

Aug. 13, 1963

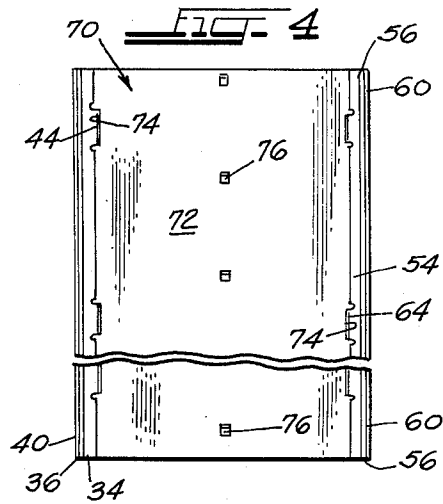
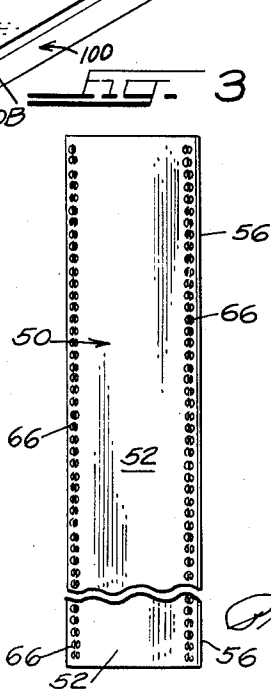
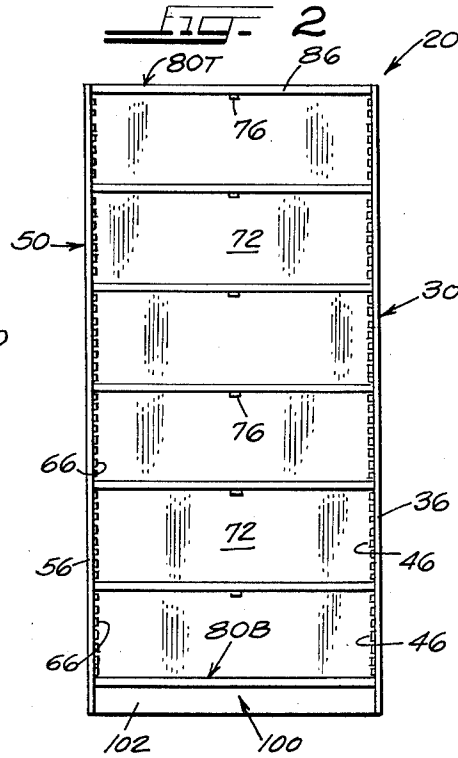
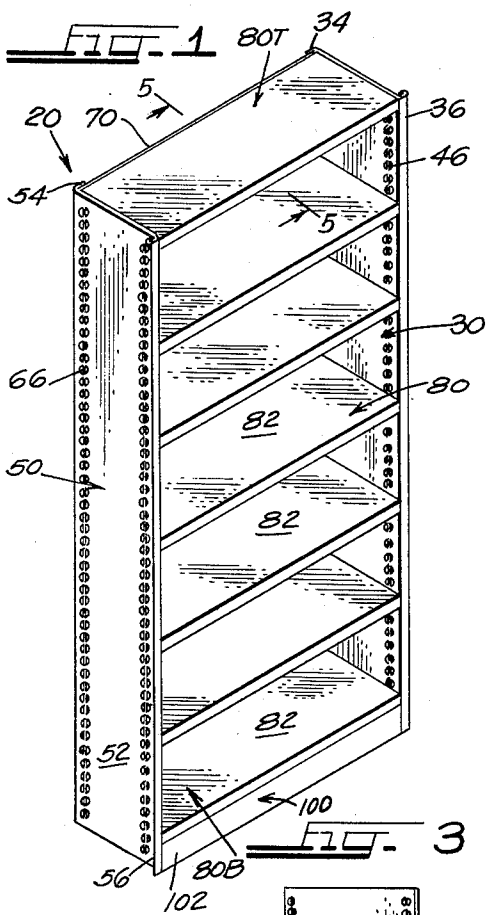
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SHELVING STRUCTURE

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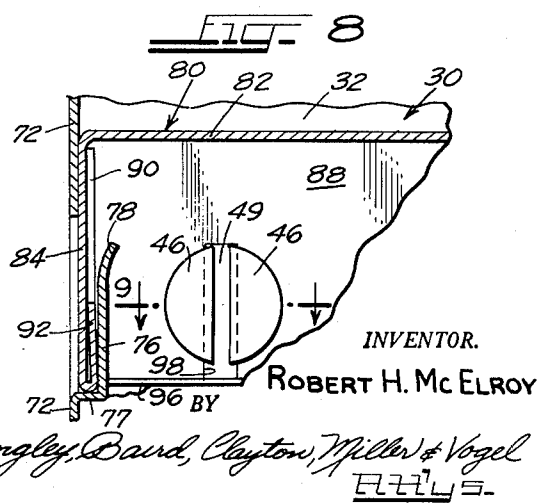
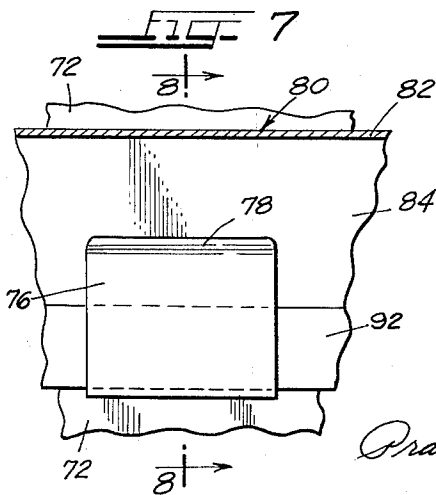
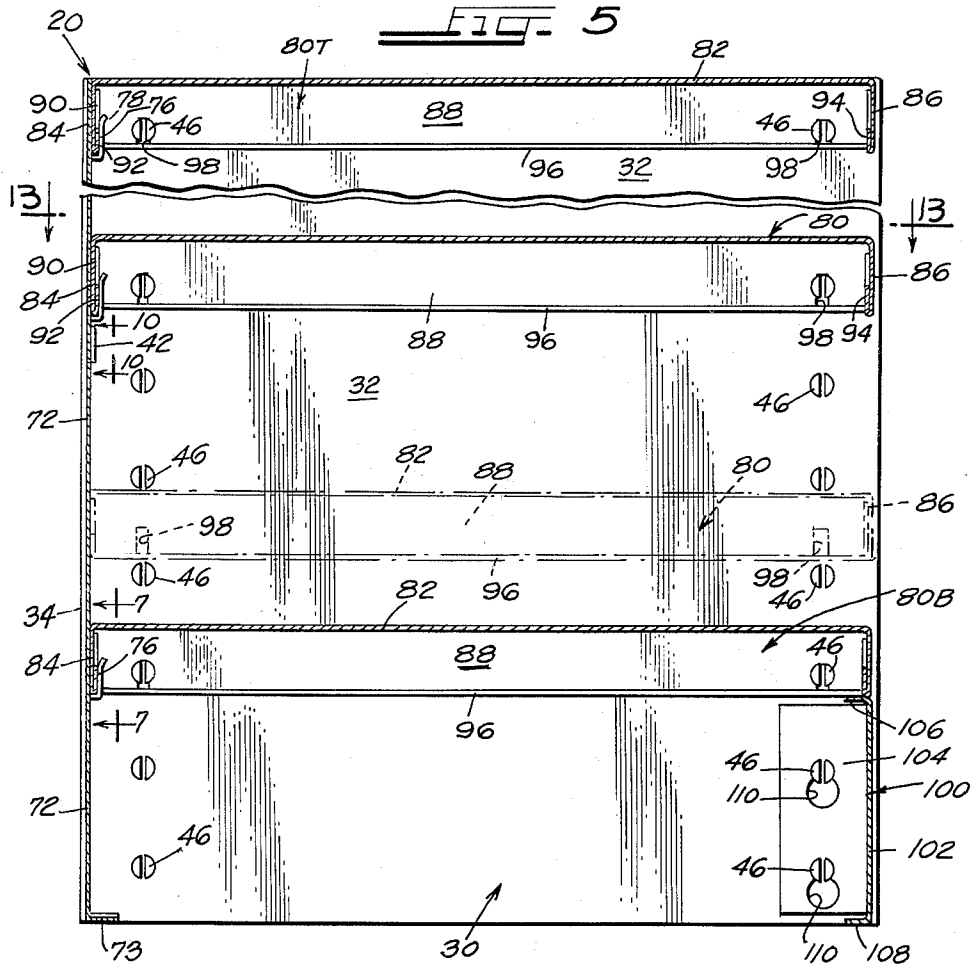
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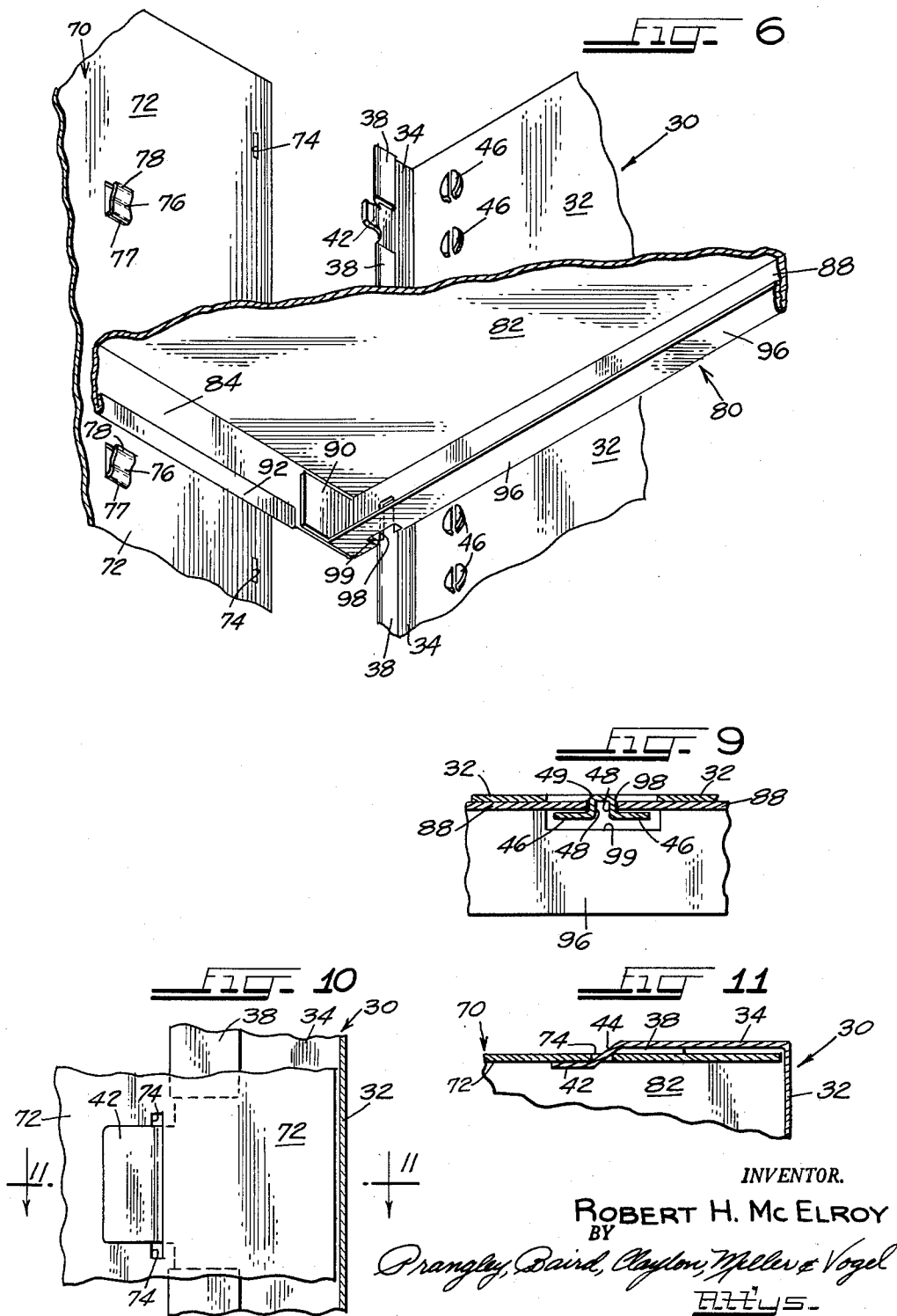
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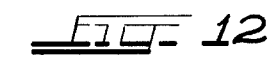
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4 Sheets-Sheet 4



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3,100,460

## SHELVING STRUCTURE

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7 Claims. (Cl. 108-109)

This invention relates to shelving constructions and particularly to an improved adjustable shelving construction that can be assembled without the use of bolts, nuts, clips and other fastening elements.

Various forms of knock-down shelving have been provided heretofore that can be assembled or disassembled or adjusted substantially without the use of any tools except a mallet or other pounding device, but in general these knock-down shelving constructions have necessitated the use of at least a minimum number of bolts, nuts, clips or other fastening elements which are easily lost or misplaced or are easily injured during assembly and use. The prior shelving constructions have also in general permitted adjustment of each individual shelf but often the adjustment was accomplished only with difficulty and by juggling a plurality of individual parts.

Accordingly, it is an important object of the present invention to provide an improved shelving construction of the knock-down type which can be assembled without the use of bolts, nuts, clips, studs and similar fastening elements.

Another object of the invention is to provide a shelving construction of the type set forth, wherein each individual shelf can be readily adjusted as to height on the supporting members of the shelving construction by simply removing the shelf and placing it at a new height, this being accomplished without the use of bolts, nuts, studs, clips or similar fastening elements.

Yet another object of the invention is to provide an improved shelving construction of the type set forth which can be completely assembled or disassembled without the use of any tools except a mallet or pounding device and which when assembled is completely rigid and self-reinforcing.

Still another object of the invention is to provide a shelving construction of the type set forth which can be readily manufactured from sheet metal utilizing standard forming equipment whereby to provide a simple and inexpensive shelving construction.

A further object of the invention is to provide an improved back member, an improved side member, an improved shelf and an improved base member useful in the improved shelving construction of the type set forth.

These and other objects and advantages of the invention will be better understood from the following description when taken in conjunction with the accompanying drawings. In the drawings wherein like reference numerals have been utilized to designate like parts throughout:

FIGURE 1 is a perspective view of a shelving construction made in accordance with and embodying the principles of the present invention;

FIG. 2 is a front elevational view of the shelving construction illustrated in FIG. 1 of the drawings;

FIG. 3 is an end view of the shelving construction of FIG. 1 with certain parts broken away;

FIG. 4 is a back view of the shelving construction of FIG. 1 with certain portions broken away;

FIG. 5 is an enlarged view in vertical section through the shelving construction of FIG. 1 substantially as seen in the direction of the arrows along the line 5-5 thereof, certain portions having been broken away;

FIG. 6 is an exploded fragmentary view on an enlarged scale showing the relationship among the back member, a side member, and a shelf;

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FIG. 7 is a further enlarged fragmentary view in vertical section of the bottom shelf of FIG. 5 substantially as seen in the direction of the arrows along the line 7-7 thereof;

FIG. 8 is a fragmentary view in vertical section substantially as seen in the direction of the arrows along the line 8-8 in FIG. 7;

FIG. 9 is a view in horizontal section substantially as seen in the direction of the arrows along the line 9-9 of FIG. 8;

FIG. 10 is an enlarged view in vertical section with certain parts broken away substantially as seen in the direction of the arrows along the line 10-10 of FIG. 5;

FIG. 11 is a view in horizontal section through the construction of FIG. 10 substantially as seen in the direction of the arrows along the line 11-11 thereof;

FIG. 12 is an enlarged exploded perspective view with certain portions broken away illustrating the relation between a side member, the base member, and the bottom shelf; and

FIG. 13 is a view in horizontal section substantially as seen in the direction of the arrows along the line 13-13 of FIG. 5.

Referring to FIG. 1 of the drawings, there is shown a shelving construction generally designated by the numeral 20 made in accordance with and embodying the principles of the present invention, the shelving 20 including a pair of upright side members 30 and 50, a back member 70, a plurality of shelves 80 including a top shelf 80T and a bottom shelf 80B, and a base member 100.

The side members 30 and 50 are similar in construction, being actually mirror images of each other, the side member 30 including a body 32 which is substantially flat and rectangular in shape having a rear flange 34 extending in one direction from the body 32 and substantially perpendicular thereto and a front reinforcing flange 36 extending in the opposite direction from the body 32 and disposed substantially perpendicular thereto, the flanges 34 and 36 extending the entire length of the side member 30. Referring particularly to FIGS. 6 and 13 it will be seen that the rear flange 34 has an integral reinforcing flange 38 thereon and that the reinforcing flange 36 in turn has a reinforcing flange 40 formed integral thereon, the reinforcing flange 38 being formed on the outer edge of the flange 34 and extending back toward the body 32 and disposed on the forward face of the rear flange 34. The reinforcing flange 40 on the front flange 36 is also formed on the outer edge thereof and extends back toward the body 32 on the rear face of the flange 36. The rear flange 34 further has several tongues 42 formed on the free edge thereof (see FIGS. 10 and 11 also), the tongues 42 interrupting the reinforcing flange 34 and being offset forwardly by an oblique connecting portion 44 whereby the tongue 42 is disposed substantially parallel to the rear flange 34 but offset forwardly thereof for a purpose which will be more fully explained hereinafter. There further is formed on the side member 30 two parallel and vertically arranged rows of tangs 46, the tangs being arranged in pairs and struck from the body 32 and including a support portion 48 (see FIGS. 8 and 9 also) extending substantially perpendicular to the body 32 and toward the other side member 50, the support portions 48 in each pair of tangs 46 being disposed substantially parallel to each other and being connected to a web 49 integral with the body 32, the tangs also including retaining portions on the outer ends of the support portions 48 and in front elevation present a semicircular figuration as may be best seen in FIG. 8. The tangs 46 are equidistantly spaced vertically with the corresponding tangs in each of the two rows thereof being at the same height as can best be seen in FIG. 5 of the drawings.

The side member 50 is formed as the mirror image of the side member 30 and includes a body 52 having a rear flange 54 and a front flange 56 disposed substantially perpendicularly thereto and extending the entire length thereof and in opposite directions therefrom. The rear flange 54 has a reinforcing flange 58 formed thereon and the front flange 56 has a reinforcing flange 60 formed thereon and lying against the rear face thereof. A plurality of tongues 62 is formed along the outer edge of the rear flange 54 and each tongue 62 includes an offset connecting portion 64 which displaces the tongue 62 forwardly with respect to the plane of the rear flange 54, the plane of the tongue 62 being parallel to the plane of the flange 54. Two parallel and vertically arranged rows of tangs 66 are struck from the body 52 and include support portions 68 that are connected to the body 52 by webs 69, the tangs 66 in each row being spaced apart vertically equidistantly and with corresponding tangs in each row being arranged in alignment horizontally as can best be seen in FIG. 3 of the drawings.

The back member 70 is also substantially rectangular in shape and formed generally flat and adapted to receive the side members 30 and 50 at each of the vertical edges thereof. More particularly, the back member 70 includes a body 72 provided with a reinforcing flange 73 at the bottom thereof and having a vertical row of openings 74 (see particularly FIGS. 4, 6, 10 and 11) to receive the tongues 42 and 62 on the side members 30 and 50, respectively, the number of openings 74 corresponding generally to the number of tongues 42 on one side of the back member 70 and the tongues 62 on the other side thereof. Disposed in a vertical row substantially centrally of the back member 70 and struck therefrom is a plurality of clips 76 (see particularly FIGS. 7 and 8 of the drawings), the clips 76 being spaced from the body 72 by support portions 77 and extending upwardly therefrom and terminating in outwardly curved camming portions 78, the clips 76 normally being disposed toward the body 72 and being resiliently bendable outwardly therefrom resiliently to receive the flange on a shelf 80 between the body 72 and the clips 76, the lower edge of the shelf flange resting upon the support portions 77.

A plurality of the shelves 80 is ordinarily provided in the shelving structure 20, each of the shelves 80 being identical in construction including the top shelf 80T and the bottom shelf 80B, and, accordingly, the construction of only one shelf will be described in detail with like reference numerals being applied to all the shelves 80, 80B and 80T. Each of the shelves 80 includes a flat body or support portion 82 on which are formed four integral depending flanges including a rear flange 84, a front flange 86 and two side flanges 88. Each of the side flanges 88 has formed on the vertical ends thereof connecting flanges 90 which are directed inwardly and lie against the inner faces of the back flange 84 and the front flange 86, respectively, and are firmly secured thereto as by welding or the like. The rear flange 84 further has a reversely bent reinforcing flange 92 lying against the inwardly directed face thereof and the front flange 86 has a similar reinforcing flange 94 lying against the inward face thereof. Formed on the lower edge of each of the side flanges 88 is a reinforcing flange 96 disposed substantially perpendicularly thereto and extending inwardly therefrom toward the opposite side flange 88 and the opposite reinforcing flange 96. Each of the end flanges 88 further has a pair of slots 98 formed therein each having a substantially rectangular configuration (see FIG. 8) and adapted to receive therethrough the web portions 48 and 68 of the tangs 46 and 66, respectively, the reinforcing flanges 96 further having an elongated opening 99 forming a portion of the slot 98 (see particularly FIGS. 6 and 9) to accommodate the passage of the tangs 46 and 66 therethrough as the web portions 48 and 68 enter the slots 98.

To complete the shelving structure 20, a base member

100 is provided at the bottom thereof, the base member 100 including a body 102 having a pair of end flanges 104 thereon at the ends thereof and upper and lower reinforcing flanges 106 and 108 formed on the longitudinal edges thereof, the flanges 104, 106 and 108 all extending in the same direction from the body 102 and rearwardly therefrom as may be best seen in FIGS. 5 and 12 of the drawings. The end flanges 104 have keyhole slots 110 therein including a larger substantially circular portion at the bottom thereof and a narrower portion 112 disposed upwardly from the larger portion thereof, the larger portion having a diameter to receive the tangs 46 and 66 therethrough and the narrower portion 112 having a width to accommodate the web portions 48 and 68 therein, whereby the base member 100 can be connected to the side members 30 and 50 by engaging the two lowermost sets of tangs 46 in the forward row of tangs on the side member 30 and the two lowermost sets of tangs 66 in the forward row of tangs on the side member 50.

In assembling the shelving structure 20, the end members 30 and 50 are first assembled on the back member 70 by the insertion of the tongues 42 and 62 in the openings 74 whereby to place the flanges 34 and 54 of the end members 30 and 50, respectively, to the rear of the back member 70. The presence of the connecting portions 44 and 64 aids in preventing lateral displacement of the end members 30 and 50 with respect to the back member 70 when the parts are in the position illustrated in FIG. 13 of the drawings. If the shelving structure 20 is to include the base member 100, the base member 100 is ordinarily the next piece assembled and this is accomplished by placing the larger circular portion of the keyhole slots 110 in alignment with the lowermost pair of sets of tangs 46 and 66 on the side members 30 and 50, respectively, and thereafter moving the tangs 46 and 66 through the large portions of the keyhole slots 110, after which the base member 100 is moved downwardly whereby the support portions 48 and 68 are moved upwardly into the narrower portions of the keyhole slots 110. The base member 100 serves rigidly to hold and to interconnect the forward edges of the side members 30 and 50 and therefore firmly to hold the tongues 42 and 62 in the openings 74 by the action of the flanges 34 and 54 and the connecting portions 44 and 64.

Thereafter the shelves 80 may be assembled on the side members 30 and 50 and on the back member 70, the top shelf 80T preferably being the first shelf assembled. The general method of assembling the shelves upon the side and back members is illustrated diagrammatically in FIG. 5 of the drawings, wherein a shelf 80 is illustrated in dashed lines in the center of the figure and disposed between adjacent pairs of tangs 46 on the side member 30 with the tangs 46 in general vertical alignment with the openings 99 in the shelf flanges 96 and with the support portions 48 in general alignment with the slots 98 in the shelf flange 88. Downward movement of the shelf 80 serves to place the tangs 46 and the support portions 48 in the position illustrated by solid lines in FIG. 5, wherein the tangs 46 are firmly seated in the slots 98 thereby to support the shelf 80 in the desired adjusted position upon the side member 30. It is to be understood that the tangs 66 and the support portions 68 on the side member 50 cooperate in a like manner with the slots 98 and 99 in the other end of the shelf 80. In those instances in which a clip 76 is in alignment with the selected position of the shelf 80, the rear flange 84 of the shelf is also received by the clip 76, the junction of the flanges 84 and 92 first contacting the camming surface 78 to move the clip 76 outwardly as the junction of the flanges 84 and 92 moves downwardly to seat upon the support portion 77 of the clip 76. It is to be noted that at certain adjusted positions of the shelves 80, there are no clips 76 on the back member 70, sufficient numbers of the clips 76 being provided to aid in strengthening and stiffening the back member 70.

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After assembly of the shelf 80T as described above, the bottom shelf 80B may advantageously next be assembled on the shelving structure 20. Thereafter the selected number of intermediate shelves 80 are placed in position in the manner described above.

It will be seen that the shelving structure 20 has been assembled without the use of any bolts, nuts, studs, detachable clips or the like and further that the assembly can be accomplished substantially without tools; only a mallet being desirable in certain instances to position the shelves 80 and the base member 100 in operative position, although in most instances the use of a mallet is not necessary or desirable whereby it can be said that the shelving structure 20 can be assembled without the use of any tools or separate fastening elements whatsoever. The shelving structure 20 is quickly assembled and can as quickly be disassembled when desired. Further, each of the intermediate shelves 80 can be adjusted as to height in increments equal to the vertical spacing between adjacent sets of tangs 46 and 66, the vertical spacing being, for example, 1½ inches from center to center. Once assembled, the shelving structure 20 is very rigid and furthermore is strong in comparison to its weight whereby to provide an inexpensive and economical installation of shelving. There are no unsightly bolts and nuts and as a result the shelving structure 20 has a clean-cut and pleasing appearance making it useful in a wide variety of environments and installations.

Although there has been described what is presently considered to be a preferred embodiment of the present invention, it is to be understood that various changes and modifications can be made therein without departing from the spirit and scope thereof and it is intended to cover in the appended claims all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A shelving construction comprising an upstanding enclosing back member, an upstanding enclosing side member disposed at each of the opposite ends of said back member, said side members extending in the same direction from said back member and substantially parallel to each other, said back member having at least one elongated opening therein adjacent to each side edge thereof, at least one tongue integral on each of said side members, said tongues being disposed in said openings for interconnecting said back member and said side members, said tongues each including abutting means engaging said back member for preventing separation between said side members and said back members in a direction perpendicular to said back member, a shelf member extending between said side members and having downturned side flanges thereon, and at least one tang integral on each of said side members intermediate the vertical edges thereof and extending outwardly therefrom toward the other of said side members, said downturned side flanges each having a slot in each end thereof and receiving one of said tangs therein for supporting said shelf member on said side members and for preventing movement of said side members away from each other and for fixing the angular relation between said back member and said side members whereby said integral tongues and openings and said integral tangs and slots serve rigidly to interconnect said back member and said side members and said shelf member and serve firmly to mount said shelf member on said side members all without the use of additional detachable fasteners and the like.

2. The shelving construction set forth in claim 1, wherein each of said side members has a front reinforcing flange on the forward edge thereof extending substantially perpendicular thereto in a direction away from the other of said side members.

3. A shelving construction comprising an upstanding enclosing back member, an upstanding enclosing side

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member disposed at each of the opposite ends of said back member, said side members extending in the same direction from said back member and substantially parallel to each other, said back member having at least one elongated opening therein adjacent to each side edge thereof, a rear flange integral on each of said side members and extending toward the opposite side member and substantially perpendicular thereto, at least one tongue integral on each of said rear flanges, said tongues being disposed in said openings for interconnecting said back member and said side members, said tongues each including abutting means engaging said back member for preventing separation between said side members and said back member in the direction perpendicular to said back member, a shelf member extending between said side members and having downturned side flanges thereon, a plurality of tangs integral on each of said side members intermediate the vertical edges thereof and extending outwardly therefrom toward the other of said side members, said tangs being arranged in two substantially vertical rows arranged respectively adjacent to the front and rear edges of said side members, said downturned flanges having a slot therein adjacent to the front edge thereof on each side thereof and a slot therein adjacent to the rear edge thereof on each side thereof and each slot receiving one of said tangs therein for supporting said shelf member on said side members and for preventing movement of said side members away from each other and for fixing the angular relation between said back member and said side members, whereby said integral tongues and openings and said integral tangs and slots serve rigidly to interconnect said back member and said side members and said shelf member and serve firmly to mount said shelf member on said side members all without the use of additional detachable fasteners and the like.

4. A shelving structure comprising an upstanding enclosing back member, an upstanding enclosing side member disposed at each of the opposite ends of said back member, said side members extending in the same direction from said back member and substantially parallel to each other, one member of each adjacent pair of said members having an elongated opening therein adjacent to the other member of said pair of members, a tongue integral with the other member of each adjacent pair of said members and disposed in the opening of said one adjacent member for interconnecting said adjacent pair of members and including abutting means for preventing separation of said adjacent pair of members in a direction perpendicular to said one member, a shelf member extending between said side members and having downturned side flanges thereon, a plurality of tangs on each of said side members intermediate the vertical edges thereof and integral therewith and extending outwardly therefrom toward the other of said side members, said downturned flanges each having a slot in each end thereof and receiving one of said tangs therein for supporting said shelf member on said side members and for preventing movement of said side members away from each other and for fixing the angular relation between said back member and said side members, whereby said integral tongues and openings and said integral tangs and slots serve rigidly to interconnect said back member and said side members and said shelf member and serve firmly to mount said shelf member on said side members all without the use of additional detachable fasteners and the like.

5. A shelving construction comprising an upstanding enclosing back member, an upstanding enclosing side member disposed at each of the opposite ends of said back member, said side members extending in the same direction from said back member and substantially parallel to each other, said back member having at least one elongated opening therein adjacent to each side thereof, at least one tongue integral on each of said side mem-

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bers, said tongues being disposed in said openings for interconnecting said back member and said side members, said tongues each including abutting means for preventing separation between said back member and said side member corresponding to the tongue in a direction perpendicular to said back member, a shelf member extending between said side members and having downturned rear and side flanges thereon, a resilient clip integral on said back member and extending upwardly therealong for receiving and supporting the lower edge of said rear flange and for resiliently gripping said rear flange between said back member and said clip, and at least one tang integral on each of said side members intermediate the vertical edges thereof and extending outwardly therefrom toward the other of said side members, said side flanges having at least one slot in each end thereof and receiving one of said tangs therein for supporting said shelf member on said side members and for preventing movement of said side members away from each other and for fixing the angular relation between said back member and said side members, whereby said integral tongues and openings and said integral clip and said integral tangs and slots serve rigidly to interconnect said back member and said side members and said shelf member and serve firmly to mount said shelf member on said back member and said side members all without the use of additional detachable fasteners and the like.

6. The shelving construction set forth in claim 5, wherein each of said tangs is struck from the associated side member and includes a support portion disposed substantially perpendicular to said side member and extending toward the opposite one of said side members, a retaining portion integral with the outer end of said support portion and disposed in a plane substantially parallel to said side member, said slots being shaped to receive said support portions therein, and said clip is struck from said back member.

7. A shelving construction comprising an upstanding enclosing back member, an upstanding enclosing side member disposed at each of the opposite ends of said back member, said side members extending in the same direction from said back member and substantially parallel to each other, said back member having at least one elongated opening therein adjacent to each side edge thereof, at least one tongue integral on each of said side members, said tongues being disposed in said openings for interconnecting said back member and said side members, said tongues each including abutting means engaging said

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back member for preventing separation between said back member and said side member corresponding to said tongue in a direction perpendicular to said back member, a shelf member extending between said side members and having downturned flanges thereon, a plurality of tangs integral on each of said side members intermediate the vertical edges thereof and extending outwardly therefrom toward the other of said side members, said tangs being arranged in two substantially vertical rows disposed respectively adjacent to the front and rear edges of said side members, said downturned flanges having a slot therein adjacent to the front edge thereof at each side thereof and a slot therein adjacent to the rear edge thereof on each side thereof, each slot receiving one of said tangs therein for supporting said shelf members on said side members and for preventing movement of said side members away from each other and for fixing the angular relation between said back member and said side members, a base member disposed between said side members at the bottom thereof and having side flanges thereon extending rearwardly therefrom, said side flanges having slots therein each receiving one of said tangs therein for interconnecting said base member and said side members and for preventing movement of said side members away from each other, whereby said integral tongues and openings and said integral tangs and slots serve rigidly to interconnect said back member and said side members and said base member and serve firmly to mount said shelf member on said side members all without the use of additional detachable fasteners and the like.

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