

[54] **ADJUSTABLE METAL SHELVING**

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[58] **Field of Search**.....211/148, 176;
108/107-111; 248/243, 220.5

[56] **References Cited**

UNITED STATES PATENTS

1,978,636	10/1934	Keil.....	248/243
2,815,130	12/1957	Franks.....	211/148
3,265,217	8/1966	Biggs.....	211/148 X
3,353,507	11/1967	Squires.....	108/107

FOREIGN PATENTS OR APPLICATIONS

431,853	9/1967	Switzerland.....	108/109
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[57] **ABSTRACT**

The parts of an adjustable metal shelving are tightly held together by supporting hooks of the shelves extending into slots of U-shaped vertical upright support members. The hooks form tapered notches with an adjacent vertical edge of the shelves from which they extend. After insertion each supporting hook is pressed downwardly until the tapered notch rides down over the lower edge of the respective slot. This cams the vertical edge of the shelf against the outer surface of the vertical support member and fits the lower edge of the slot into the notch to tightly hold the respective shelf to the vertical upright support member. A U-shaped finishing strip is telescoped into one or more of the vertical upright members with an edge of the finishing strip resiliently in contact with the supporting shelf hooks extending into the vertical upright member. This minimizes the inadvertent separation of the hooks from the upright members.

4 Claims, 7 Drawing Figures

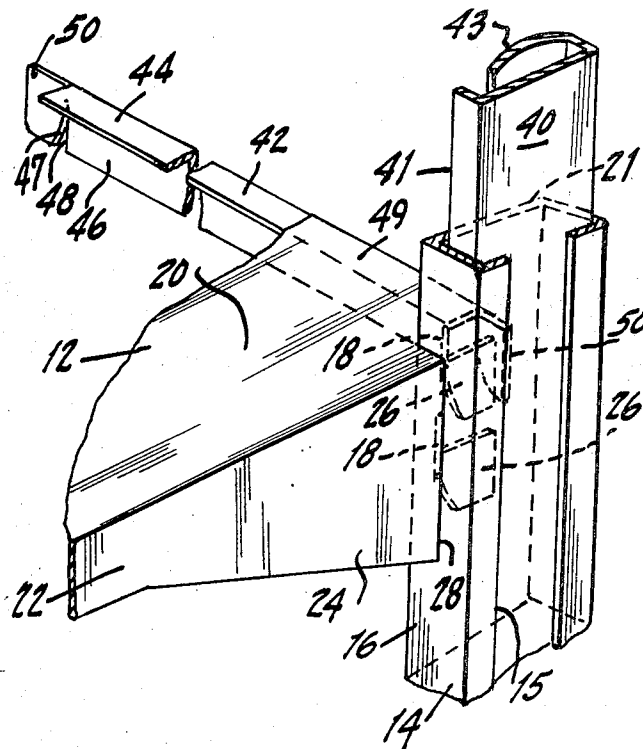


Fig. 1.

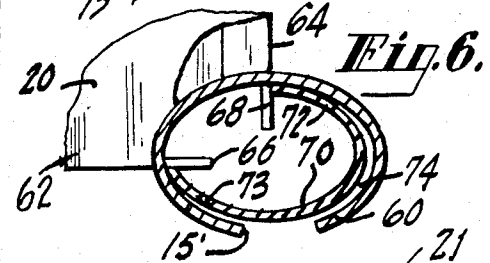
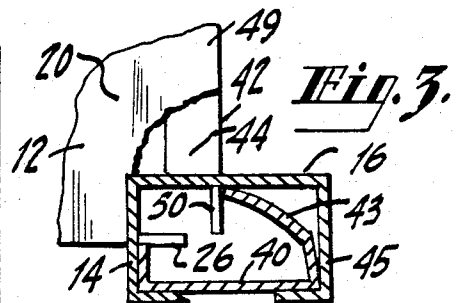
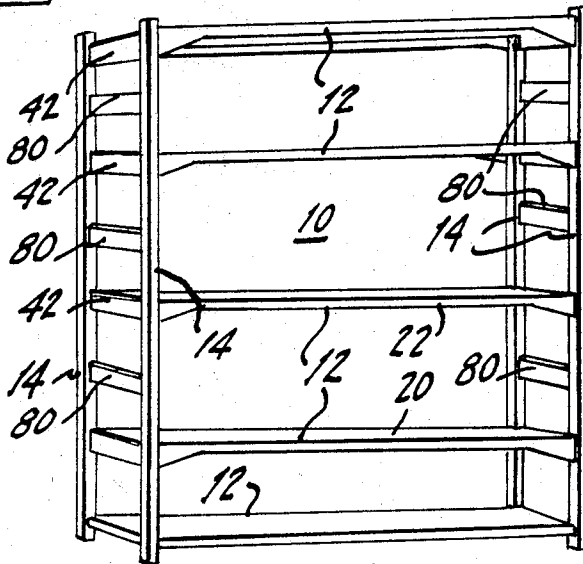


Fig. 7.

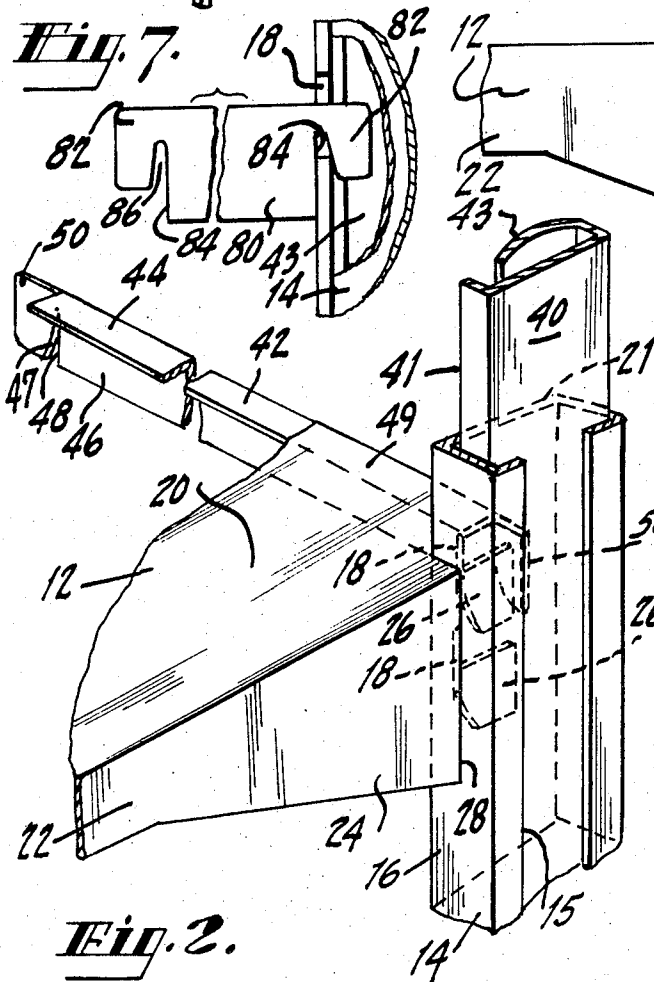


Fig. 2.

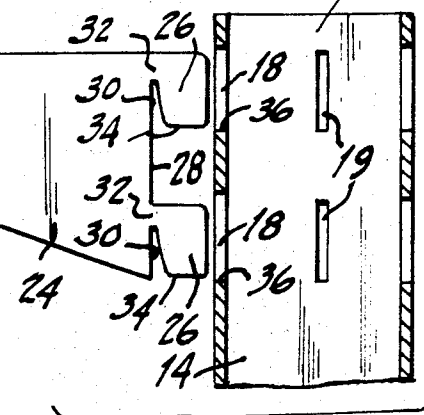


Fig. 4.

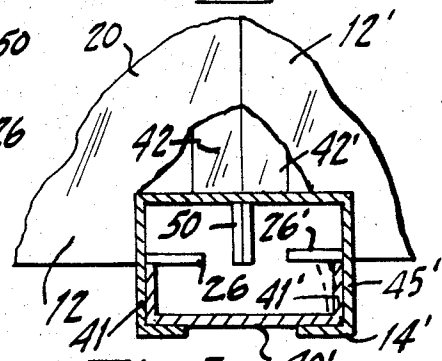


Fig. 5.

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ADJUSTABLE METAL SHELVING

The invention is an adjustable metal shelving comprising a plurality of components, which include one or more metal shelves supported by a plurality of vertical upright members at the corners of the shelves. Each upright member is a longitudinal metal channel member having a U-shaped cross-section and a plurality of spaced slots aligned along its length. Each metal shelf is an integral single piece of sheet metal forming a horizontal supporting surface, with turned-down flanges extending at right angles to and along two opposite sides of the supporting surface. The flanges extend to respective upright members supporting the shelf at the corners. Each flange terminates in an expanded portion, which has a vertical edge abutting the longitudinal surface of the corresponding upright member. The shelves and upright supporting members are held together by hooks extending from the vertical edges of the flanges and which fit into the matching slots of the adjacent upright member. Finishing metal strips may be used to close the opening between the edges of the U-shaped upright members.

One difficulty experienced in adjustable metal shelving is that of retaining the elements of the shelving tightly together. Threaded nuts and bolts provide one means for removably fastening together the parts of a shelving. This type of fastening does not lend itself to rapid assembly and disassembly. The use of supporting hooks extending from the shelves into the upright members require that the slots in the upright members offer a larger opening than the portions of the hooks, which extend into the slots. This then results in an unavoidable looseness between the hooks and slots, and enables the shelves to become inadvertently disengaged from their respective supporting upright members.

Some of the disadvantages described above are minimized by an embodiment of the invention, in which the supporting hooks of the shelving are each integral with and extend from the vertical edge of an expanded flange portion of the shelf. Each hook forms a notch with the vertical edge from which it extends. The notch tapers in width from the end of the hook to its base. Each hook extends through a slot in the upright and is forced downwardly until the lower edge of the slots makes a tight fit within the tapered notch and the vertical edge of the flange portion is cammed by the notch against the outer surface of the upright member.

Also, in accordance with another feature of the invention, finishing strips are used to close respective openings in the U-shaped upright members. Each finishing strip is designed so that when inserted into the corresponding upright member an edge of the finishing strip resiliently fits against the hooks extending through the slots in the upright member. This fit releasably holds the hooks in their respective slots and prevents their inadvertent removal.

In the drawing:

FIG. 1 is a perspective view of an adjustable shelving, in accordance with the invention.

FIG. 2 is an enlarged perspective view of a portion of the shelving of FIG. 1.

FIG. 3 is a top sectional view of a part of the shelving portion of FIG. 2.

FIG. 4 is a front elevational view, partly in section of the shelving portion of FIGS. 2 and 3.

FIGS. 5 and 6 are top sectional views of a portion of shelving, in accordance with modifications of the invention.

FIG. 7 is a partial sectional view showing the attachment of a supporting plate to the shelving of FIG. 1.

FIG. 1 illustrates an adjustable shelving 10 consisting of a plurality of components including shelves 12, each supported at the four corners by vertical upright support members 14. The upright members 14 are joined at the ends of each shelf by a horizontal end bracket 42.

FIGS. 2, 3, and 4 show in detail the construction of the shelving. Each shelf 12 is formed from an integral piece of sheet metal having a rectangular horizontal supporting surface 20. Along the two opposite sides of each shelf the metal is turned down to form flanges 22 extending the length of the shelf and at right angles to the supporting surface 20. The flanges 22 extend adjacent to the shelf corners where they terminate in tapered expanded portions 24 (FIGS. 2 and 3). Each expanded flange portion 24 ends in a vertical edge 28, from which extend a pair of support hooks 26, which are formed integrally from the metal of the respective flange portion 24. As shown, the hooks 26 are in the same plane as the flange portion 24 from which they extend.

Each support member 14 is normally a U-shaped metal channel member formed with a longitudinal opening 15 along one side of the support member. Along another side 16 of each support member 14 are a series of slots 18 spaced to receive the support hooks 26 of the shelves (FIGS. 2 and 4). To assemble the shelves to the upright members 14, the hooks 26 of each shelf are inserted into the matching slots 18 of the four support members 14 at the corners of the shelving.

In accordance with a feature of the invention each of the hooks 26 forms with the vertical edge 28 of the corresponding shelf flange 24 a notch 30 that tapers in width from a wider opening at the end 34 of each hook to a narrow spacing at the base 32 of the hook. Thus, when the hooks 26 are inserted into the matching slots 18 of the supporting uprights and the hooks are pressed downwardly, the lower edge 36 (FIG. 4) of each slot 18 fits into the tapered notch 30 and is tightly held in the notch.

The taper of each notch 30 also draws or cams the corresponding vertical edge 28 of the shelf tightly against the outer surface of the respective upright member 14. The tapered slots 30 thus have a double function; that of tightly gripping or holding the edges 36 of slots 18 in the upright supports; and that of tightly forcing the vertical edges 28 of the shelf flange portions 24 against the respective supporting uprights 14. This provides a tight fitting of the shelves 12 to the upright members 14.

Across the ends of each shelf 12 the bracket 42 consists of an integral piece of sheet metal having a horizontal flange 44 and a vertical flange 46. Each vertical flange 46 terminates in a vertical edge or surface 48 (FIG. 2), from which extends a connecting hook 50. The brackets 42 are joined at their ends to two upright members 14 by extending the connecting hooks 50 into respective slots 19 (FIG. 4) in the side wall 21 of the upright members opposite to the U-shaped opening 15. Between the vertical edges 48 of each bracket and the corresponding connecting hook 50, which extends in

the plane of the vertical flange 46 is formed a tapered notch 49 that tapers in width from a wider opening at the bottom of the vertical flange 46 to a narrow spacing adjacent to the horizontal flange 44. Notches 47 are similar to notches 30. Pressing the brackets downwardly forces the lower edges of slots 19 into the tapered notches 47, which in turn cams the vertical edges 48 of the brackets tightly into contact with the outer surface of the respective support members 14. In this manner, brackets 42 tightly tie the upright members together.

When the shelves 12 are mounted on the uprights, as described above, the dimensions of the parts are such that the terminal end portions 49 of the supporting surfaces 20 rest on and are supported by the horizontal flanges 44 of adjacent brackets 42.

The upright members 14 at the front of the shelving may have finishing strips 40 telescoped within the members 14 to close the openings 15 and present a better appearance. Such finishing strips 40 may be fitted to all the upright members 14, if desired.

The different parts of the shelving, of the type described, often and inadvertently will separate or come apart when they are only hooked together. This may occur as the shelving is moved, or when it is lifted by grasping one of the shelves 12. This will pull the hooks 26 upwardly and out of their slots. To prevent or minimize this inadvertent separation of the parts of the shelving and in accordance with another feature of the invention, the finishing strips 40 are designed to resiliently exert pressure on the hooks 26, when they are fitted into the slots 18.

As shown in FIGS. 2 and 3, each finishing strip 40 fits within and across the width of the upright member 14. The fit is not so tight that the strip 40 cannot be telescoped within the member 14 and slide through the length of member 14. The finishing strip 40 is substantially a U-shaped channel member. The bottom of each strip 40 bridges and closes the opening of the respective U-shaped member 14. Each finishing strip 40 is so proportional that one flanged side 41 slides into contact with hooks 26 of the shelves as the strip 40 is slipped into the upright 14 (FIGS. 2 and 3). The side 41 of the strip is substantially normal to the lateral surfaces of the hooks 26 and the longitudinal edge of the side 41 resiliently presses against these lateral hook surfaces. This action resiliently holds the hooks 26 within their respective slots. The other flanged side 43 of the finishing strip extends across the adjacent corner of the respective upright member 14 and makes contact with the hooks 50 of the end brackets 42. The longitudinal edge of the flanged side 43 presses against the lateral surfaces of the hooks 50, to resiliently hold the hooks 50 within their respective slots. FIG. 3 shows that the flanged side 43 of the finishing strip is spaced from the closed side 45 of the upright member 14 to allow space so that the flanged side 43 can flex and resiliently press against the hooks 50. In a similar manner the flanged side 41 of the finishing strips can also be spaced slightly from the adjacent side 16 of the upright member 14 and thus permit flexing of the flange 41.

FIG. 5 discloses a shelving where the upright 14' is an intermediate support between the shelf 12 and a similar second shelf 12'. A second side bracket 42' may be used to support the end of shelf 12'. The hooks 26'

of shelf 12' are similar to the hooks 26 and extend through corresponding slots in the side 45' of the upright 14' opposite to those slots supporting the shelf 12. The finishing strip 40' has two flanged sides 41 and 41', resiliently contacting the hooks 26 and 26', respectively.

The design of the finishing strip 40' within the upright 14', in FIG. 5, can be such as to permit flexing of the flanged sides 41 and 41'. This can be provided by bending the sides 41 and 41' slightly inwardly from their corners to provide a spacing similar to that between members 43 and 45 of FIG. 3. Such is indicated by the dotted construction in FIG. 5.

The invention need not be limited to the rectangular configurations described, but as shown in FIG. 6 the upright member 60 may be oval or circular in cross-section and the finishing strip 70 may be of a corresponding shape, with the edges of the finishing strip resiliently contacting hooks 66 of a shelf 62 and hooks 68 of an end bracket 64, respectively. The side 72 of the finishing strip 70 can have a greater curvature than the adjacent wall of the upright member 60, so that a space 74 between the members permits greater flexibility of the strip portion 72. In a similar manner strip portion 73 can also be slightly spaced from the adjacent wall portion of the upright member 60.

An additional feature is shown in FIGS. 1 and 7. End supporting plates 80 are fixed between two adjacent shelves 12 and connected between two upright members 14 at the ends of the shelving. Each end plate 80 partially closes off the vertical spacing between the corresponding ends of adjacent shelves and thus is used, for example, as a book support when the shelving is used as a book case. The end plates 80 can be used in any other appropriate manner, as a support. They also add a more aesthetic appearance to the shelving.

The end plates 80 may be a single-thickness rectangular plate with a support hook 82 extending from each end in the same plane as the plate 80. The end hooks 82, each forms with the vertical edge 84 of plate 80 a notch 86 similar to notches 30 of the shelves 12. Notches 86 also taper in width from a wider opening at the free end of each hook 82 to the base of the hook. Plates 80 are thus supported, as shown in FIG. 7, by inserting each hook 82 into a slot 18 made for the purpose in the supports 14. When both hooks 82 of the plate 80 are within their respective slots 18, the plate 80 is pressed downwardly to tightly force the tapered notches 86 onto the edges 36 of the respective slots 18. The end plates 80 can be assembled at the same time that the end brackets 42 are fitted to the support members 14 and before the shelves 12 are assembled to the support members. The flanged sides 43 of the corresponding finishing strip can extend into contact with hooks 82 of the support plates 80 to resiliently hold them in position in the support members 14.

Support plates 80 may also be doubled in thickness by folding the plate over on a longitudinal center line, thus providing a U-shaped cross section. The hooks 82 would then be integral with the ends of one of the folds. The fold itself could be the finished top edge of the support plate.

The supporting end plates 80, shown in FIG. 7 may also be assembled along the side of the shelving in a position spaced between two vertically displaced

shelves. In this manner, the plates form a backing or supporting plate for the shelving. The supporting end and side plates 80 may be used in any combination as across the ends of the shelving as shown in FIG. 1, or across one side of the shelving or any number of sides to partially or completely extend around the shelving between any two vertically displaced shelves.

I claim:

1. An adjustable metal shelving comprising a plurality of components including at least one metal shelf supported by a plurality of vertical upright members positioned with each upright member at a different one of the corners of said shelf, each one of said upright members comprising a longitudinal metal channel member having a U-shaped cross-section and a plurality of spaced slots of uniform shape and size aligned along the length of the channel member, said metal shelf comprising an integral piece of sheet metal forming a rectangular supporting surface and having turned-down flanges extending at right angles to and along opposite sides of the supporting surface to respective corners thereof, each of said flanges terminating in a vertical edge abutting the longitudinal surface of the upright member at said respective corners, at least one support hook integral to and extending from the vertical edge of each of said flanges, said supporting hooks each extending through a slot in the respective upright member, a finishing metal channel strip having a U-shaped cross-section telescoped into one of said metal

upright members with the bottom of the channel strip bridging and closing the opening of said one metal upright member, one side of said channel strip being positioned against and normal to a lateral surface of said supporting hook inserted within said one upright member, with the longitudinal edge of said one side of said finishing strip resiliently pressing against said lateral surface of said supporting hook to resiliently hold said hook within the slot of said one upright member.

2. An adjustable metal shelving in accordance with claim 1, including another supporting hook extending through another slot in said one upright member and fixed to another one of said shelving components, the other side of said channel strip being positioned against a lateral surface of said other supporting hook within said one upright member, with the longitudinal edge of said other side of said channel strip pressing against said lateral surface of said other supporting hook to resiliently hold said other hook within said other slot.

3. An adjustable metal shelving in accordance with claim 2, wherein said other one of said shelving components comprises a longitudinal horizontal bracket connecting said one upright member to another one of said upright members.

4. An adjustable metal shelving in accordance with claim 2, wherein said other one of said shelving components comprises another shelf.

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