TITLE OF INVENTION

Modular Assembly System.

FIELD OF INVENTION

The present invention relates to a modular reconfigurable assembly system with reconfigurable cable management functions.

BACKGROUND OF THE INVENTION AND PRIOR ART

In the field of office furniture and home furniture, the assembly of a structure for the purposes of including further functions or implements is common, for example, interconnected table legs so that a table surface may be placed atop or a table structure with cable management implements.

However, most structures are non-modular, not reconfigurable, difficult or inconvenient to assemble and often require the use of screws, nails, glue or similar means of affixation. Such means of affixing often result in slow and cumbersome assembly.

Further, where such means of affixing is dependent on the skill of the workman setting up the structure, and if not executed in a proper manner, the resultant assembly may be inherently unstable or may not be fully able to bear the weight and properly support its load.

There is a need for an assembly wherein rapid, simple, reconfigurable and convenient assembly is possible. Further, there is a need for a stable assembly capable of bearing its load as well as requisite load for further implements.

OBJECTS AND SUMMARY OF THE INVENTION

The present invention was made to address and solve the issues, challenges and problems above.

An object of the present invention is to provide an assembly system for rapid and convenient setting up and which is modular, extensible and easily reconfigurable.

A further object of the present invention is to provide an assembly system comprising a set of beams interconnectable at each others' ends, and wherein the resultant structure is strong and capable of bearing load.

A further object is to provide beams and connectors that are symmetrical along a central, horizontal axis to forego any need to determine vertical orientation in the assembly process.

A further object is to provide an assembly system comprising beams wherein the end of one beam may be easily and conveniently affixed to any point along either side of another similar or identical beam by means of an intermediary connector, and wherein the resultant structure is strong and capable of bearing load.

A further object is to provide an assembly system comprising one or more beams conveniently and rapidly mountable on legs with a resultant structure that is strong and capable of bearing load.

A further object is to provide an assembly system comprising conveniently and rapidly reconfigurable and repositionable cable positioning implements, panel implements and modesty panel implements

along support beams using a 'lock' and 'unlock' means of affixing and detatching said implements along said beams.

A further object is to provide an assembly system comprising conveniently and rapidly reconfigurable and repositionable cable positioning implements vertically along the legs of the assembly.

A further object of the present invention is to provide a cable management system and wherein primary cables, wires and cords are visually hidden behind covers.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a side view of one configuration of the assembly system and shows a long beam 46 affixed to the top of a leg 45, one end of said long beam 46 affixed to a connector 42, which is affixed to a short beam 41 which is affixed to the top of a further leg 45. Fig. 1 further shows a plurality of members 51 affixed to one side of long beam 46 and a plurality of cable managers 43 affixed to the inferior side of long beam 46, and a cover 92 affixed to said cable managers 43.

Fig. 2 shows a short beam 41 with connectors 42 affixed to each end of short beam 41.

Fig. 3 shows a perspective view of a short beam 41 with bolt holes 625.

Fig. 4 shows a cross-sectional view of short beam 41 with a supporting bar 101, two horizontal walls 103, two vertical walls 102 each with surface 105, and four sections 120, each with protrusion 106, indentations 142, ridge 141, vertical wall 132, short wall 137, ledge 143, bend 138, hook 160, bolt hole 122, cavity 121, ledge 124, surface 135 and hook 131 as well as ledges 176 and 177. Fig. 4 further shows channels 153.

Fig. 5 shows a perspective view of the back of connector 42, and shows each arm 205, perimeter wall 602, bolt hole 210, bolt holes 624 and central beam 201.

Fig. 6 shows a front perspective view of connector 42, showing protruding sections 203 and bolt hole 210.

Fig. 7 is a back view of connector 42 with perimeter wall 602, horizontal area 614, and with each arm 205 having areas 604, 608, 610 and 612, and with area 610 having sub-areas 614 and 616. Fig. 7 further shows bolt holes 624.

Fig. 8 is a partially exploded view of a part of the invention, showing a means by which the back of connector 42 is affixed to one end of long beam 46 and secured by bolting means, and the front of connector 42 is affixed to short beam 41 and secured by bolting means.

Fig. 9 shows a side view of a part of the assembled structure, with the fronts of two connectors 42 affixed to either end of short beam 41, and a long beam 46 affixed to the back of each connector 42, and all being secured by bolting means.

Fig. 10 shows a perspective view of plug 49 which generally has head 920 and two guides 910 connected by trunk 930. Head 90 has two longer opposing sides 921, two shorter opposing sides 922, a surface 925, a pair of diagonally opposing sharp corners 924, a pair of diagonally opposing rounded corners 923. Fig. 10 further shows each guide 910 having a primary trough 911 between two ridges 913, and slopes 912 and 914; channel 950 is shown between guides 910.

Fig. 11 shows a perspective view of cable manager 43, which compirses cylindrical trunk 301 at the top of which is plug 49, circular wall 302 which has superior disc 303, inferior disc 305, flanges 306 and surface 303. Cable manager 43 further comprises horizontal wall 307, which has a surface 308, channels 320, arch 324 and vertical walls 325. Further, Fig. 11 shows cable manager comprising a central vertical spine 311, cylindrical spine 310, vertical spine 313, arch 350, base 360, horizontal walls 332 and 336, vertical walls 331 and 335, apertures 333 and 337, and cavities 338 and 334.

Fig. 12 shows a perspective view of member 47, which comprises plug 49 with trunk 930, prongs 710, exterior surfaces 724, interior surfaces 722, channel 723 and heads 730.

Fig. 13 shows a perspective view of member 48, which comprises plug 49, prongs 810, exterior surfaces 813, interior surfaces 812, channel 823 and heads 830 each with a hole 831.

Fig. 14 is a perspective view of a member 47 and a member 48 each affixed to a superior portion and an inferior portion respectively of short beam 41.

Fig. 15 is an end view of a member 47 and a member 48 each affixed to a superior portion and an inferior portion respectively of short beam 41.

Fig. 16 is a front perspective view of member 50, which has head 751, hook 752, through hole 753, and surface 772, bolt holes 750 and hook 780 on its primary body 770, protrusion 760 and bolt hole 761.

Fig. 17 shows a perspective view of the back of member 50 affixed to member 60, showing head 751, cavity 754, through holes 753 and 771, bolt holes 750, and protrusion 760 with cavity 761 and bolt chamber 762.

Fig. 18 shows an exploded view of member 50 and member 60 with bolt chamber 790, protrusions 792 and 793 and hook 791. Fig. 18 further shows a bolting means of affixing member 50 to member 60.

Fig. 19 shows members 50 and 60 affixed to an end of long beam 46.

Fig. 20 shows a perspective view of member 50 affixed to an end of a first long beam 46 and hooked to a side of a second long beam 46.

Fig. 21 shows a side view of members 50 and 60 affixed to an end of a first long beam 46 and affixed to a side of a second long beam 46.

Fig. 22 shows a side view of member 51 affixed to the inside of cover 44, and shows member 51 comprising hooks 440, trunks 423, hooks 425, supports 424, T-shaped juts 421, surfaces 422 on juts, spines 420, walls 431 and base wall 430. Fig. 22 further shows cover 44 comprising hooks 412, walls 411 and panel 410.

Fig. 23 shows a perspective view of a plurality of members 53 affixed to leg 45 through rails 464. Fig. 23 further shows cover 44 affixed to member 51; further, member 52 secures leg 45 to an inferior portion of long beam 46. Further, leg 45 has rail 464.

Fig. 24 is a side view of a leg 45 affixed to an inferior portion of short beam 41 and secured by members 52, and further shows member 51 affixed to a side of long beam 46 with cover 44 affixed to member 51. Fig. 24 further shows each member 52 having hooks 523 and 522.

Fig. 25 shows a side view of leg 45 with horizontal base 460, supports 462 and vertical body 466, and further shows long beam 46

affixed to the top of leg 45 by means of member 52. Fig. 25 further shows members 53 affixed to the sides of leg 45.

Fig. 26 is a side perspective view of member 53, which comprises base 371, T-shaped juts 370 with ends 380, vertical walls 372, horizontal walls 373, cavities 385, apertures 378 and supports 374 each of which comprise two opposing arms 375. Shown in Fig. 26, each arm 375 comprises portions 376 and 377.

Fig. 27 is a perspective view of member 53 showing the inferior surface of its base 371. Fig. 27 shows supports 374, each with a pair of opposing arms 375, each arm 375 having a portion 376 and a portion 377.

Fig. 28 is a perspective view of long beam 46 affixed to leg 45 with members 52. Fig. 28 further shows bolt holes 525 of member 52.

BRIEF DESCRIPTION OF PREFERRED EMBODIMENTS

The following describes preferred embodiments of the present invention where like parts and portions are labelled with like numbers.

Within the present invention, the primary difference between short beam 41 and long beam 46 is that the length of long beam 46 is different to that of short beam 41. Fig. 3 shows a perspective view of short beam 41. The primary cross-sections of long beam 46 and short beam 41 are identical, and as such, any member, part, portion, surface or any other element or the like which may be affixable to, connectable with, or in any way engageable with short beam 41 is similarly affixable to, connectable with or engageable with long beam 46, and vice versa.

Hereinafter, all references to any member, part, portion, surface, or any other element or the like engaging with, affixing to, connecting with, oriented, positoned or aligned relative to, or in any way interacting with short beam 41 shall include that same member, part, portion, surface, or any other element or the like engaging with, affixing to, connecting with, oriented, positoned or aligned relative to, or in any way interacting with long beam 46. Similarly, all references to any member, part, portion, surface, or any other element or the like engaging with, affixing to, connecting with, oriented, positoned or aligned relative to, or in any way interacting with long beam 46 shall include that same member, part, portion, surface, or any other element or the like engaging with, affixing to, connecting with, oriented, positoned or aligned relative to, or in any way interacting with short beam 41.

The following is a description of the cross-section of short beam 41, which is identical to the cross-section of long beam 46, and as such, is also a description of the cross-section of long beam 46.

With reference to Fig. 4, short beam 41 has a generally H-shaped cross-section, and in preferred embodiments, all parts and portions of short beam 41 are integral to each other. Generally, the cross-section of short beam 41 is symmetrical along a central vertical axis as well as symmetrical along a central horizontal axis.

Cross-sectionally, short beam 41 has a central vertical supporting bar 101 with ends connected to the central portion of a first and second horizontal wall 103. With reference to Fig. 4, the first corresponding ends of horizontal walls 103 are connected to the central inside portion of a first vertical wall 102, and the second corresponding ends of horizontal walls 103 are connected to the central inside portion of a second vertical wall 102. Cross-sectionally, each vertical wall 102 has an inside surface 105; further, each end of each vertical wall 102 extends to the base of a section 120. In Fig. 4, superior to horizontal walls 103 is a pair of sections 120 which face and oppose each other, in this description referred to as 'superior sections 120'; similarly, inferior to horizontal walls 103 is a pair

of sections 120 which face and oppose each other, in this description referred to as 'inferior sections 120'.

In Fig. 4, cross-sectionally, on its interior side, each section 120 has an inward protrusion 106, indentations 142 and ridge 141. Channel 153 is combinatorially formed by surface 105 of vertical 102, a portion of the external surface of horizontal wall 103 and the surface of protrusion 106 closer to horizontal wall 103. The dimensions of opposing pairs of channels 153 and neighbouring corresponding horizontal wall 103 are combinatorially adapted to firmly receive head 920 of plug 49 in its 'locked' position as described in a subsequent section of this description. Further, opposing pairs of indentations 142 and ridges 141 of each pair of opposing sections 120 are adapted to combinatorially receive guides 910 of plug 49. Further, each section 120 has ledges 176 and 177.

In preferred embodiments, each section 120 has cavity 121 to reduce its material and weight; further, each section 120 has a bolt hole 122 adapted to be in alignment with its corresponding bolt hole 750 of member 50 when so affixed to an end of short beam 41 or long beam 46.

Each section 120 further comprises an externally facing vertical surface 135. Each surface 135 of superior sections 120 has, at its superior

end, an inward facing hook 131; similarly, each surface 135 of inferior sections 120 has, at its inferior end, an inward facing hook 131.

Cross-sectionally, each of superior sections 120 has a vertical wall 132 extending from and superior to corresponding superior indentation 142. For superior sections 120, cross-sectionally extending from the superior end of each vertical wall 132 is vertical short wall 137 extending to bend 138 extending to a superior preferably square inward facing hook 160. Similarly, cross-sectionally, each of inferior sections 120 has a vertical wall 132 extending from and inferior to corresponding inferior indentation 142. For inferior sections 120, cross-sectionally extending from the inferior end of each vertical wall 132 is vertical short wall 137 extending to bend 138 extending to an inferior preferably square inward facing hook 160.

At the internal junction of each vertical wall 132 and short wall 137 is inside-facing ledge 143.

With reference to Figs. 5 and 6, connector 42 is a generally H-shaped member with a horizontal central beam 201, two superior opposing irregularly shaped vertical arms 205 extending above and from the ends of horizontal beam 201, and two inferior opposing irregularly shaped vertical

arms 205 extending below and from the ends of horizontal beam 201. In Figs. 5 and 6, perimeter wall 602 extends to both the back side and the front side of connector 42, and which from either end view of connector 42, is a wall extending around the cross-sectional perimeter of connector 42, as is further seen in Fig. 7.

In Fig. 7, with references sequenced to move towards the centre of connector 42, the back side of each arm 205 further features small area 604, vertical area 606, short area 608, irregular shaped area 610 and vertical area 612. The dimensions of perimeter wall 602 and areas 604, 606, 608, 610 and 612 are all combinatorially adapted to firmly receive either end of short beam 41 as well as either end of long beam 41, in particular, cross-sectionally, area 604 is adapted to firmly receive hook 160 and a portion of bend 138, area 606 is adapted to firmly receive a further portion of bend 138 and short wall 137, area 608 is adapted to firmly receive vertical wall 132, area 610 is adapted to firmly receive a corresponding portion of the corpus of section 120 with ledge 124 in sub-area 614 and hook 131 in sub-area 616, and area 612 is adapted to firmly receive a portion of vertical wall 102.

Fig. 6 is a front perpective view of connector 42 showing perimeter wall 602 and further protruding section 203. The front side of connector

42 is identical to its back side with the exception of protruding section 203, and as such, the dimensions of perimeter wall 602 on the front side and all corresponding areas on the front side are all combinatorially adapted to firmly receive either end of short beam 41 as well as either end of long beam 41, as described for the back side of connector 42, and secured by bolting means through bolt hole 210. Protruding section 203 serves to provide a greater surface area to secure the end sections of short beam 41 and to provide more depth into which the end sections of short beam 41 may be inserted so as to have a more stable structure.

Figs. 8 and 9 show a configuration by which connectors 42 may be affixed to one or more short beams 41 and one or more long beams 46. A connector 42 may be affixed to one end of short beam 41 of long beam 46 by bolting means through bolt holes 624 and 625.

With reference to Fig. 10, plug 49 comprises one or more circular guides 910 and head 920, both of which are connected by a short, cylindrical trunk 930.

Each guide 910 comprises a primary trough 911 between two ridges 913, with a first ridge 913 being superior to primary trough 911 and a second ridge 913 being inferior. Superior to said first ridge 913 is slope 912. Inferior to said second ridge 913 is slope 914. Slopes 912 and 914 are curved and sloping from a

horizontal-like tangent near ridge 913 to a vertical-like tangent away from ridge 913. In a preferred embodiment, plug 49 has two guides 910; between said guides 910 are channels 950, which serves to provide the leeway necessary prior to rotating guides 910 into position within chamber 123 of short beam 41 as dedscribed below.

Primary trough 911 and ridges 913 are adapted to firmly engage with ridge 141 and indentations 142 of short beam 41 respectively, and slopes 912 and 914 are adapted to guide the position and orientation of plug 49 when plug 49 is inserted into chamber 123 of short beam 41 and rotated for engagement.

Head 920 comprises a generally rectangular-shaped slate with two longer opposing sides 921 and two shorter opposing sides 922 and a surface 925. Head 920 further has one pair of diagonally opposing sharp corners 924 and a further pair of diagonally opposing rounded corners 923. The thickness of head 920 is adapted so that sides 922, sharp corners 924 and rounded corners 923 may fit firmly within channels 153 of short beam 41. In a preferred embodiment, head 920 has an open hole in or around its centre and short trunk 930 is hollow.

With reference to Figs. 4 and 10, a method of 'locking' plug 49 within short beam 41 is firstly, the insertion of plug 49 into chamber 123 and in a relative position and orientation where surface 925 opposes and contacts with surface 104

of horizontal wall 103 and sides 921 oppose surfaces 105 of short beam 41, and secondly, the rotation of plug 49 in one direction so that rounded corners 923 engage within corresponding channels 153, and thirdly, the further rotation of plug 49 in the same direction so that sides 922 are fully engaged within corresponding channels and plug 49 is in a 'locked' position within chamber 123 and further rotation in the same direction is prevented by sides 921 being in contact with corresponding surfaces 105 and/or sharp corners 924 being in contact with corresponding surfaces 105. Conversely, a method of 'unlocking' plug 49 from a 'locked' position within short beam 41 is the rotation of plug 49 in an opposite direction so that sides 922 are no longer within corresponding channels 153.

Fig. 10 shows one embodiment of the invention where head 920 is configured so that plug 49, when seen from a perspective opposing head 920, is to be rotated in an anti-clockwise direction in order to reach a 'locked' position and rotated in a clockwise direction to reach an 'unlocked' position from a 'locked' position. In an alternate embodiment, head 920 is configured such that rounded corners 923, sharp corners 924, sides 922 and sides 921 are in the positions of sharp corners 924, rounded corners 923, sides 921 and sides 922 respectively in Fig. 10. In this alternate embodiment, head 920 is configured so that plug 49, when seen from a perspective opposing head 920, is to be rotated in a clockwise direction in order to reach a 'locked' position and rotated in an anti-clockwise direction to reach an 'unlocked' position from a 'locked' position.

There are numerous parts within the present invention which feature plug 49. Figs. 11, 12 and 13 show cable manager 43, member 47 and member 48 respectively, each featuring plug 49. As such, each of these parts may be engaged and assembled to short beam 41 as well as long beam 46 in one means described above. In Fig. 11, plug 49 is at the top end of trunk 301 with guides 910 located around trunk 301. In Figs. 12 and 13, plugs 49 are at the bases of each of members 47 and 48 and with each guide 910 located at the base of each of prongs 710 and 810. Figs. 14 and 15 are a perspective view and side view respectively showing members 47 and 48 affixed to short beam 41. Any part of the invention featuring plug 49 may be affixed anywhere along the length of the interior of short beam 41 or long beam 46 within chamber 123.

Preferably, all parts and portions of plug 49 are integral to each other.

Fig. 11 shows a perspective view of cable manager 43, all parts and portions of which are preferably integral to each other. From a front perspective, cable manager 43 is symmetrical along a vertical, central axis. Cable manager 43 comprises a cylindrical trunk 301 at the top of which is plug 49, circular wall 302 surrounding and approximate to the base of trunk 301, horizontal wall 307, vertical spine 311 at the base of which is cylindrical spine 310 and from which extends a further vertical spine 313. For purposes of strengthening the structure,

vertical spines 311 and 313 each has vertical flanges 312 and 314 respectively on either side of said vertical spines.

Circular wall 302 comprises a superior disc 304 with surface 303, an inferior disc 305 and a plurality of flanges 306 of a vertical orientation adjoining to and between superior disc 304 and inferior disc 305.

Affixed to the base of trunk 301 is horizontal wall 307, which comprises a surface 208, channels 320, arch 324 and vertical walls 325.

Cable manager 43 further comprises two horizontal walls 332, each extending horizontally from either side of cylindrical spine 310 and each further extending to vertical wall 331, forming cavity 334 with the inferior surface of horizontal wall 307.

Extending from the base of vertical spine 313 is the top of arch 350. Further extending from the left and right sides of arch 350 are horizontal walls 336, which each further extend to vertical wall 335, thus forming cavity 338 with the inferior surface of horizontal wall 332.

Preferrably, each set of corresponding vertical wall 325, vertical wall 331 and vertical wall 335 are vertically aligned, with an aperture 333 between vertical

wall 325 and the top of vertical wall 331, and with an aperture 337 between vertical wall 335 and the base of vertical wall 331. Apertures 333 and 337 are the entrances and exits through which cables may be placed within and removed from each of cavities 334 and 338 respectively.

At the base of arch 350 is base 360.

With reference to Fig. 12, member 47 comprises two prongs 710 adjoined at their bases by a plug 49. Each prong 710 has a flat interior surface 722 and a curved exterior surface 724, upon which a guide 910 of plug 49 is affixed. Each prong 710 has a head 730 protruding outwards from the top of prong 710 wherein the interior side of head 730 is in alignment with interior surface 722 of prong 710 ; head 730 having a thick, flat slate shape. Prongs 710 are oriented so that their heads 730 protrude in directions opposing each other and their exterior surfaces are facing away from each other while their interior surfaces are facing opposite each other forming channel 723 between prongs 710.

When member 47 is affixed to short beam 41 or long beam 46, as shown in Figs. 14 and 15, a portion of a screen or a board may be placed within channel 723, serving to support said screen or board. The dimensions of prong 710 and head 730 are adapted so that member 47 may be 'locked' into channel 153 and within chamber 123 of short beam 41 by means of plug 49 as described previously

and with each head 730 protruding above corresponding hook 160 of short beam 41.

Preferably, all parts and portions of member 47 are integral to one another.

With reference to Fig. 13, member 48 comprises two prongs 810 adjoined at their bases by a plug 49. Each prong 810 has a flat interior surface 812 and a curved exterior surface 813, upon which a guide 910 of plug 49 is affixed. Each prong 810 has a head 830 protruding outwards from the top of prong 810 wherein the interior side of head 830 is in alignment with interior surface 812 of prong 810; head 830 having a hole 831. Prongs 810 are oriented so that their heads 830 protrude in directions opposing each other and their exterior surfaces are facing away from each other while their interior surfaces are facing opposite each other forming channel 823 between prongs 810.

When member 48 is affixed to short beam 41, as shown in Figs. 14 and 15, a portion of a modesty screen or board may be placed and clamped within channel 823, serving to support said modesty screen or board, and which may be secured by bolting means. The dimensions of prong 810 and head 830 are adapted so that member 48 may be 'locked' into channel 153 and within chamber 123 of short

beam 41 by means of plug 49 as described previously and with each head 830 protruding above corresponding hook 160 of short beam 41.

Preferably, all parts and portions of member 48 are integral to each other.

With referrence to Figs. 16 and 17, member 50 generally comprises a body 770 which is of a slab-like shape, a head 751 integral to and at the top of body 770 and protrusion 760 integral to and at the base of body 770. Body 770 has one or more bolt holes 750. In a preferred embodiment, body 770 has four bolt holes 750. Further, near to the centre of body 770 are hook 780 with through hole 771 below the base of hook 780.

At the top of body 770 is head 751, which protrudes over and from one side of body 770 while protrusion 760 protrudes from the base of the remaining opposite side of body 770. One portion of the top of head 751 slopes downwards and protruding from the inferior surface of head 751 is hook 752. Preferably, with reference to Figs. 20 and 21, hooks 752 and 780 are rectangular hooks with dimensions adapted to hook over and rest firmly over hook 131 and ledge 124 respectively of long beam 46 and so that surface 772 may rest firmly against surfaces 135 along one corresponding side of long beam 46.

Protrusion 760 is generally of a hollow, rectangular cross-section with cavity 761 and with a bolt chamber 762 within it. In Fig. 16, at the base of protrusion is a bolt hole 761.

Through holes 753 and 771, cavity 761, the indentations on the back of body 770 as shown in Fig. 17, and the sloping front of head 751 as shown in figs. 16 and 17 all serve to reduce the weight and material of member 50 as well as strengthen its structure.

In Fig. 18, member 60 comprises a hollow rectangular body with a bolt chamber 790 within its hollow body, a transverse hook 791 on one side and protrusions 792 and 793 on an opposing side. Member 60 is affixed to the base of member 50 by bolting means through bolt chamber 790, bolt hole 761 and bolt chamber 762.

With reference to Fig. 19, the shapes and dimensions of protrusion 760 and member 60 are adapted to fit firmly within chamber 123 and between two opposing vertical walls 132 at an end of long beam 46, and each bolt hole 750 is configured to be in alignment with each corresponding bolt hole 122. Members 50 and 60 are affixed to one end of long beam 46 by bolting means through bolt holes 750 of member 50 and bolt holes 122 of long beam 46.

Preferably, with reference to Figs. 20 and 21, hook 791 of member 60 is a rectangular hook with dimensions adapted to hook under and grip firmly under corresponding hook 131 of long beam 46 and so that surface 772 may rest firmly against surfaces 135 along one corresponding side of long beam 46. Preferably, subsequent to member 50 hooking onto a side of long beam 46 as previously described, member 60 may be hooked under corresponding hook 131 as described and affixed to member 50 as previously described.

Referring to Fig. 20, a long beam 46 may be affixed to any point along the side of a further long beam 46 through the use of members 50 and 60 and by the means described above.

In preferred embodiments of the present invention, all parts and portions of member 50 are integral to each other; similarly, all parts and portions of member 60 are integral to each other.

In Fig. 24, cover 44 comprises a flat panel 410 which, cross-sectionally, has walls 411 extending perpendicularly from the ends of panel 410 and in the same direction as each other. At the end of each wall 411 is hook 412. Cover 44 has a uniform cross-section. Preferably, all parts and portions of cover 44 are integral to each other.

Fig. 22 shows the cross-section of member 51 which is symmetrical along a central vertical axis. Cross-sectionally, member 51 has two horizontal spines 420 on either side of its central vertical axis, and from the ends of horizontal spines 420 nearer to said vertical axis extends downwardly and perpendicularly vertical walls 431, and adjoining perpendicularly and horizontally the ends of said vertical walls is base wall 430. Cross-sectionally, extending upwardly from each of spines 420 is T-shaped jut 421 with top surface 422.

Extending downwardly and perpendicularly from the outer cross-sectional end of each spine 420 is cross-sectional hook 440, the dimensions of which are adapted to hook over, or as the case may be, as well as hook under hook 131 of short beam 41, as shown in Fig. 24. Cross-sectionally, extending diagonally upwardly and outwardly from said outer end of each spine 420 is trunk 423 at the end of which is hook 412, and extending from the superior side of each trunk 423 is flexible support 424.

The dimensions of member 51, trunks 423, hooks 412, and supports 424 are combinatorially adapted so that each hook 425 fits into the cross-sectional corner where each wall 411 adjoins panel 410 and against hook 412 while support 424 presses firmly against the interior surface of panel 410.

In Fig. 24, in its assembled state, the invention features hooks 440 hooked over or under corresponding hooks 131 with the combinatory rectangular shape of walls 431 and base wall 430 fitted firmly into channel 107, being the space between adjacent sections 120 of short beam 41.

Member 51 is of a sufficiently flexible material so that it may be affixed with cover 44 and either side of short beam 41 in the means described above. Preferably, all parts and portions of member 51 are integral to each other.

With reference to Fig. 24, in a preferred embodiment, member 52 has hooks 522 and 523 which, when assembled, hook over ledges 177 and 176 respectively of long beam 46. In an alternate embodiment, member 52 does not have hook 523 and only hook 522 hooks over ledge 177.

In Fig. 28, member 52 is affixed to leg 45 by bolting means through bolt holes 525.

Fig. 26 shows a perspective view of member 53. Cross-sectionally, member 53 has a straight horizontal base 371 from each end of which extends upwardly and perpendicularly a vertical wall 372; from one end of each vertical wall 372 extends perpendicularly and inwardly a horizontal wall 373. Cross-sectionally, extending upwardly and perpendicularly from

base 371 are one or more T-shaped juts 370 with top surface 422; between the ends 380 of each adjacent horizontal arm of T-shaped juts as well as between the ends 380 of each horizontal arm of T-shaped juts and adjacent ends 381 of horizontal walls are apertures 378, which serve as openings through which cables and wires may be placed and removed into and out of cavities 385. In a preferred embodiment, member 53 has two T-shaped juts 370 extending from either side of the central, vertical axis of member 53, and has three cavities 385.

Continuing with reference to Fig. 27, extending from the inferior horizontal side of base 371 are one or more supports 374, each support 374 comprising a pair of opposing arms 375; in particular, each pair of opposing arms 375 comprises a pair of straight portions 376 extending downwardly at an angle away from each other from which extends a pair of portions 377 downwardly and at an angle towards each other. In a preferred embodiment, member 53 has two supports 374.

In Figs. 26 and 23, supports 374 serve to clamp outwardly against rail 464, at any point along the vertical axis of rail 464, wherein portions 376 push outwardly against the sides of rail 464, and as such, member 53 may be so affixed at any point along rail 464. Preferrably, supports 374 are

of a sufficiently flexible and suitable material so as to affix member 53 to leg 45 by the means above.

In preferred embodiments, all parts and portions of member 53 are integral to each other.

Leg 45 comprises a vertical body 466 the base of which is affixed to the central portion of horizontal base 460 and supported by supports 462 on either side of vertical body 466, as shown in Figs. 23 and 25. Running along each broad side of vertical body 466 are two rails 464, adapted to receive supports 374 by a means already described.