UNITARY MODULAR SHELVING STRUCTURE

Inventor: Ralph Alster, 2 Washington Square Village, New York, N.Y. 10012

Filed: May 28, 1970

Appl. No.: 41,361

U.S. Cl. ...........................................312/111, 312/108, 312/257 R
Int. Cl. .............................................F16b 12/02
Field of Search ........................................287/289.36 H, 289.36 D; 217/69, 65; 52/285, 582, 586; 312/111, 107, 257; 257 SK, 257 SM, 351

References Cited

UNITED STATES PATENTS

3,186,561 6/1965 Strassle.............................287/189.36
3,090,162 4/1963 Brooks..................................312/111
2,752,215 6/1956 Peiss.................................312/111
2,956,705 10/1960 Clingman.............................312/257 SK
3,279,876 10/1966 St. Cyr.................................312/351

FOREIGN PATENTS OR APPLICATIONS

1,283,150 12/1961 France...............................312/107
477,128 8/1926 Germany...............................312/257 R

Primary Examiner—James T. McCall
Attorney—Hubbell, Cohen & Stiefel

ABSTRACT

A unitary modular shelving structure comprised of a plurality of plate-like members. The plate-like members are assembled into the unitary modular structure, which may comprise one or more modules, by means of hollow rectangularly configured connectors, or clips, having a plurality of peripherally arranged, equiangularly spaced congruent grooves which are complementary to tongue-like protrusions extending from the modular plate-like member outer walls. The connectors may be common junction points for adjacent modules which may be connected to form a unitary structure comprising a plurality of modules. Threaded members, such as screws, may be utilized to provide additional strength to the unitary structure. Various members may be inserted in portions of the assembled plate-like members so as to alter the structural appearance of the completed structure and/or to add additional utility.

12 Claims, 15 Drawing Figures
UNITARY MODULAR SHELVING STRUCTURE

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to shelving structures and more particularly to unitary modular shelving structures which may be easily assembled in a plurality of structures.

SUMMARY

A unitary modular shelving structure is constructed which includes a plurality of modular plate-like members, each having a substantially planar base portion and a plurality of walls upwardly extending therefrom to form a recess therein, and tongue-like protrusions associated with the upwardly extending walls and extending outwardly therefrom, each of the protrusions having a lockable portion. A protrusion is associated with a respective wall of a pair of opposing walls substantially at the ends thereof. The protrusions extend partially along the respective wall. A plurality of insertable connectors means operatively connects the modular plate-like members together to form at least one module. Each axially extending face of the connector is provided with a groove complementary to a protrusion for reception therein. The protrusion is lockable in the groove solely due to reception therein. Each of the grooves is capable of forming a common junction for an adjacent module so as to be connectible to form a unitary modular shelving structure comprising a plurality of modules.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partially exploded perspective view of a preferred embodiment of a module in accordance with the present invention;

FIG. 2 is an enlarged fragmentary sectional view of a common junction point of one of the corners of the module illustrated in FIG. 1;

FIG. 3 is a plan view of a mating panel for adjacent modules;

FIG. 4 is a sectional view taken along line 4—4 of the embodiment illustrated in FIG. 3;

FIGS. 5 and 6 are views partially in section and partially in side elevation illustrating various means of connecting the module illustrated in FIG. 1 to a wall;

FIG. 6 is a partially exploded plan view of the connecting means in FIG. 5;

FIG. 7 is an end view of a part of the connecting means in FIG. 5;

FIG. 9 is a view partly in section and partly in plan of the connecting means in FIG. 8;

FIG. 10 is an end view of the connecting means in FIG. 8;

FIG. 11 is a partially exploded perspective view of the module illustrated in FIG. 1 showing additional components associated therewith;

FIG. 12 is a plan view of an alternative embodiment of the present invention;

FIG. 13 is a sectional view taken along line 13—13 of the embodiment illustrated in FIG. 12;

FIG. 14 is a partial sectional view of an assembled module in accordance with the embodiment illustrated in FIG. 12; and

FIG. 15 is a perspective view of a particular structure utilizing the module illustrated in FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in detail, especially to FIG. 1 thereof, a cubic bookshelf module shown therein, and generally referred to by the reference character 10, is made up of four separable identical plate-like members 12, 14, 16 and 18 which are releasably held together by a multiplicity of connectors, or clips 20 to 34 inclusive, in a manner which will be described in greater detail hereinafter. As shown the plate 12 forms the floor or shelf for the module 10, plates 14 and 16, the upright sidewalls thereof, and plate 18 the top. As shown in FIG. 1 and as is preferred in connection with this embodiment, each of the plates 12, 14, 16 and 18 has a planar base 36 and an upstanding peripheral wall portion 38. The peripheral wall portion 38 is shown defining upstanding side walls 40 and 42 and end walls 44 and 46, which define a recess in the plate. Peripheral wall 38 adds substantial rigidity to the plates 12, 14, 16 and 18. As shown and as preferred each of the plates 12 through 18 inclusive are integrally formed as by injection molding of plastic or the like. Naturally, they may be made of other materials such as metal, wood or synthetic compositions.

Referring now particularly to FIG. 4, to further strengthen the plate-like members 12 through 18, extending out from the central portion of the side wall parts 40 and 42 of the upstanding peripheral side wall 38 of the plate-like members 12 through 18 inclusive are ribs 48 which terminate inward of the end walls 44 and 46 in substantially V-shaped abutments 50. The V-shaped abutments 50 also provide for proper orientation of adjacent plates relative to each other in the module 10. Cantilevered out from each of the four abutments 50 in each plate-like member 12 through 18 inclusive in a dove-tail shaped securing member or element 52 which, preferably, although not necessarily, is secured to the confronting portion of the sidewalls 40 to 42 and by ribs 54 to strengthen the securing member 52. As shown and as preferred, the dovetailed securing elements 52 and the ribs 54 are formed integrally with the remainder of each of the plate-like members 12 through 18 inclusive as by injection molding. Naturally, as already noted, other means of fabrication may be employed. Furthermore, preferably each dove-tailed securing element 52 is formed as one piece so as to provide added strength thereby.

As already noted, the plate-like members 12 through 18 are connected to one another in the cubic arrangement of FIG. 1 by a multiplicity of clips 20 through 34 inclusive. Each of the clips is essentially a rectangular solid with a square cross-section, with a longitudinally extending dovetail-shaped groove in each face thereof, each groove being formed complementary to a securing element 52 and its attaching rib 54. Specifically, as shown in FIG. 2, the clip 26, which is representative of all of the clips 20 through 34 inclusive, has four substantially identical faces 56, 58, 60 and 62 arranged at right angles to one another with each face thereof having therein an arrowhead-shaped groove 64, 66, 68 and 70, respectively, comprising a neck portion and a locking cavity portion, each of which groove is complementary to a connecting member 52 and its associated rib 54, said neck portion being complementary to said rib 54 and said locking cavity portion being complementary to said connecting member 52. With such a construction, it will be obvious that two of the plate-like members can be connected to one another at right angles, merely by arranging them at right angles and slidably mounting a clip on their confronting securing members 52 as may be seen in FIG. 2. To further assure good solid securement of two plate-like members such as the members 12 and 16, a second clip 34 may be secured to the rear confronting securing members 52 as by slidably mounting the clip 34 thereon in precisely the same manner as the clip 26 is mounted. Thus, the clips 26 and 34 form the juncture between bottom plate-like member 12 and side wall plate-like member 16. Similarly, clips 24 and 32 perform the same function for side wall plate-like members 12 and top plate-like member 18; clips 22 and 30 join top wall 18 with side wall 14; and clips 20 and 28 (not shown) will serve to join side wall 14 to bottom 12 whereby to complete the cubic arrangement and hold it in the defined and illustrated relationship in FIG. 1.

Referring now to FIG. 11, various associated components exemplary of the flexibility of the modular building block of the present invention are shown. As shown, the cubic bookshelf module 10 is substantially as described with reference to FIG. 1, similar elements having the same reference numeral, with the modifications therefrom to be subsequently described.
Each of the plates 12, 14, 16 and 18 have pluggable apertures 19 located close to the four corners of the plate so as to extend through the peripheral wall 38 at the corners thereof and through the base 36 into the interior of the module 10 near the interior corners thereof. The apertures 19 are shown as extending through the base 36 to the outside of the module 10. However, if desired, the aperture 19 need only extend from the interior a sufficient depth to retain a plug therein. The sidewalls 14 and 16 have additional pluggable apertures 21 located in the base 36. Substantially U-shaped pluggable supports 23, having plugs 25 are insertable in the apertures 21 at the innermost side of the plates 14 and 16 from the interior of the module 10 and may be located at any desired height thereof, one being shown for purposes of illustration, and presently being preferred.

A removable horizontal divider, or shelf 27, is slidably insertable within the U-shaped supports 23 to form a partition within the module 10. Alternatively, a vertical divider may be incorporated in a manner similar to horizontal divider 27. As shown and preferred, the plates 12, 14, 16 and 18 are assembled in the module 10 with the recess 29 formed by the peripheral wall 38 opening to the exterior of the module 10. A capping member 31 is insertable within the recesses 29 formed in the plates 12, 14, 16, and 18 so as to be substantially flush with the uppermost edges of the peripheral walls 38 and present a flush finished appearance. Screws (not shown) through apertures 73 and 75 in the plates and cups, respectively, are preferably used to join the plates and cups together. These caps 31 conceal the portions of the plugs 25 associated with the U-shaped supports 23 which extend through the base 36 of the side walls 14 and 16 into the recess 29. These caps 31 are shown as provided preferably with a horizontal edge 33 to stiffen the cap. Caps 31 may be provided with apertures identical to aperture 21 in the base 36 of plates 12, 14, 16, 18 for support of U-shaped supports 23 so that divider shelves 27 can also or alternatively be inserted in adjacent modules 10. Preferably, these apertures are defined in bosses 77 as shown in FIG. 11.

In the module 10, as shown, two square shaped openings 35 are present. These openings may be closed in a variety of ways. If desired, one or both of these openings 35 may be left open without impairing the utility of the module 10. As shown and preferred, a complementary substantially square member, or backing panel 37 is inserted within the openings 35. As shown and preferred, square backing panel 37 has a planar base 39 and a peripheral wall portion 41. The peripheral wall 41 is shown defining a plane wall 45 and 47, and top and bottom ends 49 and 51. Extending outwardly from the top and bottom walls 49 and 51, and situated substantially at the ends thereof are plugs 53. The plugs 53 are insertable in the apertures 19 of the top 18 and floor 12 of the module 10 adjacent the opening 35 to retain the backing panel 37 in position, and thereby close the rear opening.

As shown and preferred, a square door 55 closes the other or front opening of the cubic module 10. As previously stated, if desired, the opening may be left open and no door 55 utilized. The door 55 is shown in opening 35 and substantially identical to the backing panel 37 with the exception of having the plugs 53 situated at only one end of the top 49 and bottom 51. A handle 57 is located at the side of the door 55 opposite from where the plugs 53 are to facilitate opening of the door 55. The handle 57 is shown as extending outwardly from the base 39 although any conventional handle, such as one integrally formed as a recess in the base 39 may be utilized. The plugs 53 are inserted in the apertures 19 of the top 18 and floor 12 of the module 10 adjacent the opening 35 at one side thereof so as to provide a pivotal mounting for the door 55. The plugs 53 on both the backing panel 37 and door 55 may be located so as to have the door 55 and backing panel 37 flush with the respective outer edges of the plates if desired. Moreover, a cylindrical shape for plugs 53 is preferred as well as a complementary round cross section for apertures 19.

In order to present a "finished" appearance to the exposed corners of the modular structure, cap members 59 are provided. Such cap members are elongated and have at their ends a pair of oppositely extending dowels 102 similar to securing members 52, for insertion into the grooves 64, 66, 68 and 70 of a clip 20-34 unoccupied by a securing member 52. These cap members 59 are formed so as to have their outermost sides at right angles to each other and proportioned to fit alongside of surfaces 48 and 50. Thus two perpendicularly arranged cap members 59 will finish off a corner of an array.

Referring now to FIGS. 12 through 14, a modified form of the present invention is illustrated. In the modification of FIGS. 12 through 14, as may best be seen in FIG. 14, the module 110 is formed of four plates 112, 114, 116, and 118 (not shown) which respectively form the bottom, the two sides, and the top of the module 110. In accordance with the modification of FIGS. 12 through 14, each of the plates 112 through 118 is made up of two half plates 120, the structure of which may best be seen in FIGS. 12 and 13.

Referring now to FIGS. 12 and 13, a typical half plate 120 is provided with a planar base 122, two angularly extending side walls 124 and 126, each of which extends upwardly from base 122 preferably at an angle of 45°, and each of which terminates in V-shaped abutments 128 which correspond to half of the abutments 59 in the FIG. 1 embodiment. Each half plate 122 further includes end walls 130 and 132 which are joined by the V-shaped abutments 128 by end wall extensions 134 which extend in from the end walls 130 and 132 at right angles thereto. Connected to abutments 128 by means of half ribs 54' parallel to end wall extensions 134 and terminating flush with the plane of the end walls 130 and 132 are securing members or elements 136 which are similar to one-half of the securing elements 52 of the FIG. 1 embodiment.

To add further stiffening to the half plates 120, a central upright rib 138 is provided. Also, in order to effect a connection of two confronting half plates to form a full plate as will be described hereinafter, each half plate is provided with upstanding tubular bosses 140 adjacent the end wall extensions 134 and adjacent the reinforcing rib 138 through which securing elements may pass to connect two half plates as will be described. Lastly, it will be seen that the angularly sloping side walls 124 and 126 are provided with apertures 142 for reasons which will become apparent hereinafter.

To assemble a module 110, the half plate 120 forming the upper half of plate 112 is placed at right angles to the half plate 120 forming the right hand portion of side wall 114, whereby to place their respective end walls 124 into surface-to-surface relation with the apertures 142 therein in register so as to receive securing elements such as bolts 144 therethrough for securing of the inner plate 120 of the as the affixing of nuts 146. A similar operation can be employed to effect a junction between the right hand half plate 120 of the upstanding wall 114 and the lower half plate 120 of the top 118 (not shown) and then the lower half plate 120 of the upper plate or top 118 can be secured by nuts 146 and bolts 144 to the left hand half plate 120 of the side wall 116. Then, to complete the square or cubic array of the module 110, the left hand half plate 120 of the side wall 116 is brought into engagement with the upper half plate 120 of the bottom 112 whereby they retaining their angular end walls 126 into confronting relation with the bolt holes 142 therein in register to enable bolts 144 to pass therethrough and be held as by nuts 146. This establishes the cubic array.

The above steps can be repeated to assemble a predeter mined desired number of square or cubic arrays. Thereafter, the cubic arrays made up of the half plates can be joined to one another as shown in FIG. 14 by passing bolts 147 through apertures 149 in adjacent plates of two square arrays, which apertures are in register, and then secured as by nuts 148 to thereby join the two adjacent square arrays. This joining step may be repeated for arrays which are adjacent both in the horizontal and vertical directions so that an entire grid as shown in FIG. 15 can be constructed.
Half plates which are on the outer surface of the now assembled array will have an unfinished appearance. To eliminate the unfinished appearance, additional half plates may be brought into confronting relation with the exposed half plates which have already been integrated into the array and joined as by bolts 147 and nuts 148 in the manner previously described so as to give the array a finished appearance. To complete the connection between adjacent square arrays which are now joined to one another only at the middle of confronting half plates by bolts 147 and nuts 148, clips 20 through 34 inclusive are slidably disposed on the dovetail connecting elements 150 in a manner similar to the incorporation of the clips in the Fig. 1 embodiment. Further, the mounting of the clips will provide a finished appearance.

As an alternative to forming shelves in accordance with Figs. 12 through 14, whole plates may be initially assembled from half plates 122 as by bolts 147 and nuts 148 20 and thereafter the so formed whole plates may be treated in the precise manner of the plates 12, 14, 16 and 18 of Fig. 1. That is, the array may be formed by joining perpendicularly arranged now formed whole plates through the use of the clips alone, thereby eliminating the need for the bolts 144.

Turning now to Figs. 5 through 10, means are shown therein to make the modules 10 or 110 wall mountable if desired. In order to accomplish this feature, in accordance with the present invention, each of the clips 20 through 34, inclusive must be provided with a central axially extending aperture 96 (as shown in Fig. 1) and the end walls of plates 12, 14, 16 and 18, or their modified counterparts of Figs. 12 through 14, namely, 112, 114, 116 and 118, must be formed with short perpendicular surface 99 which between them define an aperture (Figs. 5 and 8), or a passage which registers with the apertures 96 in the clips. The purpose of the registered apertures in the clips and in the end walls is to permit a bolt 98 to pass through the passages 96 in the clips and through the passage defined by surfaces 99 on the end walls of plate-like members 12 through 18 to secure the plate-like members and their associated clips to a fastener 101 for subsequent mounting on a wall bracket or the like. By way of example, two types of fasteners are shown in Figs. 5 through 10 inclusive and reference to these figures should be had. Referring now to Fig. 5, the clip 101 in that figure is of the well known type having a pair of downwardly extending lugs 103 spaced from the main body of the clip 101 and insertable in slots that are provided in the bight of a channel member 104 that is mounted on a wall as by screws 105.

In Fig. 8 the bracket 109 is generally U-shaped with the elongated fastening portion passing through the bight of the U to secure the clips and plate-like member to the fastener 109. The fastener 109 has two outwardly extending flanges 111 on its legs which flanges are provided with apertures 113 through which screws 115 may pass to mount the assembly on the wall.

As can be seen by reference to Fig. 15, a plurality of component modules 10 are connected in a desired structure to form a unitary modular shelving structure. In the structure shown in Fig. 15, a plate-like member may be utilized for a common wall of an adjacent module thereby minimizing the cost and redundancy associated with having to utilize two separately constructed modules jointly to form a unitary modular structure. The rectangular, or cubic array as shown and preferred, is desirable as a building block for such modular shelving structures, although other arrays (not shown) may be utilized. This is just one of the many advantages associated with the present invention.

It will be recognized that in addition to founding the array sideways and vertically as previously described the array can be extended perpendicularly to the plane thereof so as to make it deeper. That is to say two modules can be brought into horizontal register in order to make a unitary double deep module. The connection between the modules can be effected by the use of clips of double axial extent which are therefore adapted to receive the dovetail connecting members of two aligned plates and the securement can be further made permanent by means of a bolt passing through registered apertures defined by surfaces 99 and central apertures 96 in the clips 20 through 34.

It is to be understood that the above described embodiments of the invention are merely illustrative of the principles thereof and that numerous modifications and embodiments of the invention may be derived within the spirit and scope thereof.

What is claimed is:

1. A modular rectangular shelving structure comprising four rectangularly arranged modular substantially rectangular plate-like members each having a substantially planar base portion and side walls and end walls perpendicular to said base portion;

2. A plurality of axially elongated protrusions associated with said upwardly extending side walls and extending outwardly therefrom; a protrusion being associated with each respective side wall of a pair of adjacent plate-like members;

3. A plurality of insertable connectors means operatively connecting said modular plate-like members together to form said module, said connector means having four rectangularly arranged, axially extending faces and a pair of end faces, each axially extending face of said connector means being provided with a groove complementary to a protrusion for reception thereinto, terminating in at least one of said end faces, whereby four of said connector means in receiving relation with adjacent pairs of protrusions at the four corners defined by said four rectangularly arranged plate-like members hold said plate-like members in said rectangular array.

4. A structure in accordance with claim 1 wherein said protrusions are located on said side walls adjacent said end walls and extend partially along said respective side walls, and an abuttable orientation member longitudinally extends between said protrusions so as to provide for proper orientation of an adjacent plate-like member in abutting relation therewith.

5. A structure in accordance with claim 1 wherein said groove has a neck portion and a locking cavity portion, said locking cavity portion being larger in area than said neck portion so as to retain said protrusion in said groove after reception therein.

6. A structure in accordance with claim 3 wherein said connector means is rectangular and having a square cross-section, said groove is a longitudinally extending arrowhead-shaped groove, each of said axially extending faces being substantially identical, and said complementary protrusion has an arrowhead configuration comprising a rib portion complementary to said groove neck portion and a connecting portion complementary to said locking cavity portion.

7. A structure in accordance with claim 1 wherein said plurality of plate-like members in said array comprises two upright members and a bottom and a top horizontal member, said upright members having pluggable apertures therein; U-shaped pluggable clamps in said apertures at the innermost side of said upright members at a desired shelf height; a shelf slidably insertable within said U-shaped clamps; said recess opening to the outermost side of said upright portion; and a clamping member insertable in each of said recesses substantially flush with the outer edges of said upright portions.

8. A structure in accordance with claim 1, wherein said plurality of plate-like members in said rectangular array comprises two upright and a bottom and a top horizontal member, said bottom and said top horizontal members having pluggable apertures therein; and a pluggable substantially rectangular member complementary to an opening formed within the rectangular array at one side thereof adjacent said upright members, said pluggable member being pluggable in a side of the top and bottom members.
7. A structure in accordance with claim 6, wherein said pluggable member is pivotally mounted in the top and bottom members solely due to insertion in only one side thereof.

8. A structure in accordance with claim 2 wherein said grooves terminate in both said end faces, and said structure further includes a pair of perpendicularly arranged cap members longitudinally extending along said respective walls and insertable in each of said grooves unoccupied by a protrusion; each of said cap members' outermost side being substantially flush with a contiguous related plate-like member at said common junction point to provide a continuous peripheral edge at said common junction point; each of said cap members' innermost side having tongue-like protrusions and a portion complementary to said adjacent abuttable orientation member, said protrusions being complementary to said grooves and insertable therein.

9. A structure in accordance with claim 1 wherein said perpendicularly arranged side walls each have an angularly related portion, said angularly related portion including a plurality of apertures therein, said angularly related apertures being registerable with said angularly related apertures of an adjacent plate-like member placed in abutting relation therewith so as to form a continuous passageway therethrough; and a connecting member insertable in said continuous passageway and lockable therein to retain said abutting members in position.

10. A structure in accordance with claim 1 wherein said module is a substantially rectangular array; each of said plate-like members comprises two half plate-like members in abutting relation; each of said half plate-like members comprises a substantially planar base portion and side walls and end walls extending upwardly from said base portion, each of said side walls having a half protrusion extending outwardly therefrom, said side walls each having an angularly related portion, said angularly related portion comprising an outwardly extending angularly related abuttable member having grooves therein, said angularly related abuttable member and said grooves therein being complementary to said angularly related abuttable member of an adjacent half plate-like member placed in abutting relation therewith so as to form a continuous passageway therethrough, said half plate-like member planar base portion includes a plurality of grooves therein, said base grooves being registerable with said base grooves of said other half plate-like member comprising said plate-like member so as to form a continuous passageway therethrough, said half protrusions being complementary so as to form said protrusions; and a threaded member insertable in said continuous passageway and lockable therein so as to retain said abutting members in position.

11. A structure in accordance with claim 10 wherein: a panel-like member extends substantially between said side walls and is mateable with an abutting plate-like member, said panel-like member having apertures therein registerable with said abutting plate-like member base grooves, to form a continuous passageway therethrough, said connecting member being insertable in said continuous passageway and lockable therein to retain said panel in abutting relation with said plate-like member.

12. A structure in accordance with claim 1 wherein said modular plate-like members and said tongue-like protrusions and said connector means are integral and made of synthetic plastic.

* * * * *