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I. J. FERDINAND ET AL
KNOCKDOWN STEEL SHELVING UNIT AND CORNER
FASTENING MEANS THEREFOR

3,276,403

Filed April 23, 1964

2 Sheets-Sheet 1

FIG. 1

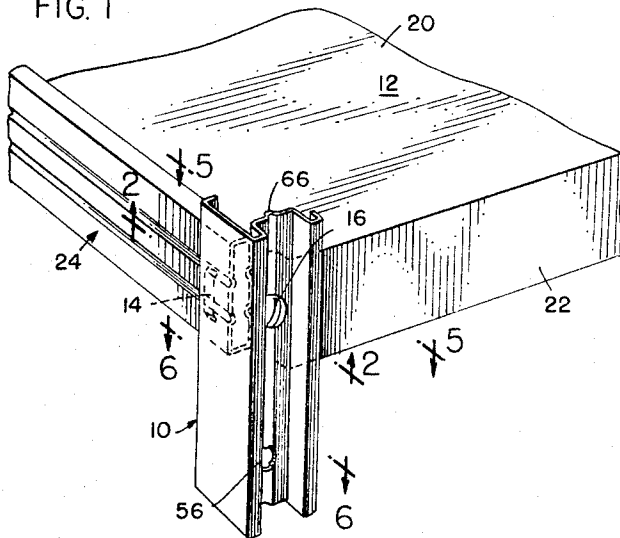


FIG. 2

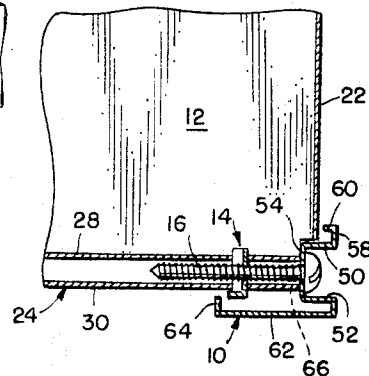


FIG. 3

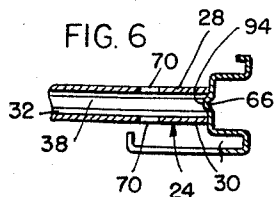
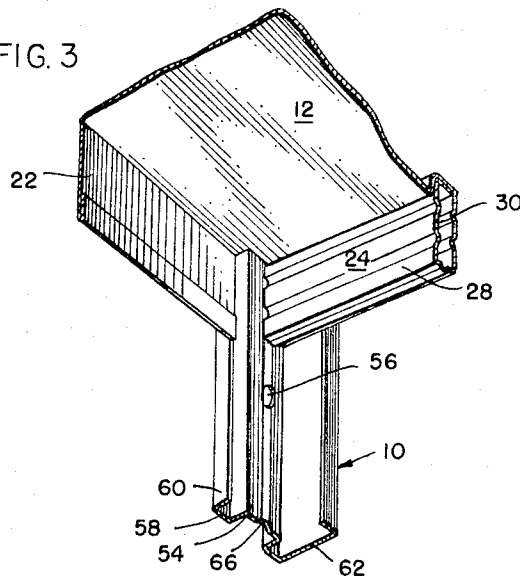
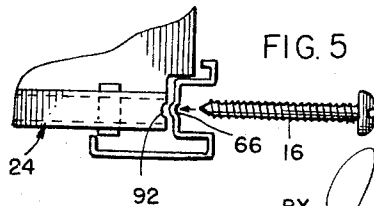


FIG. 5



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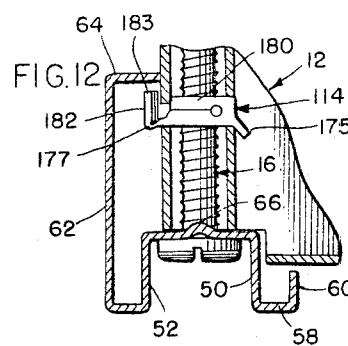
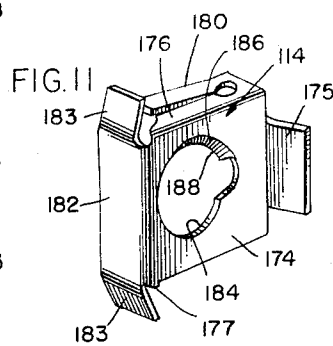
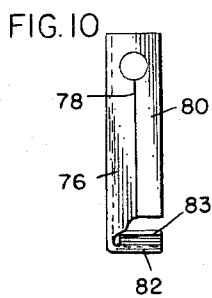
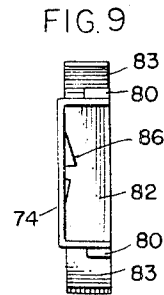
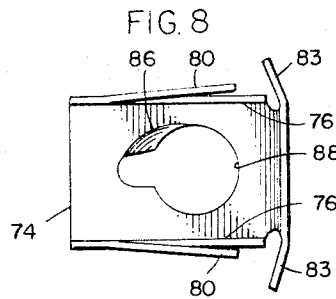
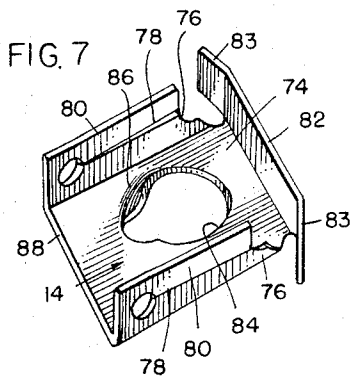
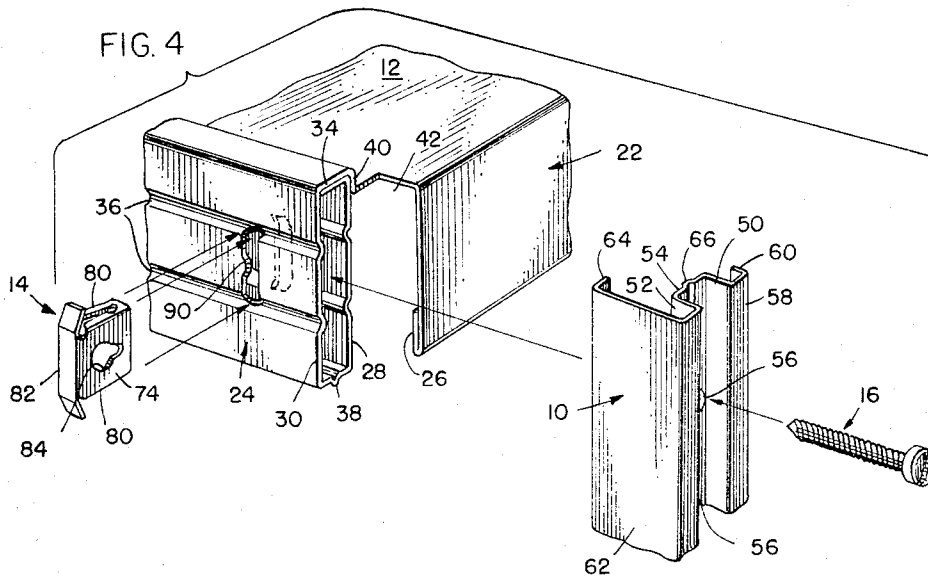
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KNOCKDOWN STEEL SHELVING UNIT AND CORNER FASTENING MEANS THEREFOR

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22 Claims. (Cl. 108—144)

The present application is a continuation-in-part of our application Serial No. 184,045, filed April 2, 1962 and now abandoned and incorporates the subject matter of co-filed application Serial No. 362,149, now abandoned, relating to FIGS. 4 to 12 herein.

The present invention relates to knockdown steel shelving of the type embodying vertically spaced horizontally disposed rectangular shelves which are releasably secured at their corners to vertical upright supports or corner posts. More specifically, the invention relates to a novel shelving unit wherein both the shelves and the corner posts are of improved design so that, individually, they inherently possess a high degree of weight bearing strength and rigidity and are so interrelated that when the parts are assembled with one another, they provide a novel rugged interfitting relationship of excellent appearance which is of great strength against buckling or side sway. The invention also is concerned with novel corner fastening means whereby the four corner regions of the various shelves are quickly and easily secured to the adjacent corner posts in rigid relationship that results partly from the interrelated design of the shelves and corner posts and partly from the provision of a concealed novel clamping means whereby the interfitting shelves and corner posts are drawn hard against one another.

The shelves which are associated with knockdown shelving of the type under consideration preferably are provided with downturned marginal strengthening flanges of determined design ranging from a single thickness flange to compound flanges of plural thickness or full box design. Heretofore, in connection with such shelving, it has been considered essential in the interests of shelving rigidity to employ small strut-like reaction brackets (commonly referred to as corner clips) which extend at an angle of 45° between adjacent marginal flanges as shown in said application. These reaction brackets underlie the respective corner region of the shelves and have centrally located holes therein which are aligned with cooperating holes in the adjacent corner posts so that fastening bolts which are passed through the holes will serve to draw the posts inwardly of the shelves in a diagonal direction into corner notches which are provided for their reception.

Shelving of this arrangement has many advantages but is possessed of certain limitations, one limitation arising from the fact that the diagonal clamping action offered by the fastening bolts is divided into two vectorial thrusts, the directions involved being at right angles to each other. Furthermore, the thrusts involved are not direct thrusts but rather they are camming thrusts on a 45° bias so that an extra tightening force on the threaded parts of the fastening bolts is required to assure joint rigidity. Additionally, the corner clips involved must be designed to fit the flanges between which they extend and since, in several designs of the shelving the longitudinal flanges of the shelves differ from the transverse flanges, "right" and "left" hand types of corner clips must be supplied, and some difficulty is encountered therefrom in erecting the shelving despite painstaking directions which are supplied in the instruction sheets accompanying such shelving.

Approximately ninety eight percent of such shelving is designed for household consumer use and, therefore, ease

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of assembly is a primary consideration, secondary only to self rigidity and attractiveness when the installation is complete. Shelving designs which leave little to be desired from a functional point of view have been rejected for lack of ease of assembly and disassembly. Consumers upon occasion have been obliged to return to the seller for assistance in erecting the shelving, and sometimes even the seller has been unable to enlighten the consumer with comparatively simple constructions unless previously given instructions by the manufacturer. It follows therefore that the simpler the erection procedure involved in connection with a given design of shelving, the more favorable will be its reception on the competitive market.

The present invention is designed to overcome many of the limitations that are attendant upon the construction and use of present day steel knockdown shelving now on the market designed for household consumer use and, toward this end, the invention contemplates the provision of a novel shelving unit which offers advantages over present day shelving units, both functionally and from the standpoint of appearance and ease of assembly and erection.

Briefly, in carrying out the invention, the shelves are provided with full box-type marginal longitudinal flanges, three walls of which are rigidified by the provision of co-extensive longitudinally extending ribs therealong. The fourth wall of each box flange incorporates a double thickness of sheet metal. Thus, extreme rigidity is offered in the long direction of the shelves. The corners of the shelves are notched or cut-away to expose the end edges of the thus rigidified box flanges and the exposed ends thereof are designed for clamping cooperation with the corner posts. The corner posts themselves are of three-quarter box design, i.e. channel shaped with the webs of the channels rigidified by coextensive ribs. The channel webs oppose the ends of the box flanges on the shelves and fastening means are provided for drawing the ribbed webs of the corner posts hard and directly against the open ends of the box flanges. The ribs of the corner posts bear against the edges of the double thickness walls of the box flanges and also against the end edges of the ribs on the walls which oppose the double thickness walls so that work-hardened portions of the shelf flanges and work-hardened portions of the adjacent corner posts cooperate with each other to assimilate the full tightening pressure of the fastening devices and, moreover, when the fastening devices are drawn tight, the metal of the corner posts in the vicinity of the ribs is self seating in the metal of the box flanges so that a direct rigidity is effected between the box flanges and corner posts which has not been present heretofore with earlier knockdown shelving employing diagonal corner clips. With such extreme rigidity between the corner posts and the longitudinal box flanges of the shelves, longitudinal rocking of the assembled shelving is eliminated even with high loading limits. Transverse rocking of the shelving is restrained by the inherent rigidity of the shelves along their short transverse dimension.

The invention further contemplates the provision of a novel form of corner fastening means whereby the upright corner posts are securely clamped against the end edges of the box flanges as set forth above. The clamping direction is a right angle one as distinguished from the acute angle one of the diagonal direction of clamping associated with shelving which employs corner bracing clips and it involves the use of a novel T-nut construction which cooperates with a fastening bolt which preferably is in the form of a coarse thread sheet metal screw. The T-nut is in the form of a small spring tempered sheet metal stamping which fits through a pair of aligned slots provided in the side walls of the associated box flange

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so that the T-nut effectively spans transversely across and through the box flange. The fastening screw associated with the T-nut is passed through one of a series of vertically spaced holes provided in the web portion of the channel-like corner post and it projects longitudinally into the open end of the box-flange and finds threaded engagement with a hole formed in the T-nut. Upon tightening of the fastening screw, the corner post is drawn hard and directly against the open end of the box flange.

The hole in the sheet metal T-nut presents an on-edge helical thread upset in the direction against the load thereon for cooperation with the fastening screw and thus it is essential that the T-nut be inserted through the slots in the box flange so that the proper on-edge relationship will obtain. To prevent improper insertion of the T-nut through the slots, cooperating means on the T-nut and box flange are provided which assures proper T-nut insertion.

Means also are provided for latching the T-nut in position within the slots provided for it in the box flange so that after a preliminary insertion of the T-nut it can be either withdrawn or forced to its full limit within the box flange. When forced to its full limit it will not become dislodged during handling of the associated shelf as when manipulating the shelf into position against the various corner posts preparatory to applying the fastening screws. Thereafter, little occasion will arise requiring removal of the T-nut even if it is desired to change the elevation of a given shelf inasmuch as the T-nut once properly installed cooperates only with the shelf for reaction purposes and does not change its position in the box-flange, although the fastening screw may be moved to different locations along the corner post.

The provision of a shelving unit and corner fastening means of the character briefly outlined above being the principal object of the invention, it is another object to provide a shelving unit wherein all of the elements associated with the fastening means are substantially concealed from view when the erection procedure has been completed. This object is attained by the provision of a reinforced trim flange on each corner post which overlies and conceals the exposed head portions of the various associated T-nuts, and by locating the heads of the fastening screws deep within the channel portions of the corner posts so that they are visible only when seen from an unlikely point of view endwise of the shelving.

Further objects of the invention contemplate a shelving unit wherein the principal constituent parts thereof are susceptible to conventional rolling processes and require for their completion no machining operations so that the shelving as a whole may be manufactured at a low cost; a unit which is rugged and durable and which will withstand rough usage and heavy loads; one which may be assembled and disassembled with the aid of only a single tool, namely a screw driver; one which possesses no sharp edges or corners and which is devoid of abrupt protrusions; one which allows for wide manufacturing tolerances; one which is attractive in its appearance and pleasing in its design; and one which otherwise is well adapted to perform the services required of it. These and further desirable features characterize the structure and production of embodiments of the present invention.

Other objects and advantages of the invention, not at this time enumerated, will readily suggest themselves as the nature of the invention is better understood.

In the accompanying two sheets of drawings forming a part of this specification, two illustrative embodiments of the invention have been shown.

In these drawings:

FIG. 1 is a fragmentary perspective view of a corner region of a shelving unit constructed in accordance with the principles of the present invention;

FIG. 2 is a sectional view taken substantially on the horizontal plane indicated by the line 2—2 of FIG. 1 and in the direction of the arrows;

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FIG. 3 is a fragmentary inside or underneath perspective view of the corner region shown in FIG. 1;

FIG. 4 is a fragmentary exploded perspective view illustrating the manner of installation of certain corner fastening means associated with the shelving unit of the invention;

FIG. 5 is an exploded sectional view taken substantially on the horizontal plane indicated by the line 5—5 of FIG. 1 in the direction of the arrows and illustrating certain self-seating relationships which exist between the corner posts and shelves of the shelving unit;

FIG. 6 is an assembled sectional view similar to FIG. 5 and taken substantially on the horizontal plane indicated by the line 6—6 of FIG. 1 in the direction of the arrows;

FIG. 7 is a perspective view of a T-nut employed as an element of the fastening means of the present invention;

FIG. 8 is a plan view of the T-nut of FIG. 7;

FIG. 9 is an end view of the T-nut of FIG. 7;

FIG. 10 is a side view of the T-nut of FIG. 7;

FIG. 11 is a perspective view of a slightly modified form of T-nut capable of being employed in connection with the invention; and

FIG. 12 is an enlarged sectional view similar to FIG. 2, showing the modified T-nut of FIG. 12 substituted in the assembly.

Referring now to the drawings in detail and in particular to FIG. 1 wherein one corner region of a shelving unit constructed according to the present invention has been fragmentarily illustrated, the unit involves in its general organization a series of four corner posts, only one of which has been illustrated and designated in its entirety at 10, and two or more shelves, one of which has been illustrated and designated in its entirety at 12. The various corner posts 10 and shelves 12 are identical.

The shelves 12 and corner posts 10 are rigidly secured together in their operative assembled relationship by means of counterpart fastening devices each of which includes a T-nut 14 and a fastening bolt 16 in the form of an elongated sheet metal screw. The T-nut 14 constitutes a reaction member for assimilating the thrust of the fastening screw which serves to clamp the corner post 10 rigidly to the shelf 12 in a manner that will be made clear presently.

The shelf 12 is generally of rectangular configuration and it includes a horizontal planar supporting or body portion 20 having downturned transversely extending marginal flanges 22 and downwardly and longitudinally extending marginal flanges 24. The transverse flanges 22 are single thickness flanges and are provided with re-entrant reverse bends (FIG. 4) 26 at their lower edges for reinforcing purposes.

The longitudinal flanges 24 are box flanges and, as best seen in FIG. 4, each flange includes inside and outside walls 28 and 30 respectively, a bottom wall 32 and a dual thickness top wall 34. The walls 28 and 30 are reinforced by spaced apart reinforcing ribs 36, while the bottom wall 32 is reinforced by a single central rib 38. This rib 38 constitutes an important feature of the present invention in that it cooperates with a counterpart rib on the corner post 10 in a manner and for a purpose that will be made clear presently. The upper edge region of the box flange 24 projects a slight distance above the horizontal plane of the planar body portion 20 of the shelf 12 by reason of a vertical connecting flange 40 between the body portion and top wall 34, the flange 40 constituting a marginal restraining flange to prevent supported objects from rolling or sliding from the upper surface of the shelf. The four ribs 36 are inwardly rolled ribs while the rib 38 in the bottom wall 32 is an outwardly rolled rib. The four corners of the shelf 12 are notched or cut-away as indicated at 42 (FIG. 4) for reception of selected regions of the corner posts therein in a manner that also will be described in detail subsequently.

The details of the corner posts 10 are best illustrated in FIGS. 1, 2 and 4. Each post is of rolled sheet metal

construction, preferably of heavier gauge metal than that of the shelf 12 and comprises a main body portion of channel-shape cross section including side walls 50 and 52 and a connecting web 54. The web is provided with a series of vertically spaced holes 56 therethrough for selective reception of the fastening screw 16 to the end that the shelf 12 may be secured to the post 10 at selected elevations therealong. The side wall 50 is provided with a narrow laterally turned trim flange 58 which terminates in a laterally turned bearing flange 60. The side wall 52 is provided with a comparatively wide reentrant trim flange 62 which terminates in a laterally turned bearing flange 64.

The vertical corner post 10 is adapted to seat within the corner notch 42 with the web 54 of the channel-shaped body portion opposing and bearing against the adjacent open end or rim of the box flange 24 as best seen FIGS. 1 and 2. The web 54 is formed with a central coextensive outwardly rolled rib 66 (FIGS. 1 to 6 inclusive) which makes a seat for the web when the post 10 is drawn against the box flange 24. As will be described in greater detail presently, the manner in which the rib 66 cooperates with the rib 38 on the bottom wall of the box flange 24 and with the dual thickness top wall 34, constitutes one of the important features of the present invention.

When the corner post 10 is in its operative position within the notch 42 (FIGS. 1 and 2), the trim flange 58 overlies the outside face of the depending flange 22 while the bearing flange 60 opposes such outside face in close proximity thereto. Similarly, the trim flange 62 overlies the outside wall 30 of the box flange 24 while the bearing flange 64 opposes this wall in close proximity thereto.

In order to fasten the corner post 10 securely to the shelf 12 within the notch 42, the previously mentioned fastening device including the T-nut 14 and fastening screw 16 are provided. The T-nut 14 projects through and is anchored in a pair of transversely registering slots 70 and 72 (FIGS. 4, 6 and 7) formed in the outside and inside walls 30 and 28 respectively and is designed for threaded engagement with the fastening screw 16 which is passed through one of the holes 56 in the channel web 54 and enters the open rim or end of the box flange 24 endwise as shown in FIG. 2.

The T-nut 14 is of sheet metal construction and, as shown in FIGS. 8 to 11 inclusive, it is in the form of a stamping having a flat generally rectangular body or shank portion 74 provided with marginal side flanges 76 which are split longitudinally as at 78 to form retaining latch fingers 80 which extend at a small angle to the planes of the flanges 76. The flat shank portion 74 is the working portion which engages the edges of the slots 70 and 72 for reaction purposes.

The T-nut is preferably formed from spring steel stock so that the latch fingers 80 retain their small angle bias but are capable of being deflected inwardly to permit entry of the body portion of the T-nut into and through the slot 70, after which the fingers 80 will again become spread apart to retain the T-nut in position against a dislodgment from the box flange 24. The T-nut 14 is further provided with a T-head 82 which bears against the outside face of the outer wall 70 of the box flange 24 when the T-nut is in its installed position. Preferably the head 82 has spring ends 83 thereon which are inclined out of the general plane of the head 80 and deflect slightly when the T-nut is thrust home with force to provide clearance for the latch fingers 80 to attain their latching positions. Additionally, the ends 83 serve to properly center the T-nut in position between the two walls 28 and 30 so that when the fastening screw 16 is tightened, the adjacent edge of the outside wall will not oppose the narrow area of the body portion of the T-nut at the base of the T-head 80, such area being unsupported by the side flanges 76. In other words, the spring ends 83 limit the extent to which the T-nut may be pushed into the slots 70 and 72.

The body or shank portion 74 of the T-nut is formed

with an opening 84 therethrough of keyhole design and the marginal region 86 of this opening is progressively outstruck or raised to provide a helical edge 88 (FIGS. 7, 8, 9 and 11) which is offset bodily away from the working face of the body portion 74 to constitute a one-turn tooth designed for threaded cooperation with the threaded fastening screw 16. Since the fastening screw 16 may enter the opening 84 for proper on-edge cooperation with the helical edge 88 by extending axially of the opening in one direction only, a blocking ear or flange 90 (FIG. 4) projects partially across the slot 70 from one side thereof and allows entry of the T-nut 14 in only the proper position of orientation. When the T-nut is operatively installed within the box flange 24, it will assimilate the pulling force of the threaded clamping or fastening screw 16, thus constituting a reaction element for the screw. The reaction force of the T-nut is, in turn, balanced on and assimilated by corresponding side edges of the slots 70 and 72 in the side walls 30 and 28 respectively.

In assembling the corner post 10 upon the shelf 12, the T-nut 14 will first be operatively installed in the box flange 24. This operation may be effected by aligning the body portion 74 of the T-nut with the registering slots 70 and 72 so that the side flanges 76 straddle the blocking flange 90 and thereafter forcing the T-nut endwise through the slot 70 until the T-head 82 engages the outside face of the side wall 30 of the box flange 24. The spring ends 83 and latch fingers 80 will yield to allow entry of the T-nut through the slot 70 and, after the fingers have passed through the slot, they will snap into locking position as shown in FIG. 9. Thereafter the T-nut may not be removed from its installed position and the shelf 12 may be handled without danger of the T-nut falling from its installed position preparatory to application of the fastening screw 16.

The proper hole 56 in the corner post 10 is then selected for the desired shelf elevation and the fastening screw 16 is passed endwise through this hole and caused to enter the adjacent open end of the box flange 24 and make threaded engagement with the thread-providing opening 84 of the previously installed T-nut. Tightening of the fastening screw with the aid of a suitable tool such as a screwdriver will bring the rib 66 of the corner post into register and engagement with both the dual thickness top wall 34 of the box flange 24 and the rib 38 in the bottom wall thereof, while at the same time the trim flanges 58 and 62 (FIG. 2) will assume their overlying relationship with respect to the flanges 22 and 24 as previously described, the trim flange 62 serving to conceal the head 82 of the T-nut 14.

It is to be particularly noted at this point that upon final tightening of the fastening screw 16 the vertically disposed rib 66 (FIGS. 5 and 6) will be drawn hard against the dual thickness top wall 34 of the box flange 24 and will actually crush the metal of the adjacent edges of this dual thickness wall sufficiently to establish a self-formed seat such as has been indicated at 92 in FIG. 5. Similarly and as shown in FIG. 6, this rib 66 will be drawn hard against the adjacent edge of the horizontal rib 36 on the bottom wall 32 of the box flange 24 and will establish a self-formed seat 94. The creation of these two spaced apart self-formed seats 92 and 94 greatly rigidify the corner post and self assembly against rocking movement of the shelving in a transverse direction so that it is not essential that cross braces or the like be employed in connection with the shelving. Rigidity of the shelving against rocking movement in a longitudinal direction is, of course, inhibited by the extreme rigidity of the box flange 24 when under on-edge compression.

It also is to be noted that the vertical extent of the slots 70 and 72 is substantially equal to the distance between the center lines of the two horizontally extending ribs 36 on the walls 30 and 28 so that the opposite ends of the slots lie directly at the apices of the ribs. Thus,

when lateral pulling force is applied to the T-nut by the fastening screw 16, the reaction forced offered by a portion of each of four ribs 36 prevents "peeling" or tearing of the sheet metal of the box flange 24 at the corners of the slots 70 and 72.

Finally, it is to be noted that because the trim flange 62 conceals the head portion 82 of the T-nut 14 and because the head of the fastening screw 16 is disposed deep within the channel portion of the vertical corner post 10, all portions of the composite fastening means are substantially concealed from view. Although the head of the fastening screw 16 may be seen when the shelving is viewed on end through a small limited angular range of viewing, such viewing of the shelving is seldom available when the shelving is put to use.

It has been stated previously that the spring fingers 83 on the T-head 82 of the T-nut 14 serve to prevent the adjacent edge region of the outside wall 30 of the box flange 24 from registering with or opposing the narrow area near the base of the T-head when the fastening screw 16 is drawn taut. A more positive means for preventing the T-nut from being pushed too far through the slots 70 and 72 is provided in connection with the modified form of T-nut 114 shown in FIGS. 11 and 12. Additionally, means are provided in connection with the T-nut 114 for insuring that the T-nut will be pushed sufficiently far into the registering holes 70 and 72 and remain so positioned that the distal edge of the T-nut remote from the T-head will register with the inside wall 28 so that the latter may assimilate the lateral thrust of the T-nut when the fastening screw 16 is drawn taut.

The T-nut 114 of FIGS. 11 and 12 is similar in many respects to the T-nut 14 and therefore, in order to avoid needless repetition of description, corresponding reference numerals, but of a higher order, have been applied to the various corresponding parts as between the disclosures of FIGS. 2 and 8, and FIGS. 12 and 13, these two pairs of views being similar in their disclosures.

Referring now to FIGS. 11 and 12, the T-nut 114 remains substantially the same as the T-nut 14 except for the addition to the T-nut 114 of an inclined outwardly extending flange 175 along the edge of the body portion 174 remote from the T-head 182, and also the addition of a transverse rib 177 on the body portion 174 near the base of the T-head 182. When the T-nut 114 is in position within the slots 70 and 72 as shown in FIG. 13, the inclined flange 175 interlocks with one side edge of the slot 72 and prevents axial shifting of the T-nut outwardly of the shelf 12. Similarly, with the T-nut 114 in position, the rib 177 interlocks with one side edge of the slot 70 and prevents inward movement of the T-nut 114 at the time of installation to such an extent that the edge of the slot 70 might become misaligned with the narrow area of the body portion 174 near the base of the T-head and which is not reinforced by the side flanges 175. In connection with the T-nut 114, the spring fingers 183 do not exert a centering function on the T-nut as a whole. However, their inclination prevents them from protruding unduly from the surface of the outside flange 30 so that they are unlikely to constitute obstructions for interference with adjacent objects such as the clothing of a person in the vicinity of the shelving. Otherwise the T-nut 114 functions in a manner similar to the T-nut 14. The T-nuts 14 and 114 are, obviously, useable interchangeably with the illustrated shelving of the present invention.

The invention is not to be limited to the exact arrangement of parts shown in the accompanying drawings or described in this specification as various changes in the details of construction may be resorted to without departing from the spirit of the invention. For example, whereas no cross bracing for the shelving has been illustrated herein and none is considered necessary, such can be used if desired by the customer as where the height of the shelving with one unit on another is deemed to require it.

Additionally, while the terms long "longitudinal" and "transverse" in the above description refer to the long and short dimensions respectively of the shelf 12, obviously the box flange 24 may extend marginally along the short dimension of the shelf if desired. Therefore, only insofar as the invention has particularly been pointed out in the accompanying claims is the same to be limited.

What is claimed is:

1. In an adjustable knockdown sheet metal shelving unit, in combination, an elongated upright corner post comprising a main body portion of channel shape cross section and including parallel side flanges and a connecting web portion, a generally rectangular horizontally disposed shelf having a shelf portion and a depending closed rectangular box flange extending along at least one longitudinal edge thereof, with its two vertical walls supporting the shelf portion at said edge, a depending flange extending along an adjacent transverse edge thereof, said shelf and depending flanges being cut away at a corner region of the shelf to receive the corner post with the web portion bearing against the adjacent open rim of the box flange and with one side flange of the corner post opposing an adjacent end edge of the transverse shelf flange, a reaction nut interengaging said vertical walls and having a portion thereof fixedly disposed within said box flange against axial movement thereof towards said corner post, there being a series of vertically spaced holes in said web portion of the corner post, and a fastening screw selectively receivable through said holes and projecting through one of them and threadedly received in said reaction nut, said fastening screw and reaction nut serving to draw the web portion of the corner post hard against the adjacent open rim of the box flange.

2. In an adjustable knockdown sheet metal shelving unit, the combination set forth in claim 1 and wherein said web portion of the corner post is formed with an outwardly projecting vertically extending rib, said rib, when the fastening screw is tightened in the reaction nut, displaces the metal of the box flange at its region of contact with said adjacent open rim of the box flange.

3. In an adjustable knockdown sheet metal shelving unit, the combination set forth in claim 1 and wherein said reaction nut and fastening screw constitute the sole means for securing the corner post and shelf together.

4. In an adjustable knockdown sheet metal shelving unit, in combination, an elongated upright corner post comprising a main body portion of channel shape cross section and including parallel side flanges and a connecting web portion, a generally rectangular horizontally disposed shelf having a depending closed rectangular box flange extending along one longitudinal edge thereof and a depending flange extending along an adjacent transverse edge thereof, said shelf and depending flanges being cut away at a corner region of the shelf to receive the corner post with the web portion bearing against the adjacent open rim of the box flange and with one side flange of the corner post opposing an adjacent end edge of the transverse shelf flange, a reaction nut having a portion thereof fixedly disposed within said box flange against axial movement thereof towards said corner post, there being a series of vertically spaced holes in said web portion of the corner post, and a fastening screw selectively receivable through said holes and projecting through one of them and threadedly received in said reaction nut said fastening screw and reaction nut serving to draw the web portion of the corner post hard against the adjacent open rim of the box flange, said box flange including a dual-thickness top wall and a single thickness bottom wall, said web portion of the corner post being formed with an outwardly projecting vertically extending rib, said rib, when the fastening screw is tightened in the reaction nut, displaces the metal of the dual thickness top wall and of the bottom wall in the adjacent rim region of the box flange.

5. In an adjustable knockdown sheet metal shelving

unit, the combination set forth in claim 4 including, additionally, a vertical connecting flange extending along said one longitudinal edge of the shelf and merging with said dual thickness top wall of the box flange, said connecting flange serving to maintain the box flange top wall of the box flange a slight distance above the horizontal level of the main body portion of the shelf.

6. In an adjustable knockdown sheet metal shelving unit, in combination, an elongated upright corner post comprising a main body portion of channel shape cross section and including parallel side flanges and a connecting web portion, a generally rectangular horizontally disposed shelf having a shelf portion and a depending closed rectangular box flange extending along at least one longitudinal edge thereof with its two vertical walls supporting the shelf portion at said edge and a depending flange extending along an adjacent transverse edge thereof, said shelf and depending flanges being cut away at a corner region of the shelf to receive the corner post with the web portion bearing against the adjacent open rim of the box flange and with one side flange of the corner post opposing an adjacent end edge of the transverse shelf flange, said box flange including a horizontal top wall, a horizontal bottom wall, and said vertical walls comprising inside and outside vertical walls interconnecting and extending between said top and bottom walls, said inside and outside vertical walls being formed with transversely aligned slots therein, a T-nut including a shank portion projecting through said aligned slots and across the interior of the box flange and a head portion fitting against said outside wall, there being a series of vertically spaced holes in said web portion of the corner post, and a fastening screw selectively receivable through said holes and projecting through one of them and threadably received in the shank portion of said T-nut, said fastening screw serving to draw the web portion of the corner post hard against the adjacent rim of the box flange.

7. In an adjustable knockdown sheet metal shelving unit, the combination set forth in claim 6 and including, additionally, latch means operable upon projection of the T-nut through said slots for preventing withdrawal of the T-nut from said box flange.

8. In an adjustable knockdown sheet metal shelving unit, the combination set forth in claim 6 and including, additionally, a reentrant trim flange on the other side flange of the corner post overlying the head portion of the T-nut and serving to conceal the same.

9. In an adjustable knockdown sheet metal shelving unit, the combination set forth in claim 6 and including, additionally, a reentrant trim flange on the other side flange of the corner post overlying the head portion of the T-nut and serving to conceal the same, and a lateral bearing flange on said trim flange bearing against said outside wall of the box flange on the side of the T-nut remote from the adjacent end of the box flange.

10. In an adjustable knockdown sheet metal shelving unit, the combination set forth in claim 6 and including, additionally, a reentrant trim flange on the other side flange of the corner post overlying the head portion of the T-nut and serving to conceal the same, a lateral bearing flange on the trim flange bearing against said outside wall of the box flange, and a lateral trim flange on said one side flange of the corner post, said latter trim flange overlying a portion of the transversely extending depending flange of the shelf.

11. A metal shelving assembly comprising:

- a shelf having a planar portion and peripheral reinforcing side and end flanges terminating at end edges a spaced distance from each other at a right angle with each other at each corner of the shelf to define a notch-out recessed opening at each corner,
- a supporting upright at each corner having outwardly extending portions engaging the end edges of the flanges in the notched out recessed opening at the

corner and the one of said portions engaging a side flange having a hole therethrough,
said side flanges having apertures therein adjacent to their end edges,

releasable means securing the shelf to the uprights including for each upright a threaded element loosely disposed in a position perpendicular to the side flanges in each of said apertures; and

a threaded member extending through said hole in each upright and engaging said elements respectively to force said end edges of the side flanges into squared relationship with said one of said portions of each upright to support the shelving assembly against side sway.

12. A metal stand comprising:

a horizontal shelf having a corner and a flat planar surface with peripheral flanges depending therefrom on opposite sides of the corner and defining a recessed opening, one of said flanges having a double wall,

an angular supporting upright having two legs disposed complementary to the depending flanges on opposite sides of the recessed opening,

one of said legs having a plurality of vertically spaced bolt receiving openings therein,

a bolt member received in one of said spaced openings, and a threaded element disposed in the one of the depending double wall flanges that is disposed normal to said one leg and receiving the bolt member in threaded relationship to secure the end of said flange endwise against the supporting upright in clamped relationship, the axis of said bolt member being normal to said one leg.

13. A metal stand comprising:

a horizontal shelf having a corner and a planar article supporting surface with peripheral flanges depending therefrom on opposite sides of the corner defining a notched recessed opening, one of said flanges having spaced parallel wall portions,

an angular supporting upright having two leg portions disposed complementary to the depending flanges on opposite sides of the recessed opening,

rib portions on the marginal edges of the legs offset towards the depending flanges to engage the depending flanges in abutting relationship,

one of said legs engaging said wall portions endwise thereof and having a plurality of vertically spaced openings therein,

a bolt member received in one of said spaced openings, and

a threaded element disposed in the depending flange that is disposed endwise to the leg having the openings therein and received on the bolt member in threaded relationship for securing the shelf to the supporting upright, the axis of the bolt member being parallel to the last mentioned depending flange.

14. A vertically adjustable metal shelving assembly comprising

a shelf having a planar portion and a pair of depending peripheral opposing side flanges and end flanges, said side flanges and end flanges terminating a spaced distance from each other at the corners of the shelf defining recessed openings said side flanges having double walls,

a plurality of supporting uprights each having an outwardly extending first and second leg portions disposed at right angles to one another, said first leg portion engaging the end edges of one of the side flanges and the second leg engaging the end edges of one of the end flanges at each corner,

a channel portion formed in said second leg portion received in the recessed opening at the shelf corner and having a bottom wall normal to said side flange,

a plurality of equally spaced apertures centrally formed through the bottom wall of said channel,

- a locking bracket disposed in said double wall side flange adjacent the end thereof, said locking bracket having a threaded aperture therethrough for alignment in spaced relation with one of the apertures in said channel, and
 - a threaded element disposed through one of said channel apertures parallel to said side flange and threadably engaging said holding bracket to draw and rigidly secure the shelf to the upright.
15. A vertically adjustable metal shelving assembly comprising:
- a shelf having a planar portion and a pair of depending peripheral opposing side flanges and end flanges, said side flanges and end flanges terminating a spaced distance from each other at the corners of the shelf defining recessed openings and said side flanges having double walls,
 - a plurality of supporting uprights having an outwardly extending first and second leg portions disposed at right angles to one another, said first leg extending outwardly in a plane parallel to a side flange and the second leg extending outwardly in a plane parallel to an end flange at a corner,
 - a lip portion formed on the extending edge of said first and second leg portion resiliently engaging said end and side flanges,
 - a channel portion formed in said second leg portion received in the recessed opening at the shelf corner and having a bottom wall normal to and in contact with said side flange,
 - a plurality of equally spaced vertical aligned apertures centrally formed through the bottom wall of said channel,
 - a locking bracket secured in said double wall side flange adjacent the end thereof, said locking bracket having a threaded aperture therethrough for alignment in spaced relation with one of the apertures in said channel, and
 - a bolt disposed through one of said channel apertures disposed parallel to said side flange and engaging said locking bracket to draw and rigidly secure said side flange to the upright.
16. In a shelving unit, the combination with a sheet metal shelf having a depending flange of box-like configuration and presenting opposed vertical outside and inside walls respectively, said walls being provided with a pair of opposed vertical slots therein, of a reaction T-nut in the form of a sheet metal stamping formed of spring material and having a shank portion projecting through said slots and bridging the distance between said walls, and an enlarged head portion designed for engagement with said outside wall for limiting the extent of projection of the shank portion through said slots, said shank portion including a substantially flat body portion having a central contoured thread-forming opening therein designed for threaded engagement with a pointed fastening screw and provided with laterally turned side flanges which terminate short of the head portion, said head portion being in the form of a laterally turned flange at the proximate end of said flat body portion, said side flanges being provided with longitudinally extending slits therein defining a pair of spring-biased latching fingers the proximate ends of which are displaced laterally outwardly of the side flanges a slight distance so that the latching fingers extend at a small angle to the longitudinal axis of the shank portion, said head portion and latching fingers serving to confine the outside wall of the box-like flange therebetween and prevent appreciable endwise shifting of the T-nut and consequent removal thereof from its position on the box-like flange.
17. In a shelving unit, the combination set forth in claim 16 and wherein said head portion is formed with spring ends which are inclined at a small angle out of the general plane of the head portion in the direction of the shank portion, said spring ends serving to maintain the medial regions of the head portion spaced from said outside wall

and thus maintain the edges of the slot in the outside wall in operative register with said laterally turned side flanges on the flat body portion.

18. In a shelving unit, the combination set forth in claim 16, wherein said head portion is formed with spring ends which are inclined at a small angle out of the general plane of the head portion in the direction of the shank portion, said spring ends serving to maintain the medial regions of the head portion spaced from said outside wall in operative register with said laterally turned side flanges on the flat body portion, and wherein the slot in said outside wall has one edge thereof formed with a protuberance which is straddled by said side flanges and which, as a consequence, prevents insertion of the shank portion through the slots in the walls of the box flange in any oriented position other than the specified position.

19. In a shelving unit, the combination with a sheet metal shelf having a depending flange of box-like configuration and presenting opposed vertical outside and inside walls respectively, said walls being provided with a pair of opposed vertical slots therein, of a reaction T-nut in the form of a sheet metal stamping formed of spring material and having a shank portion projecting through said slots and bridging the distance between said walls, and an enlarged head portion designed for engagement with said outside wall for limiting the extent of projection of the shank portion through said slots, said shank portion including a substantially flat body portion having a central contoured thread-forming opening therein designed for threaded engagement with a pointed fastening screw and provided with laterally turned side flanges which terminate short of the head portion, said head portion being in the form of a laterally turned flange at the proximate end of said flat body portion, said side flanges being provided with longitudinally extending slits therein defining a pair of spring-biased latching fingers the proximate ends of which are displaced laterally outwardly of the side flanges a slight distance so that the latching fingers extend at a small angle to the longitudinal axis of the shank portion, said body portion being formed with a transversely extending outwardly struck rib thereon at the juncture region between said head and body portions, said rib and latching fingers serving to confine the outside wall of the box-like flange therebetween and prevent appreciable endwise shifting of the T-nut and consequent removal thereof from its position on the box-like flange.

20. In a shelving unit, the combination with a sheet metal shelf having a depending flange of box-like configuration and presenting opposed vertical outside and inside walls respectively, said walls being provided with a pair of opposed vertical slots therein, of a reaction T-nut in the form of a sheet metal stamping formed of spring material and having a shank portion projecting through said slots and bridging the distance between said walls, and an enlarged head portion designed for engagement with said outside wall for limiting the extent of projection of the shank portion through said slots, said shank portion including a substantially flat body portion having a central contoured thread-forming opening therein designed for threaded engagement with a pointed fastening screw and provided with laterally turned side flanges which terminate short of the head portion, said head portion being in the form of a laterally turned flange at the proximate end of said flat body portion, said side flanges being provided with longitudinally extending slits therein defining a pair of spring-biased latching fingers the proximate ends of which are displaced laterally outwardly of the side flanges a slight distance so that the latching fingers extend at a small angle to the longitudinal axis of the shank portion, the distal edge of said body portion being formed with a laterally turned flange thereon designed for engagement with said inside wall exteriorly of the box-like flange, said head portion and latching fingers serving to confine the outside wall of the box-like flange therebetween and, in conjunction with said laterally turned flange at the distal end of the body portion, prevent ap-

preciable endwise shifting of the T-nut and consequent removal thereof from its position on the box-like flange.

21. In a shelving unit, the combination with a sheet metal shelf having a depending flange of box-like configuration and presenting opposed vertical outside and inside walls respectively, said walls being provided with a pair of opposed vertical slots therein, of a reaction T-nut in the form of a sheet metal stamping formed of spring material and having a shank portion projecting through said slots and bridging the distance between said walls, and an enlarged head portion designed for engagement with said outside wall for limiting the extent of projection of the shank portion through said slots, said shank portion including a substantially flat body portion having a central contoured thread-forming opening therein designed for threaded engagement with a pointed fastening screw and provided with laterally turned side flanges which terminate short of the head portion, said head portion being in the form of a laterally turned flange at the proximate end of said flat body portion, said side flanges being provided with longitudinally extended slits therein defining a pair of spring-biased latching fingers the proximate ends of which are displaced laterally outwardly of the side flanges a slight distance so that the latching fingers extend at a small angle to the longitudinal axis of the shank portion, said head portion and latching fingers serving to confine the outside wall of the box-like flange therebetween and prevent appreciable endwise shifting of the T-nut and consequent removal thereof from its position on the box-like flange, said slot in said outside wall having one edge thereof formed with a protuberance which is straddled by said side flanges and which, as a consequence, prevents insertion of the shank portion through the slots in the walls of the box flange in any oriented position other than the specified position.

22. In a shelving unit, the combination with a sheet metal shelf having a depending flange of box-like configuration and presenting opposed vertical outside and inside walls respectively, said walls being provided with a pair of opposed vertical slots therein, of a reaction T-nut in the form of a sheet metal stamping formed of spring material and having a shank portion projecting through said slots and bridging the distance between said walls, and an enlarged head portion designed for engagement with said outside wall for limiting the extent of projection of the shank portion through said slots, said shank portion including a substantially flat body portion having a central contoured thread-forming opening therein de-

signed for threaded engagement with a pointed fastening screw and provided with laterally turned side flanges which terminate short of the head portion, said head portion being in the form of a laterally turned flange at the proximate end of said flat body portion, said side flanges being provided with longitudinally extending slits therein defining a pair of spring-biased latching fingers the proximate ends of which are displaced laterally outwardly of the side flanges a slight distance so that the latching fingers extend at a small angle to the longitudinal axis of the shank portion, said head portion and latching fingers serving to confine the outside wall of the box-like flange therebetween and prevent appreciable endwise shifting of the T-nut and consequent removal thereof from its position on the box-like flange, said vertical slots being of different widths and the ends of the side flanges remote from said latching finger being reduced in width over a substantial portion to be received only in the slot having a lesser width.

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