lacer bar assembly 110 according to a second preferred embodiment. The lacer bar assembly 110 is generally similar to lacer bar assembly 10 in its structure and operation. One of the differences between the first and second embodiments 10, 110 of the lacer bar is that the first member 120 of lacer bar 110 is provided with a first tab 126 having a tab hole 28 with a central axis 130 perpendicular to the hole, wherein the hole central axis 130 extends in a direction substantially parallel to the axial direction T. Furthermore, the first member 120 has a frame 132 with a plurality of principal openings 134, as well as a plurality of smaller connector slots and holes 136.

[0027] Another difference between the first and second embodiments 10, 110 of the lacer bar is that the second member 140 of lacer bar 110 is provided with a second tab 146 having a tab hole 48 with a central axis 150 perpendicular to the hole, wherein the hole central axis 150 extends in a direction substantially parallel to the axial direction T, and preferably axially aligned with the central axis 130 of the first hole. The second member 140 also includes a body 152 with a plurality of connector holes and slots 154, similar to the body in the first embodiment.

[0028] Thus, in lacer bar assembly 110, both the first and second members 120, 140 are provided with a plurality of connector slots and holes 136, 154.

[0029] With particular reference to FIG. 5, the lacer bar 110 of the second embodiment is adapted to connect to either electronic rack columns (which is shown in FIG. 5 as the connection between the first and third columns 101, 103). Alternatively, the lacer bar 110 of the second embodiment can be connected to a pair of opposing lacer bar assemblies, either of the first embodiment 10 or the second embodiment 110, that are themselves connected to the columns. As a further alternative, the lacer bar 110 of the second embodiment can be connected to a pair of opposing column brackets (or “rack rail brackets”) 105.

[0030] The first and second lacer bar assemblies 10, 110 are preferably fabricated from conventional materials, such as steel or aluminum, using conventional fabrication techniques, such as stamping and laser cutting.

[0031] An adjustable length lacer bar is thus provided, well-suited for use with adjustable size electronics storage racks. The adjustable length lacer bar may also be used with fixed size electronics storage racks.

[0032] Although the invention has been described and illustrated with respect to an exemplary embodiment thereof, it should be understood by those skilled in the art that the foregoing and various other changes, omissions and additions may be made therein and thereto, without parting from the spirit and scope of the present invention.

What is claimed is:

1. An adjustable length lacer bar assembly for use with an electronics storage rack having first and second columns, the adjustable length lacer bar defining openings for receiving cables or for attaching electronics-related components to the electronics storage rack, the adjustable length lacer bar assembly comprising:

   a first elongated member having a first end and a second end; and

   a second elongated member having a first end and a second end, at least one of the first and second members defining a plurality of openings,

   the first end of the second member telescopically received by the second end of the first member such that the lacer bar assembly is adjustable in length,

   the second end of the first member adapted to connect to the first column,

   the second end of the second member adapted to connect to the second column.

2. The adjustable length lacer bar assembly of claim 1, wherein the first member includes a first tab proximate the first member first end and the second member includes a second tab proximate the second member second end, the first and second tabs each defining at least one hole adapted for receipt of a fastener for respectively connecting the first and second members to the first and second columns.

3. The adjustable length lacer bar assembly of claim 2, wherein the first and second members define an axis along which the first and second members move telescopically relative one another and wherein each hole of the first and second tabs has a central axis perpendicular to the hole extending in a direction substantially perpendicular to the axis of the telescopic movement of the first and second members.

4. The adjustable length lacer bar assembly of claim 2, wherein the first and second members define an axis along which the first and second members move telescopically relative one another and wherein each hole of the first and second tabs has a central axis perpendicular to the hole extending in a direction substantially parallel to the axis of the telescopic movement of the first and second members.

5. The adjustable length lacer bar assembly of claim 1, wherein the first member comprises a generally rectangular frame defining a central opening.

6. The adjustable length lacer bar assembly of claim 1, wherein the second member comprises a generally flat body defining a plurality of slots and holes.

7. The adjustable length lacer bar assembly of claim 1, wherein the first and second members each has a generally flat body defining a plurality of slots and holes.

8. The adjustable length lacer bar assembly of claim 1, wherein the electronics rack has third and fourth columns and wherein a first lacer bar assembly is adapted for connection to the first and second columns, a second lacer bar assembly is adapted for connection to the third and fourth columns, and a third lacer bar is adapted for connection to any one of a) the first and second lacer bar assemblies, b) the second and fourth columns, and c) opposing rack rail brackets.

9. The adjustable length lacer bar assembly of claim 1 having a retracted configuration wherein the second member is telescopically received on the first member such that the second member substantially overlaps the first member and a total length of the lacer bar assembly is substantially equal to a length of the first member, and having an extended configuration wherein the second member is extended away
from the first member and the total length of the lacer bar assembly is substantially equal to the length of the first member plus a length of the second member.

10. The adjustable length lacer bar assembly of claim 9, wherein the total length of the lacer bar assembly is approximately 16 inches in the retracted configuration and approximately 26 inches in the extended configuration.

11. The adjustable length lacer bar of claim 9, wherein the total length of the lacer bar assembly is approximately 19 inches in the retracted configuration and approximately 30 inches in the extended configuration.

12. The adjustable length lacer bar of claim 9, wherein the total length of the lacer bar assembly is approximately 20 inches in the retracted configuration and approximately 36 inches in the extended configuration.

13. The adjustable length lacer bar assembly of claim 9, wherein the total length of the lacer bar assembly is approximately 36 inches in the retracted configuration and approximately 50 inches in the extended configuration.

14. An adjustable length lacer bar assembly for use with an electronics storage rack, the adjustable lacer bar defining openings for receiving cables or for attaching electronics-related components to the electronics storage rack, the adjustable length lacer bar assembly comprising:

   a first elongated member having a first end, a second end and a first tab proximate the first end; and
   a second elongated member having a first end, a second end and a second tab proximate the second end,
   at least one of the first and second members including a generally flat body defining a plurality of openings,
   the first end of the second member telescopically received on the second end of the first member such that the lacer bar assembly is adjustable in length,
   the first and second tabs each defining a fastener hole with a central axis perpendicular to the hole, the first and second members defining an axis along which the first and second members move telescopically relative one another,
   the central axis of the fastener hole of each of the first and second tabs substantially perpendicular to the axis of the telescopic movement between the first and second members.

15. An adjustable length lacer bar assembly for use with an electronics storage rack, the adjustable length lacer bar defining openings for receiving cables or for attaching electronics related components to the electronics storage rack, the adjustable length lacer bar assembly comprising:

   a first elongated member having a first end, a second end and a first tab proximate the first end; and
   a second elongated member having a first end, a second end and a second tab proximate the second end,
   at least one of the first and second members including a generally flat body defining a plurality of openings,
   the first end of the second member telescopically received on the second end of the first member such that the lacer bar assembly is adjustable in length,
   the first and second tabs each defining a fastener hole with a central axis perpendicular to the hole, the first and second members defining an axis along which the first and second members move telescopically relative one another,
   the central axis of the fastener hole of each of the first and second tabs substantially parallel to the axis of the telescopic movement between the first and second members.

* * * * *