United States Patent [19]

Korell

[11] **3,842,555**

[45] **Oct. 22, 1974**

[54] **PARTITION CONNECTOR SYSTEM**

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[73] Assignee: **Steelcase Inc.,** Grand Rapids, Mich.

[22] Filed: **June 18, 1973**

[21] Appl. No.: **370,976**

[52] **U.S. Cl.** ..... **52/238,** 52/582, 52/753 C, 403/17 D

[51] **Int. Cl.** **E04b 2/82**

[58] **Field of Search** ..... 52/753 R, 753 C, 753 Y, 52/753 J, 756, 758 D, 755, 582, 584, 586, 238, 241, 239, 285; 403/170, 174, 173, 339, 340

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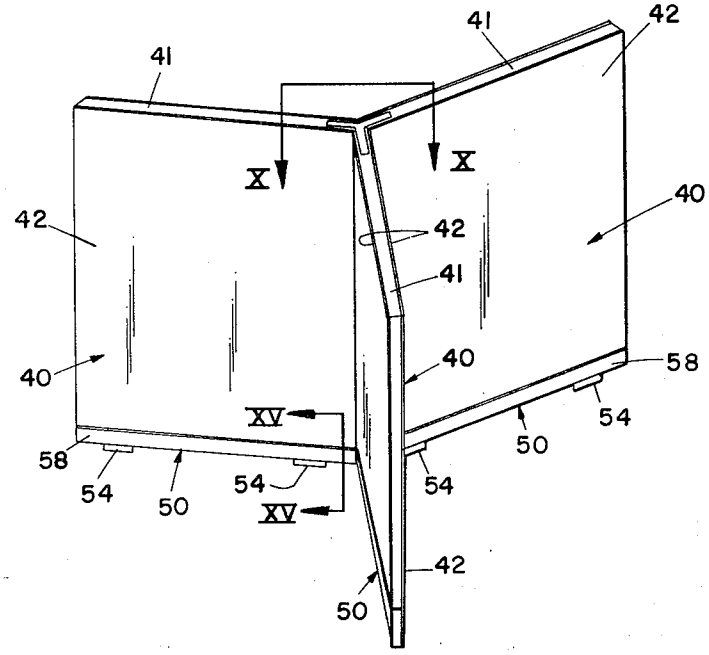
Primary Examiner—Price C. Faw, Jr.

Attorney, Agent, or Firm—Price, Heneveld, Huizenga & Cooper

[57] **ABSTRACT**

A connector system for partition panels in a space divider partition system includes specially configured elongated connectors which may be used in combination or individually to connect two or more panels. The connectors include an elongated body having elongated slots formed along their length through which a fastener may be passed for securement to the top edge of the panels. The end of one of the elongated bodies is provided with a tapered boss while the end of a similar elongated body is provided with a tapered boss-receiving opening.

13 Claims, 17 Drawing Figures



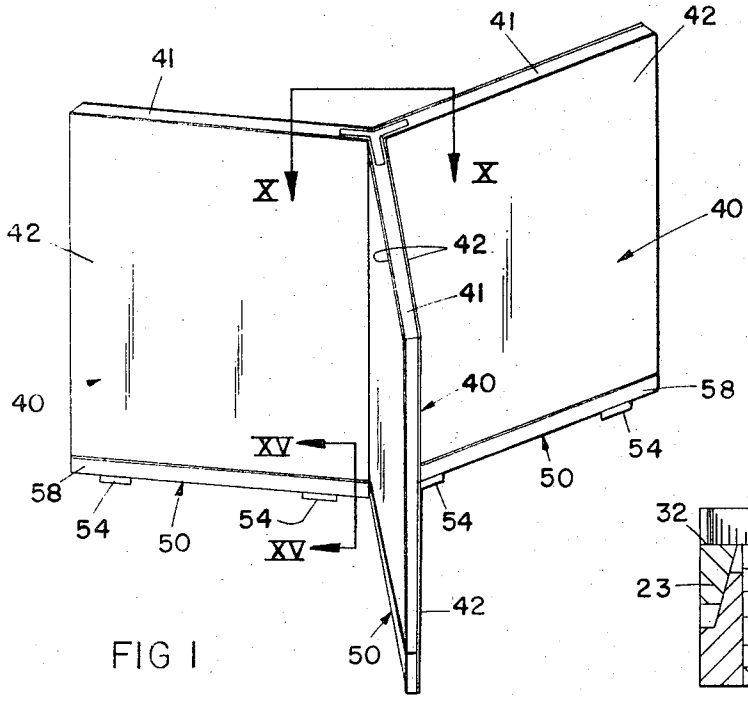


FIG 1

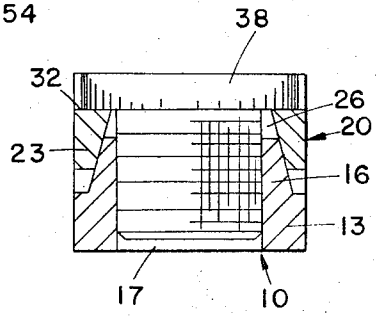


FIG 7

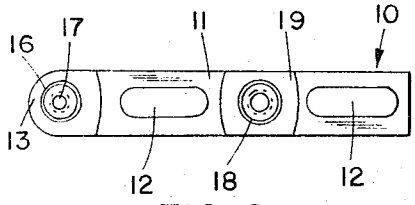


FIG 2

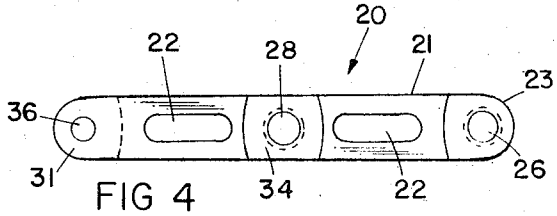


FIG 4

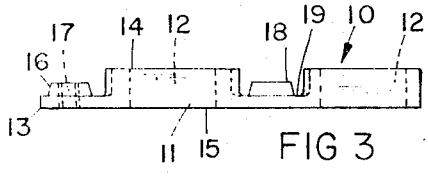


FIG 3

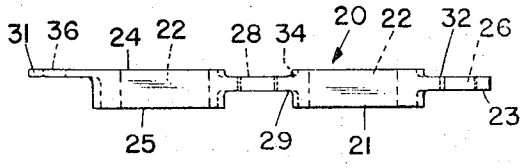


FIG 5

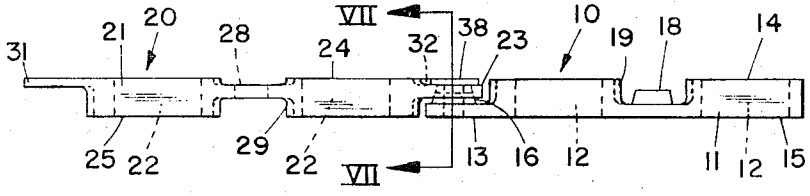


FIG 6

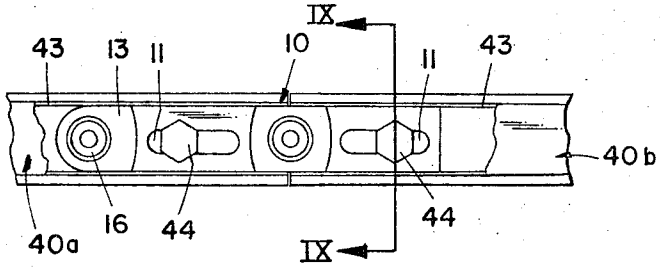


FIG 8

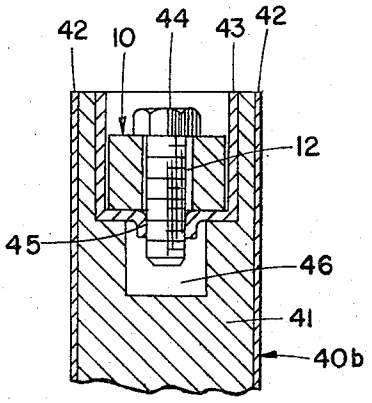


FIG 9

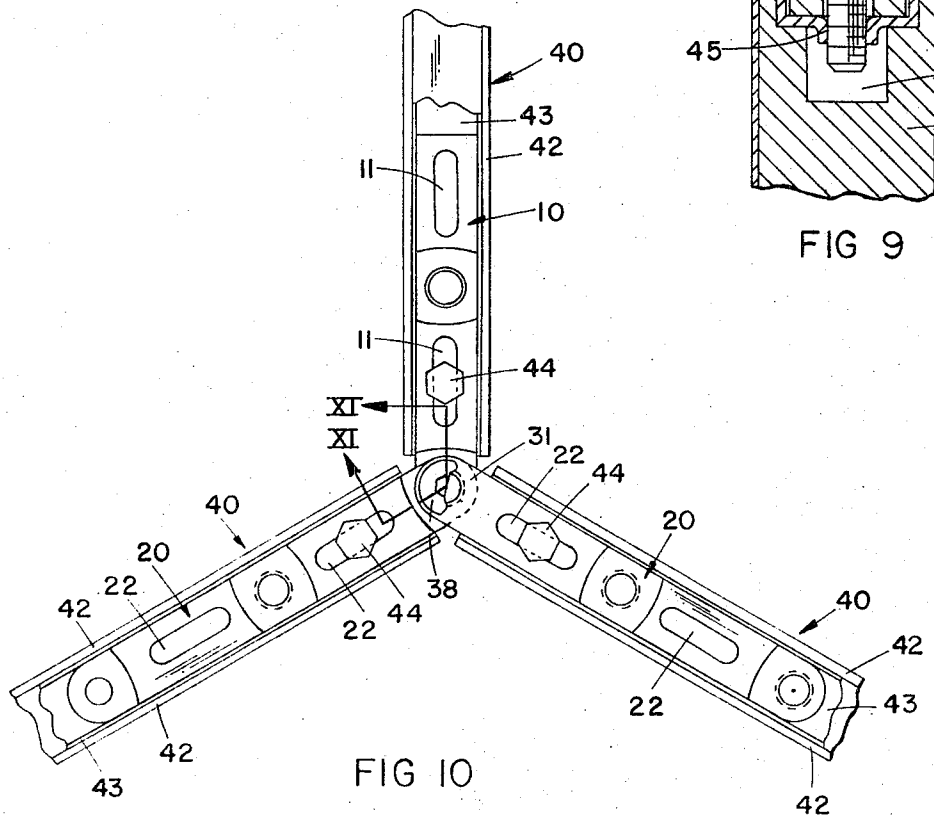


FIG 10

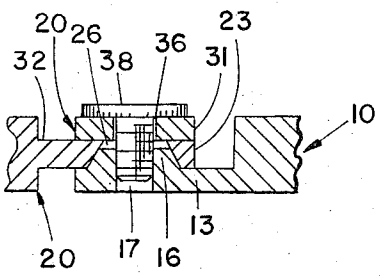


FIG 11

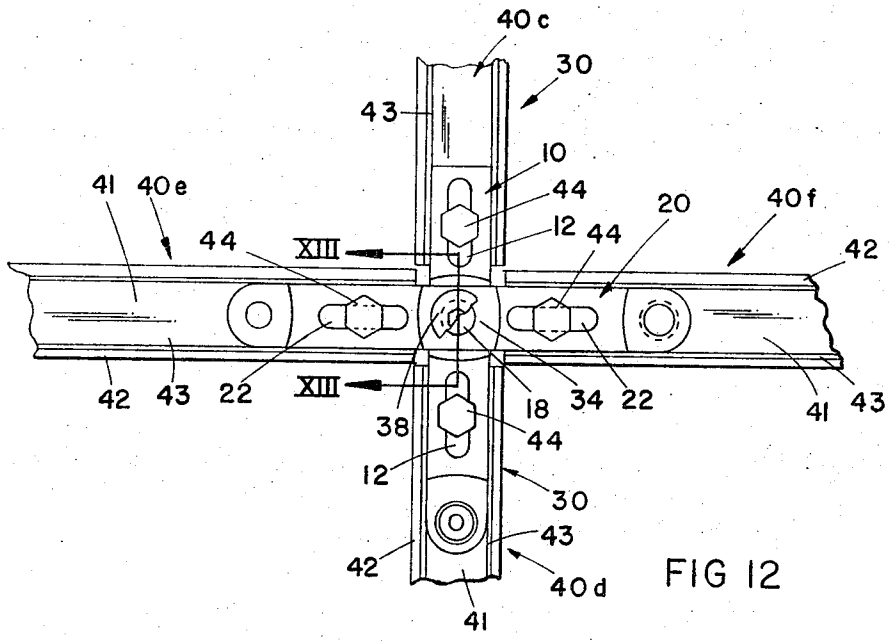


FIG 12

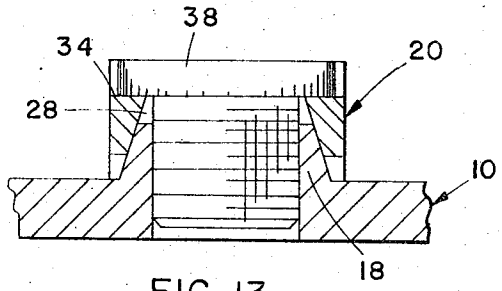


FIG 13

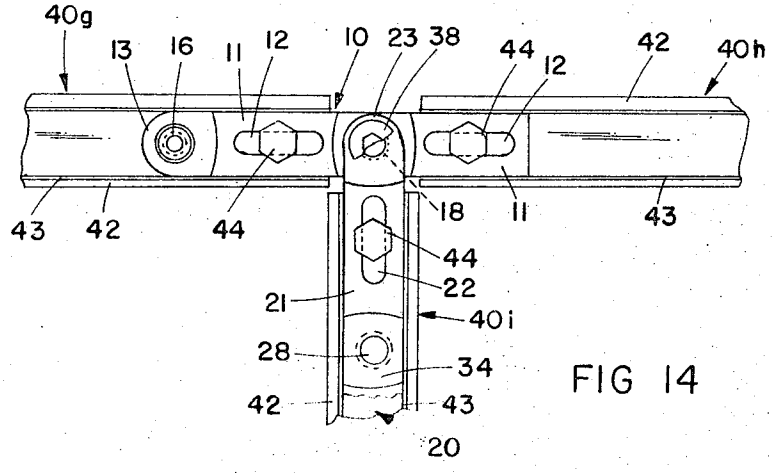


FIG 14

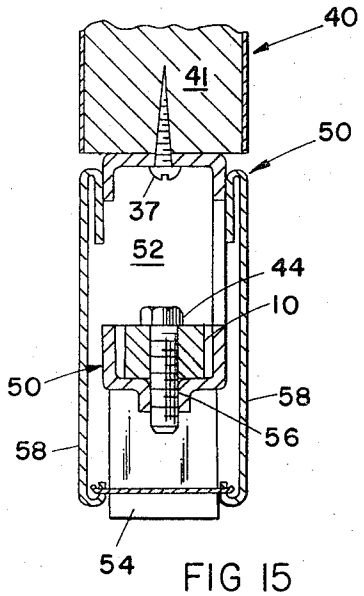


FIG 15

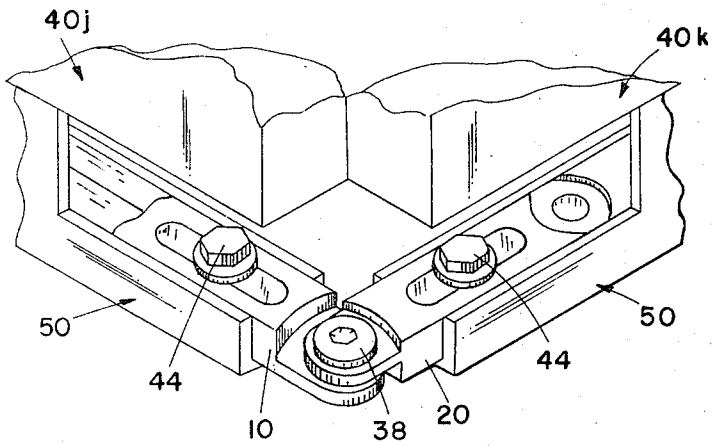


FIG 16

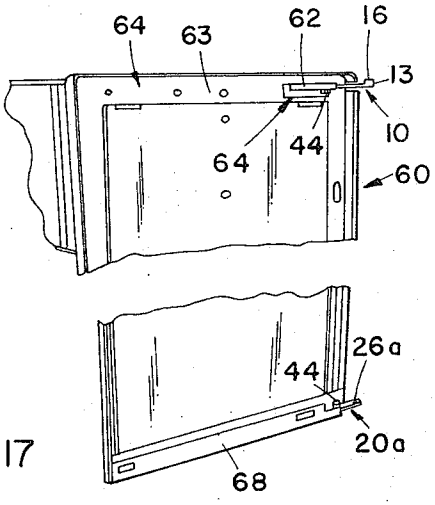


FIG 17

PARTITION CONNECTOR SYSTEM

BACKGROUND OF THE INVENTION

In prior art space divider partition systems, individual partition panels are generally free standing having perpendicular legs positioned at their lower portions. To form a wall or space divider, the partition panels are placed in an abutting relation. Since the separate panels are not secured together, some of them may shift out of alignment rendering an unsightly appearance. Some modern systems include connector members to connect pairs of panels. Some systems rely on offset bracket members fixed at the top and bottom of the panels to secure the pairs together. The offset brackets, however, are unsightly since they project outwardly from the divider panels. In addition, no provision is made for locking the panels and brackets in position. Accordingly, the panels are subjected to shifting with respect to one another. In other systems, provision is made for connecting three panels in a Y-shaped configuration. The panels are hinged along one edge thereof and a special Y-shaped key is fixed at the top of the panels in a recess to secure them in position. These and other systems, however, all suffer from the drawback that complicated brackets and special connectors must be provided for each different arrangement of panels.

SUMMARY OF THE INVENTION

The present invention overcomes the disadvantages of the above-mentioned systems in its provision of a simple inexpensive connector structure which makes it possible to provide virtually any practical arrangement of panels using only a basic pair of connector components. The connector system of the present invention includes a pair of elongated connectors, one having a tapered boss thereon and the other a tapered boss-receiving opening. The boss is threaded to receive securement means as a screw so that when it is drawn into position within the tapered opening, the two connectors wedge together locking the panels together, thereby eliminating the need for special keys or other locking mechanisms.

More specifically, the partition connector system of the present invention comprises at least a pair of elongated body members each having an elongated slot formed therein to accommodate fastening means secureable at the upper and lower edges of the divider panels. Each of the elongated body members has a flange extending outwardly at one end. The flange on one body has a tapered boss while the flange on the other body has a tapered boss-receiving opening formed thereon. The tapered boss has a tapped center portion to receive a screw passing through the tapered opening so that when assembled, the boss is wedged in the opening to prevent twisting or turning of the connectors and the panels connected thereby. The flanges extend from the body portions of the connectors at different levels such that when connected, the upper and lower surfaces of the connectors are at the same level. The present invention finds particular utility in combination with modular furniture systems particularly those incorporating end panel support constructions as shown in the commonly assigned application entitled END PANEL SUPPORT SYSTEM by Robert G. Mohr, Jack Hockenberry, Ronald R. Hodges, Douglas Scheerhorn, and Gale F. Wilcox filed on June 1, 1973, Ser. No. 366,218.

The many important objects and advantages of the present invention will be more fully appreciated by those skilled in the art when reading the following description with reference to the accompanying drawings illustrating a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a space divider panel arrangement in which the partition connector system of the present invention is utilized;

FIG. **2** is a top, plan view of a first one of the connectors of the invention;

FIG. **3** is a front view of the connector illustrated in FIG. **2**;

FIG. **4** is a top plan view similar to FIG. **2** illustrating the second connector of the invention adapted for cooperative engagement with the first connector;

FIG. **5** is a front view of the connector of FIG. **4**;

FIG. **6** is a front view of a pair of connectors as shown in FIGS. **2–4** in cooperative engagement;

FIG. **7** is a cross-sectional view taken along the plane VII—VII of FIG. **6**;

FIG. **8** is a plan view of one of the connectors used to interconnect a pair of adjacent space divider panels;

FIG. **9** is a cross-sectional view taken along the plane IX—IX of FIG. **8**;

FIG. **10** is a plan view illustrating three connectors of the invention arranged to connect three divider panels in a "Y" configuration as viewed along plane X—X of FIG. **1**;

FIG. **11** is a cross-sectional view taken along the plane XI—XI of FIG. **10**;

FIG. **12** is a plan view illustrating a pair of connectors interconnected to provide an intersecting connection of four divider panels;

FIG. **13** is a cross-sectional view taken along the plane XIII—XIII of FIG. **12**;

FIG. **14** is a plan view illustrating a perpendicular or "T" connection of three divider panels;

FIG. **15** is a fragmentary, cross section taken along the plane XV—XV of FIG. **1** illustrating the lower portion of the divider panel assembly;

FIG. **16** is a perspective view illustrating the connection of a pair of divider panels at the lower edge thereof; and

FIG. **17** is a fragmentary perspective of the interior of an end panel utilized in an end panel support system showing the connectors positioned therein.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The partition connector system of the present invention employs various combinations of male connectors **10** (FIGS. **2** and **3**) and female connectors **20** (FIGS. **4** and **5**) to connect pairs or other arrangements of panels **40** together to effectively and efficiently provide a space divider system for modern modular office layouts. A representative panel assembly is shown in FIG. **1** arranged in a Y-shaped configuration. Each of the several panels **40** includes a generally elongated core **41** made of particle board or the like and covered on each side with a decorative face panel **42**.

The lowermost end of panel **40** is supported on and secured to an elongated C-shaped channel member **50**

(FIG. 15) as by screws 37 passing into core 41. The channel is open at one side to form an opening to a recess 52. Leveling guides 54 threaded therein serve to level the panel on the floor surface in a conventional manner. Channel 50 includes an extruded opening 56 threaded to receive fastening means to secure connectors 10 or 20 therein as will be more fully described hereinafter. Removable decorative cover plates 58 provided on each side of channel member 50 complete the assembly and close the opening into recess 52.

Referring again to FIGS. 2 and 3, male connector 10 includes an elongated body member 11 having a pair of spaced-apart slots 12 therein and an outwardly extending flange 13 at one end. For convenience, connector 10 is best described as having an upper surface 14 and a lower surface 15. Flange 13 is an extension of lower surface 14 and has a slight thickness from which an annular tapered boss 16 extends upwardly. Upwardly extending boss 16 is provided with a threaded central portion 17 to receive fastening means as will be hereinafter described.

A second centrally located threaded annular tapered boss 18 is provided in the main body of the connector between spaced slots 12. Central boss 18 extends upwardly from lower surface 15 in a recess 19 formed in upper surface 14.

Female connector 20 is shown in FIGS. 4 and 5 and like its counterpart, male connector 10, includes an elongated body 21 having a pair of spaced slots 22. Flange 23 extends outwardly from one end while an additional flange 31 extends from the opposite end. Flange 23 is provided with an annular tapered boss-receiving opening 26 to receive boss 16 or central boss 18 of male connector 10 (FIG. 7). Like male connector 10, female connector 20 has an upper surface 24 and a lower surface 25 (FIGS. 4 and 5). Flange 23 extends outwardly from the one end intermediate the upper and lower surfaces and is stepped downwardly at 32 from upper surface 24 a slight distance corresponding to the thickness of second flange 31. Flange 31, as previously mentioned, extends outwardly from the opposite end of body 21 and is an extension of upper surface 24. Flange 31 has a thickness equal to the stepped-down portion 32 between flange 23 and upper surface 24. Second flange 31 includes an opening 36 through the central portion thereof.

A recess 29 is provided in lower surface 24 between elongated slots 22 (FIGS. 4 and 5). A tapered boss-receiving opening 28 opens upwardly from the recess toward upper surface 24. Opening 28 is tapered to receive boss 16 or central boss 18. An annular recess 34 is provided in upper surface 24 surrounding the smaller end of tapered boss-receiving opening 28 so that the head of a bolt can set therein.

In FIGS. 6 and 7, a pair of connectors 10 and 20 are connected together to provide for a pivotal connection between a pair of panels 40. In the preferred embodiment, two such paired connectors are employed, one pair at the top and one pair at the bottom of the panels to be connected. As shown in the figures, tapered boss 16 on male connector 10 is positioned in tapered boss-receiving opening 26 in female connector 20. Fastening means as a cap head screw 38 is passed through opening 26 and is threadably received in threaded portion 17 of boss 16. When screw 38 is tightened, tapered boss 16 is drawn and squeezed in tapered opening 26. This wedging action prevents any turning of one connector with respect to the other and thereby of one panel with respect to another. When screw 38 is loosened, the connectors and panels associated therewith may be pivoted with respect to each other. It will be noted that when the connectors are assembled, upper surfaces 14 and 24 and the lower surfaces 15 and 25 in the male and female connectors 10 and 20, respectively, are on the same plane and that the head of screw 38 fits flush in the stepped portion 32 of flange 23 so that the adjacent surfaces are generally flat, level, and parallel to each other. The slots 12 and 22 are used to fasten the connectors 10 and 20, respectively, to abutting panels 40 via bolts passing through the slots in a manner described hereinbelow.

In the assembly shown in FIGS. 8 and 9, a single male connector 10 is used to connect a pair of panels in a straight-line arrangement. In this case, connector 10 is used to bridge the space between a pair of panels 40*a* and 40*b* at their upper and lower edges. At the top edge of the panels a recess is formed in core 41 and a channel-like insert liner 43 is positioned in the recess. Liner 43 has an extruded tapped opening 45 therein in which a bolt or like fastener 44 is received through spaced slots 12 to secure the connector to the panels. A clearance opening 46 in core 41 is provided for the end of bolt 44. At the lower edge of the divider panels, the connector is fixed in channel 50 (FIG. 15) in a similar manner. Bolt 44 passing through slot 12 is received in threaded extruded opening 56. It will be noted that female connectors 20 can be utilized to connect a pair of panels as above described and in this case, fasteners 44 will pass through slots 22 and into tapped extruded openings 45 and 56.

The four-panel intersecting assembly shown in FIGS. 12 and 13 utilizes a male connector 10 and a female connector 20 connected together at their central portions. In this embodiment, a first pair of panels 40*c* and 40*d* are connected in a manner similar to FIG. 7 by male connector 10 and fasteners 44 passing through slots 12 into the threaded inserts 43 provided in the upper edges of the panels and in inserts 52 (FIG. 15) at the lower edges. In this case, lower surface 15 of connector 10 is oriented so that central tapered boss 18 extends upwardly. To complete the four-panel connection, female connector 20 is positioned across male connector 10 with its central boss-receiving opening 28 positioned over boss 18. A second pair of panels 40*e* and 40*f* are secured to female connector 20 by fasteners 44 passing through slots 22. While the resultant construction is relatively rigid, if desired, screw 38 may be threaded into boss 18 through the tapered boss-receiving opening of the female connector to secure the connectors together. The cap head of screw 38 fits into recess 34 and is flush or below upper surface 24 of connector 20.

FIG. 14 illustrates a "T" connection of three panels wherein male connector 10 is positioned to bridge panels 40*g* and 40*h* and is secured thereto by fasteners 44 passing through slots 11 as previously described. Boss 18 in the central portion of the male connector extends upwardly. Female connector 20 is similarly fastened to panel 40*i* by fastener 44 passing through one of slots 22. Opening 26 in flange 23 of the female connector is positioned over central boss 18 of the male connector where it may be secured by a screw as previously described. Before screw 38 is tightened, limited angular movement of panel 40*i* with respect to panels 40*g* and

40*h* is possible in this embodiment. If greater adjustability in a Y-shaped assembly is desired, a plurality of connectors may be arranged as shown in FIGS. **10** and **11.**

In the embodiment of FIGS. **10** and **11,** two female connectors **20** and a single male connector **10** are used. In this arrangement, male connector **10** is positioned with boss **16** (FIG. **11**) extending upwardly into boss-receiving opening **26** of female connector **20** at flange **23.** A second female connector **20** is positioned such that its second flange **31** (FIG. **5**) fits into stepped portion **32** on flange **23.** Screw **38,** passing through the openings in flanges **31** and **23** is received in threaded portion **17** of boss **16** to thereby secure the flange ends of the connectors together. Upper connector **20** does not utilize a wedging action because of the use of flange **31** and its opening **36.** While securely held, it is allowed a slight pivotal movement. Careful adjustment of the panels, however, will prevent such movement as the edge portions of the panels abut each other to thereby prevent any pivoting. In this regard, it must be noted that elongated slots **11** and **22,** in the male and female connectors, respectively, allow lateral shifting of the connectors with respect to the panels. The connections, therefore, may be shifted laterally with respect to the panels to thereby change the relative position of the pivot points. Accordingly, various angular adjustments between panels can be made if desired. Although the entire head of screw **38** extends above the surface of the flange in this "Y" arrangement, the abutting edges of the panels hide the connector and screw from view.

In FIG. **16,** the lower connection of a pair of panels **40***j* and **40***k* is illustrated. A male connector **10** is secured in channel **50** attached to divider panel **40***j*. The end of the connector is broken away for simplicity of illustration. A female connector **20** is secured in channel **50** on divider panel **40***k*. Boss **16** fits into recess **26** as previously described in connection with FIGS. **6** and **7** where they are secured and wedged together by screw **38.**

Those skilled in the art will appreciate that the connectors of the present invention provide a simple extremely effective partition connector system in which basic male and female connector structures can be utilized to provide virtually any arrangement of attached panels. While the more commonly utilized divider panel structures as straight line (FIG. **8**), "X" shaped (FIG. **12**), "T" shaped (FIG. **14**), and "Y" shaped (FIG. **10**) are illustrated, the present invention is also specifically adapted for and used for interconnecting office furniture systems of the type described in the above-referenced application entitled END PANEL SUPPORT SYSTEM.

An end panel **60** as utilized in such a support system is shown in FIG. **17.** The cover of the end panel has been removed for clarity. Connectors are fastened in the interior of the end panels near the top and bottom portions thereof. At the top of the interior, a generally J-shaped bracket **62** is welded in a recess **64** and extends outwardly from an inner wall **63** of the end panel a slight distance. Bracket **64** includes a tapped opening to receive bolt **44** passing through openings **12** in a connector **10** to thereby secure the connector thereon. When secured, flange end **13** of connector **10** extends a slight distance outwardly through a small opening in the side edge of the end panel such that its boss **16** (or opening **26** if the female connector is used) is exposed for connection to a corresponding connector on an adjacent panel. Lower connector **20***a* is a modified, shorter, female connector and is similarly secured in the lower supportive framework **68** of end panel **60** by means of a fastener **44.** The flange end having an opening **26***a* of the lower connector also extends outwardly through an opening in the side edge of panel **60** for connection to an adjacent panel as previously described. The tapered boss **16** and the boss-receiving opening **26***a* in female connector **20***a* are used to connect to similarly equipped end panels in an adjacent article of furniture. Alternately, the supporting end panels may be connected to divider partitions of the type shown in FIG. **1.**

Those skilled in the art will immediately recognize that many other arrangements of the invention can be provided by utilizing the simple connector structure of the present invention. Accordingly, all modifications of the invention are to be considered as included in the appended claims unless these claims by their language expressly state otherwise.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows.

1. An apparatus for connecting panels in a modular office system including male and female connector members adapted for mating engagement to secure adjoining panels, said male connector comprising:

an elongated body member, said body member having an upper and lower surface and adapted for connection to a first panel;

a flange extending outwardly at one end of said body member from said lower surface; and

a tapered boss extending upwardly from said flange; said female connector including an elongated body member adapted for connection to a second panel and having an outwardly extending flange thereon, said flange having a tapered opening therein adapted to receive said boss whereby said male and said female connectors may be secured together to thereby connect adjacent panels.

2. The apparatus of claim **1** wherein said female connector further includes said elongated body having upper and lower surfaces, said flange extending outwardly intermediate said upper and lower surfaces whereby said upper and lower surfaces of said male connector and said female connector are in the same plane when said boss is received in said opening.

3. The apparatus of claim **2** and further including fastening means for securing said connectors together, said boss having a tapped central opening therein adapted to receive said fastening means whereby said boss may be secured in said tapered opening.

4. The apparatus of claim **3** wherein said female connector includes a second flange extending outwardly from the end of said body opposite said first-mentioned flange, said second flange extending in a plane from said upper surface and having a central opening therethrough and a step formed in said first-mentioned flange from said upper surface whereby a second female connector may be connected at said second flange with said male and said first-mentioned female connector to thereby secure three panels together.

5. The apparatus of claim **3** and further including said female connector having a second tapered boss-receiving opening formed in said elongated body, said

lower surface having a recess therein, said second boss-receiving opening tapering inwardly from the bottom of said recess to said lower surface whereby said boss on said male connector may be positioned in said second boss-receiving opening.

6. The apparatus of claim **2** and further including said male connector having a second tapered boss thereon having a tapped central opening therein, said second boss extending upwardly from said lower surface in a recess provided in said upper surface of said body member, said second boss being positionable in said boss-receiving opening in said female connector.

7. The apparatus of claim **6** and further including said female connector having a second tapered boss-receiving opening formed in said elongated body, said lower surface having a recess therein and said boss-receiving opening tapering upwardly from the bottom of said recess to said lower surface whereby either of said first-mentioned boss or said second boss on said male connector are positionable in said second boss-receiving opening and said upper and said lower surfaces of each of said connectors are in a generally common plane.

8. In a space divider partition system wherein divider panels are interconnected, said panels having fastener-receiving means thereon to receive connector means for securement of said panels together, the improvement comprising:

a pair of elongated body members to serve as connector means, each said body member having an elongated slot formed therein to accommodate fastener means received in said fastener-receiving means in said panels;

each of said pair of elongated body members having a flange extending therefrom on at least one end thereof, said flange on one of said body members having an upwardly extending tapered boss thereon, said flange on the other of said body members having a tapered boss-receiving opening formed therein; and

means for securing said boss in said tapered receiving opening whereby a pair of panels each having at least one of said pair of connectors fixed thereon may be secured together, said tapered boss in said tapered boss-receiving opening when received preventing rotation of said panels with respect to each other.

9. The system as defined in claim **8** wherein said one of said body members has an upper and a lower surface, said flange extending outwardly on a plane from said lower surface and said tapered boss extending upwardly therefrom.

10. The system as defined in claim **8** wherein said other of said body members has an upper and a lower surface, said flange extending outwardly parallel to and intermediate said upper and lower surfaces, said tapered boss-receiving opening having its larger opening oriented toward said lower surface.

11. The system of claim **8** wherein said one of said body members has an upper and a lower surface, said flange extending outwardly on a plane from said lower surface, said tapered boss extending upwardly therefrom; and the other of said body members having an upper and lower surface, said flange on said other of said body members extending outwardly parallel to and intermediate said surfaces, said tapered boss-receiving opening having its larger opening oriented toward said lower surface whereby said upper and said lower surfaces of each of said connectors extend in a generally common plane when said boss is received in said opening.

12. The system as defined in claim **11** wherein said other of said body members includes a second flange extending therefrom at the end of said body opposite said first-mentioned flange, said second flange extending in a plane from said upper surface and having an opening therethrough whereby two of said other body members can be joined to said boss; one with its first flange fitted over said boss and another with its said second flange resting on top of said first flange with said fastening means passing through said opening therethrough and being secured to said boss.

13. The system as defined in claim **12** wherein said first-mentioned flange and said other of said body members is positioned downwardly from said upper surface a distance corresponding to the thickness of said second flange whereby said upper and lower surfaces all extend in a generally common plane.

* * * * *