June 7, 1960 M. E. HANDLER ET AL 2,939,589

STEEL SHELVING

Filed Jan. 11, 1957

FIG. 1

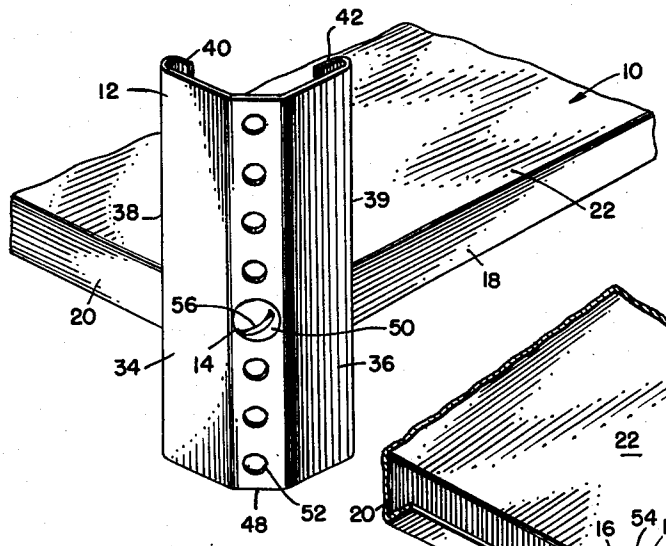


FIG. 2

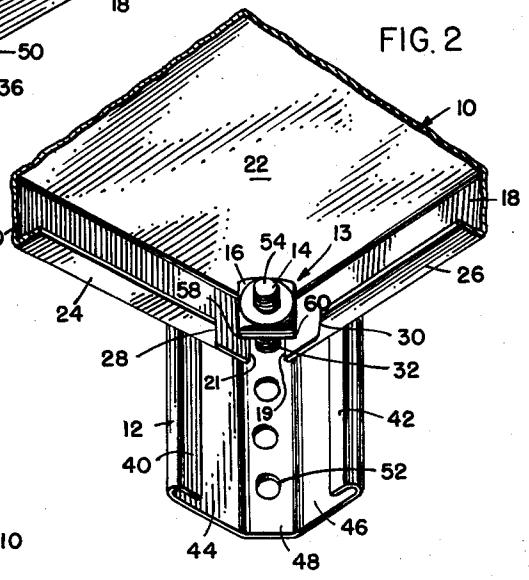


FIG. 3

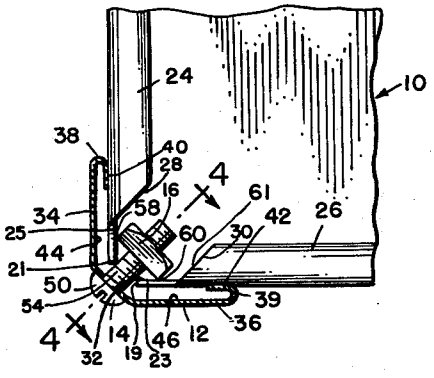


FIG. 4

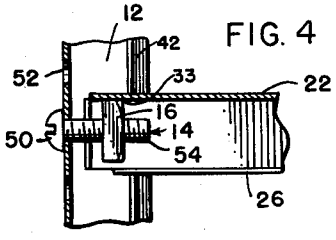
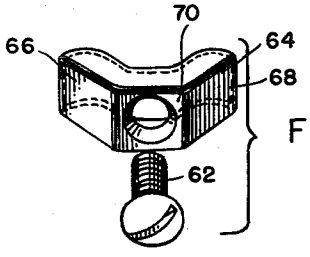


FIG. 5



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STEEL SHELVING

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This invention relates to steel shelving and more particularly to shelving which is adjustably positioned upon uprights by fastening means which afford ready insertion and removal of the shelf structure together with cooperatively tensioned and secure connection between the shelf and uprights therefor.

Heretofore, steel shelving has generally involved considerable danger due to sharp edges and corners, as well as undesirable complexity and expense in fastening the shelving to upright supports therefor. Also, desirably tight alignment of parts has been lacking, particularly where usual manufacturing tolerances have been used.

Accordingly, it is an object of the present invention to provide a steel shelving construction wherein the outlines of the shelving are clean and have an attractive appearance, with no sharp edges, but which utilizes a simple, effective, and adjustably tight fastening means between the shelves and their upright supports.

Another object of the invention is to provide steel shelving which may be adjustably positioned upon uprights disposed at its corner edges by means of a spring construction in the uprights which engages resiliently with the shelves to maintain the parts in exceptionally stable and strong alignment regardless of normal variations in manufacturing tolerances.

Another object of the invention is to provide a shelf construction as described wherein the upright portions supporting the shelves are given a substantially U-shaped inward flange turn adapted to press against resilient side walls of the shelving secured thereto as adjustably tensioned by fastening means coacting with the uprights and the shelving.

Another object of the invention is to provide steel shelving as described wherein the corner portions thereof define downwardly opening slots for receiving a preassembled nut and bolt loosely installed in a selected aperture of a plurality of vertically spaced apertures defined in an upright suport whereby the shelf may be moved downwardly into a predetermined supported position on the upright and the shelf will also serve as a nut lock for the nut so that the bolt need only to be tightened to complete a rugged assembly.

Another object of the invention is to provide steel shelving as described wherein suitable means are threadedly secured upon the bolt for abutting engagement with the corner side walls of the shelf to dispose these walls in adjustably tight engagement with the U-shaped flanges of the upright.

Another object of the invention is to provide a cross-sectional configuration for the uprights which is complementary to the corners of the shelves to be secured thereto whereby tension stress produced by said fastening means is distributed evenly between the uprights and the shelving for uniformly secure engagement thereof.

Yet another object is to provide a shelf construction wherein the corner edges are concealed and protected in clean outline by the uprights to which they are affixed, the fastening elements also being effectively disposed in a protected position.

Other objects and advantages of the invention will become apparent as the description proceeds in accordance with the drawings in which:

Fig. 1 is a front perspective view of a steel shelf construction according to the present invention showing the shelf and upright in assembled position;

Fig. 2 is a rear perspective view disclosing details of the mode of assembly in accordance with the invention;

Fig. 3 is a bottom plan view in fragmentary form disclosing the shelf and upright connection in assembled condition;

Fig. 4 is a vertical sectional view taken along the lines 4—4 of Fig. 3; and

Fig. 5 is a view of yet another embodiment of the fastening means in accordance with the invention as hereinbefore set forth.

Referring now to Figs. 1 through 4, a shelf **10** formed in accordance with the invention is secured to an upright **12** at a corner edge **13** thereof by means of a bolt **14** and a nut **16** threadedly received therein.

The shelf **10** is preferably formed of a metal such as stainless steel, or any other metal of clean and attractive appearance having a somewhat resilient characteristic, and is provided peripherally with depending flanges such as the flanges **18** and **20**, at right angles to the planar shelf portion **22** and terminating short of the corners **13** in spaced edges **19** and **21** defining a vertically extending opening or slot **32** which opens downwardly to slip over and receive therethrough the shank **54** of the bolt **14** (Figs. 3 and 4). In the preferred form of the invention, the flanges **18** and **20** are turned inwardly at the lower edges to provide flanges **24** and **26** spaced in predetermined disposed parallel relationship to the planar portion **22**. These flanges **24** and **26**, which strengthen the shelf and eliminate sharp edges therein, terminate in proximately spaced relationship to the corners of the shelf **10** as, for example, at the beveled edges **28** and **30** respectively so as to define an opening or space **61** therebetween at the interior corner of the shelf to permit the nut **16** when loosely mounted on the bolt **14** to pass therebetween into supporting engagement at **33** with the planar portion **22** of the shelf as the shank **54** of the bolt **14** is received in the slot **32** with downward movement of the shelf **10** (Figs. 3 and 4). When the nut **16** is tightened it engages and bears outwardly against the end portions **23** and **25** of the flanges **18** and **20** between flanges **18** and **20** at the end portions **23** and **25** disposed between the edges **19** and **28** and the edges **21** and **30**, respectively.

The upright **12** is designed to support the shelf **10** in selected vertical alignment therewith, and has sides **34** and **36** disposed in substantially right-angled horizontal cross-sectional configuration. In order to provide resiliently tight engagement with the shelf, it has at the outer ends or vertical edges **38** and **39** of its sides inwardly turned flanges **40** and **42**, which preferably extend in proximately spaced parallel relationship to the inner surfaces **44** and **46** of the said sides **34** and **36**. The vertical edges or bends **38** and **39** of the sides **34** and **36** respectively are preferably flexed or curved at a radius of curvature which is relatively gradual rather than sharp so as to provide a spring-like tensioning action as hereinafter further set forth. These inwardly-turned flanges **40** and **42** are spaced apart from each other a predetermined amount, but in their assembled condition with respect to the shelf **10** are preferably dimensioned to overlap and cooperate with the flanges **20** and **18**. The upright **12** is constructed to receive fastening means for connecting the shelf thereto, and to this end one corner **48** of the upright is desirably flat for a predetermined width thereof to provide an abut-

ment strip for the head 50 of the bolt 14. As shown more particularly in Figs. 2 through 4, the bolt 14 may extend perpendicularly to the strip 48 through any of a series of apertures 52 defined in the said strip in predetermined vertically spaced alignment. With the head 50 of the bolt 14 engaging the said strip 48 in abutting relationship as described, the shank 54 of the bolt extends outwardly a predetermined distance beyond the inner surface of the strip 48 and it is adapted to support one corner of the shelf 10 as will now be described. In mounting the shelf on the said upright 12, the bolts 14 are disposed within individual uprights 12 so that the apertures through which they are to be inserted are disposed in registration horizontally. Thereupon the shelf is moved downwardly so that the slots 32 slide over the bolts until the upper portion 22 of the shelf comes into supported relationship upon the nut 16, which is displaced slightly outwardly of its normal fastening position on the shank 54. It is preferred that the nut 16 be secured on the bolt 14 before the shelf is moved downwardly thereupon so that adjustment is made free of the impediment which might be offered by the shelf edges, although it will be observed that the opening provided by the shelf edges is adequate for any adjustments which will be required.

Thereupon the bolt 14 is tightened by means of the kerf 56 until the edges 58 and 60 of the nut 16 engage the inner faces of the portions 23 and 25 of the flanges 18 or 20 and move them toward the sides 34 and 36 of the uprights, the nut being dimensioned to fit within the space 61 defined by edges 28 and 30 to permit this tensioning action. The corresponding tensioning of the flanges 40 and 42 also permits an adjustable amount of stress to be exerted between the flanges 18 and 20 and the upright 12, so that an extremely firm and solid, yet resilient, connection is achieved.

Referring now to Fig. 5, a second embodiment of a fastening element for use in the shelving of the invention is disclosed wherein a bolt 62 is provided with a wing nut 64 whose wing portions 66 and 68 are disposed substantially at right angles to one another while the central planar portion 70 thereof is made flat so that the entire construction of the nut is complementary to the flanges 24 and 26 and also to the structure of the upright 12 for even distribution of stress along the said flanges to effect uniform application of tensioning strength between these flanges and the stops or U-shaped flanges 40 and 42. The fastening of the shelf 10 to the upright 12 is otherwise accomplished as described with respect to Figs. 2 through 4 while the slidable action of the wing portions 66 and 68 prevents undue stress at any given point such as might be provided by the corner edges of the nut 16.

The construction herewith described and disclosed may be utilized in numerous applications and in a variety of specific structures, while its ease of manufacture and assembly, its clean and attractive outline, and freedom from exposed edges and the like, make it particularly useful in all installations where metal shelving is currently in use.

Although we have herein set forth and described our invention with respect to certain principles and details thereof, it will be understood by those skilled in the art that these may be varied without departing from the spirit and scope of the invention as set forth in the hereunto appended claims.

We claim:

1. A metal stand comprising a horizontal shelf having a corner, a leg extending beyond the level of said shelf, and means for fastening said leg at the corner of the shelf, said shelf comprising a flat central section, downwardly directed vertical flanges bordering the central section and terminating short of said corner to provide a slot between the ends thereof, inwardly directed flanges on the lower edges of said vertical flange ends terminating short of the vertical flanges at the corner, said leg having two sides disposed substantially at a right angle with

respect to each other and interconnected with a web element having vertically spaced openings therein, reversely bent flanges carried by and spaced from the inner faces of said two sides and engaging said vertical flanges, and said means including a bolt through one of said openings with the shank thereof extending through said slot, and an element threadedly received upon the shank of the bolt supported outwardly of said slot against rotation by and tightened against said vertical flanges at points spaced from said reversely bent flanges to hold said vertical flanges and reversely bent flanges in resiliently stressed relationship.

2. A metal stand comprising a horizontal shelf having a corner, a leg extending beyond the level of said shelf, and means for fastening said leg at the corner of the shelf, said shelf comprising a flat central section, depending flanges bordering the central section and over a portion of their height terminating short of said corner to provide a slot therebetween wide enough to receive a bolt therethrough, inwardly directed flanges on the lower edges of said depending flanges, said leg having two sides disposed parallel with the respective depending flanges and interconnected by a web element having vertically spaced openings therein, reversely bent flanges carried by and having inwardly facing portions spaced from the inner faces of said two sides and engaging said depending flanges within the length of said inwardly directed flanges, and said means including a bolt through one of said openings with the shank thereof extending through said space, and an element threadedly received upon the shank of the bolt engaging the bottom of said shelf, said inwardly directed flanges on opposite sides of said corner being spaced a distance from each other greater than the width of said element, said element being tightened against said depending flanges to press said inwardly facing portions of the reversely bent flanges against the depending flanges resiliently under stress.

3. In a metal shelving assembly, a shelf having a planar portion and a plurality of depending peripheral flange portions terminating in ends disposed a spaced distance from each other in aligned relationship with each other at a corner of the shelf to form a vertically extending, downwardly opening slot between them, an upright having a pair of sides formed in a predetermined angular relationship complementary to said pair of flange portions and having a plurality of vertically spaced apertures adapted to be disposed selectively in registration with said slot, a vertically extending spacing element formed along the outer marginal edge of each of the said angular disposed sides and including an intermediate portion extending outwardly from the inner face of its respective side a predetermined distance and a marginal portion thereon, the marginal portions on the intermediate portions extending toward each other and being spaced from each other a distance substantially greater than the distance between said spaced depending flange portions, said spacing elements engaging said depending flanges at a distance spaced from said slot and supporting the flange ends in spaced relationship with respect to said depending flange portions, and fastening means comprising a bolt received in one of said apertures and said slot and a nut member thereon of predetermined width within the space between said spacing elements to grip tightly the inner surface of said depending flanges adjacent said slot to effect spring flexion thereupon and for adjustably stressing said flange portions and marginal portions against each other.

4. In a metal shelving assembly, a shelf having a planar portion and a plurality of depending peripheral flange portions terminating a spaced distance from each other at a corner of the shelf and providing a vertically extending, downwardly opening slot between them, an upright having a pair of sides formed in a predetermined angular relationship complementary to said flange portions and defining a plurality of vertically spaced aper-

tures selectively disposed in registration with said slot, a vertically extending inwardly and reversely turned spacing element formed along the outer marginal edge of each of the said angularly disposed sides, said reversely turned spacing elements marginally extending toward each other and being spaced from each other a distance substantially greater than said spaced distance between said flange portions, and fastening means in one of said apertures and said slot for engaging said upright and said depending flanges comprising a bolt received in said slot and a nut member thereon having a predetermined width adapted to engage and support said shelf within the space between said spacing elements upon movement of said shelf downwardly along a path defined by said upright to grip tightly the inner surfaces of said depending flange portions adjacent said slot to effect spring flexion thereupon and adjustably tension said flange portions toward said upright, in co-action with said spacing elements and said depending flange portions to effect a resiliently close engagement therebetween.

5. A shelf assembly comprising a metal shelf having a planar surface and a plurality of depending flanges, a pair of said flanges providing a vertically extending downwardly opening slot between them, a vertical upright having a pair of sides in angular complementary relationship to said depending flanges and a plurality of vertically spaced openings between said sides, spacing means interposed between said depending flanges and said sides to hold said depending flanges spaced distances from said sides at points spaced outwardly of said slot, and fastening means extending through one of said openings and said slot adapted to engage said depending flanges under tension force to secure said shelf upon said upright at a predetermined position vertically thereof, said fastening means including a bolt having a nut threadedly received thereon and engaging said depending flanges inwardly of said spacing means to hold said depending flanges resiliently by said nut and said spacing means in stressed relationship.

6. In a metal shelving assembly, a shelf having a planar surface and a plurality of depending peripheral flanges, a pair of said flanges terminating in ends aligned diagonally in predetermined spaced relationship across a corner of the shelf to define a vertically extending downwardly opening slot at said corner, an upright having a pair of sides disposed at right angles to each other in relationship complementary to said pair of flanges and having a relatively flat diagonally disposed vertical corner strip portion intermediate said sides having a plurality of vertically spaced openings therein adapted to be disposed in registration with said slot, a vertically extending spacing element formed along the outer marginal edge of each of the said angularly disposed sides and extending outwardly from the inner faces of the sides a predetermined amount for a spaced distance between them substantially greater than the distance separating said ends of the depending flanges, and fastening means adapted to be received in one of said openings and said slot and of a width within the space between said spacing elements engaging said upright and said depending flanges for adjustably tensioning said flanges toward said upright, said fastening means engaging and supporting said shelf upon movement of said shelf downwardly along a path defined by said upright and gripping tightly the inner surface of said depending flanges adjacent said slot to effect spring flexion thereupon, said fastening means having a head adapted to be disposed in abutting engagement with said corner strip portion.

7. In a metal shelving assembly, a shelf having a planar surface and a plurality of depending peripheral flanges, a pair of said flanges being aligned in predetermined proximately spaced relationship at a corner of the shelf forming a vertically extending, downwardly opening slot having the corners thereof generally free at their ends, an upright having a pair of sides formed in a predetermined angular relationship complementary to said pair of flanges and a plurality of vertically spaced apertures between said sides adapted to be disposed in registration selectively with said slot, a vertically extending spacing element formed along the outer marginal edge of each of the said angularly disposed sides and extending outwardly from the inner faces of the sides a predetermined amount, each of the said spacing elements extending toward the other spacing element a distance substantially less than the distance separating the said proximately spaced depending flanges and fastening means adapted to be received in one of said apertures and said slot for engaging said upright and said depending flanges for adjustable tensioning of said flanges toward said upright, said fastening means comprising a bolt and a nut member threadedly received thereon having a predetermined width adapted to support said shelf upon movement of said shelf downwardly along a path defined by said upright and to grip tightly the inner surface of said depending flanges adjacent said slot to effect spring flexion thereupon towards said inner surfaces of said pair of sides, said nut having a pair of wings configured to define an angle complementary to the angle between said depending flanges.

8. A metal stand comprising a horizontal shelf having a support point, a leg extending above the level of said shelf, and means for fastening said leg to the shelf at said support point, said shelf comprising a flat central section, having a depending peripheral flange bordering the central section on opposite sides of said support point and defining a downwardly opening slot at said support point, an inwardly directed flange on the lower edge of said depending flange terminating a spaced distance from said slot on opposite sides thereof, said leg having two sides disposed complementary to said depending flange on opposite sides of said slot and having marginal spacer flanges offset towards said depending flange overlapping said inwardly directed flange to engage said depending flange in abutting relationship, said two sides of the leg being interconnected with a web element having vertically spaced openings therein, said fastening means being received into shelf supporting position when said shelf is lowered into place in engagement with said spacer flanges and including a bolt through one of said openings extending through said slot with the shank thereof received in said slot, and an element threadedly received upon the shank of the bolt and passing between the termination of said inwardly directed flange, said element being tightened against said depending flange and held against turning at points on opposite sides of said slot spaced inwardly from said spacer flanges.

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