July 11, 1967 I. J. FERDINAND ETAL 3,330,229

KNOCKDOWN STEEL SHELVING UNIT AND CORNER FASTENING MEANS THEREFOR

Filed Oct. 21, 1965 2 Sheets-Sheet 1

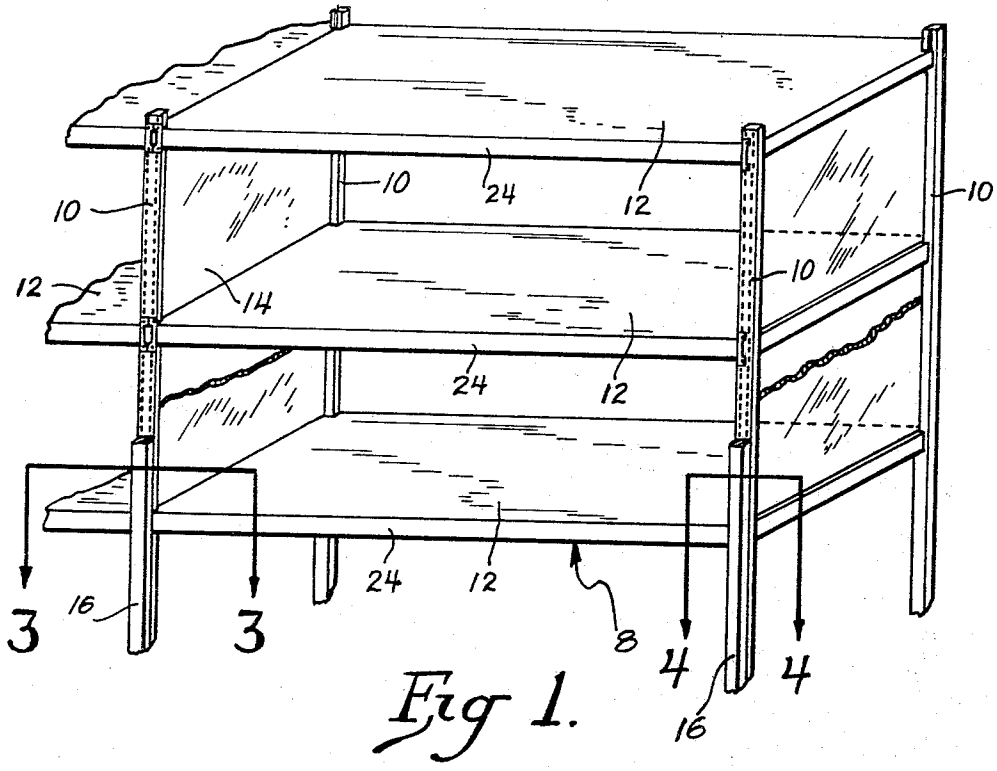


Fig 1.

Fig 6.

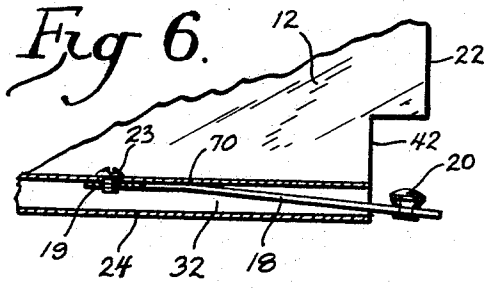
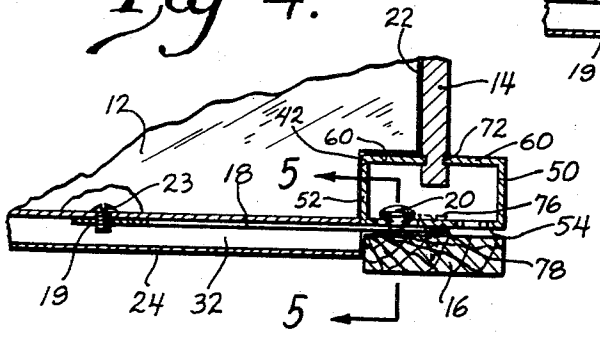


Fig 4.



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KNOCKDOWN STEEL SHELVING UNIT AND CORNER FASTENING MEANS THEREFOR

Filed Oct. 21, 1965 2 Sheets-Sheet 2

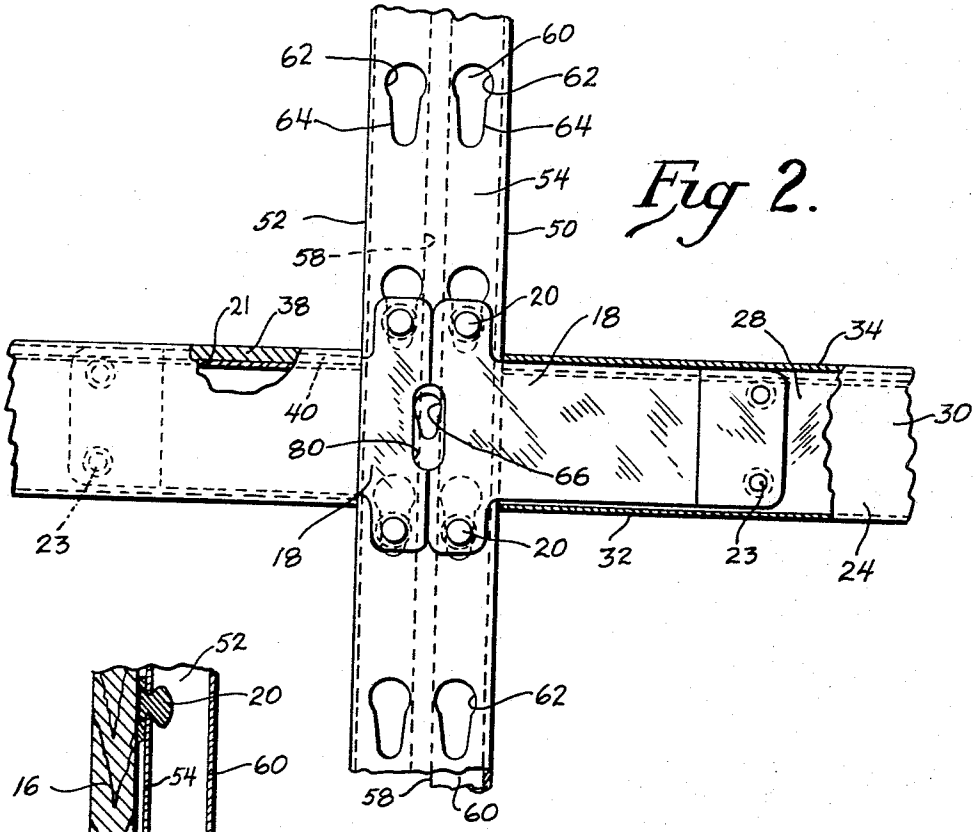

Fig 2.

Fig 5.

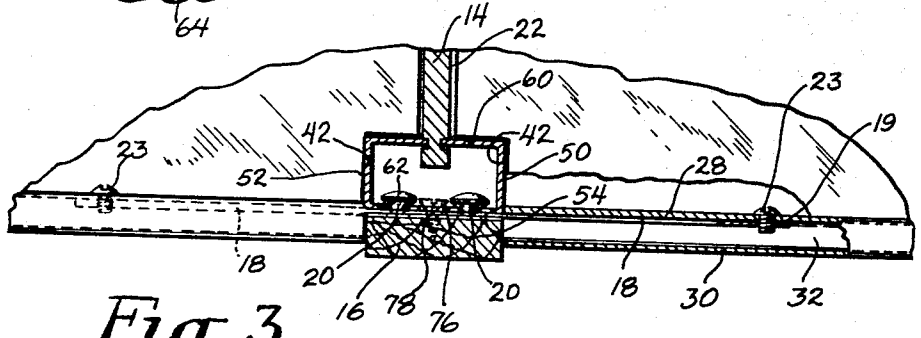

Fig 3.

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KNOCKDOWN STEEL SHELVING UNIT AND CORNER FASTENING MEANS THEREFOR

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7 Claims. (Cl. 108—111)

The present invention relates to knockdown steel shelving of the type embodying vertically spaced horizontally disposed rectangular shelves which are releasably secured and braced at their corners to vertical corner posts with a readily and easily engaged novel self-tightening corner fastening means concealed in box flanges on the shelves and engaging the front walls of the posts to provide a completely concealed rugged interfitting relationship which is of great strength.

The shelves which are considered are of the type more particularly described in our application, Ser. No. 362,150, now U.S. Patent 3,276,403 granted Oct. 4, 1966 reference to which is hereby made, in which the shelves are lengthwise marginally reinforced by compound flanges of plural thickness. Briefly, the shelves are longitudinally provided with vertically extending marginal full box-type flanges, three walls of which are preferably further rigidified by the provision of coextensive longitudinally extending ribs therealong with the fourth wall of each box flange offset upwardly and preferably incorporating a double thickness of sheet metal adjacent to the top of the shelf. The corners of the shelves are notched or cut-away to expose the ends of the thus rigidified box flanges for clamping cooperation with the corner posts.

The corner posts themselves are of four sided box design, preferably with a medial slot through what may be termed the rear wall of the post. Opposite side walls of the posts face the ends of the box flanges on the shelves and the wall is provided with two vertical rows of equally spaced key hole perforations with the narrow portion disposed downwardly. The fastening means spans and engages two adjacent holes of one of the rows with tapered buttons exerting a downward weight bearing tightening movement. The buttons are rigidly carried by a spring element having an arm fastened within the box flange of the shelf and is flexed to urge the buttons away from engagement in the key hole slots. The taper of the buttons tighten the spring element against the post. With the rigidity established between the corner posts and the longitudinal box flanges of the shelves in this way, longitudinal rocking of the assembled shelving is eliminated even with high loading limits. Also transverse rocking of the shelving is restrained by the inherent rigidity of the shelves along their short transverse dimension. A finishing strip covers the buttons bottoms for appearance and prevents their removal from the key-hole perforations.

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

The provision of a shelving unit and corner fastening means the character briefly outlined above which can be assembled and dismantled without any tools 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 accessible from outside the shelving and are concealed from view with finger applied trim strips which lock the fastening means against disengagement when the erection procedure has been completed.

Further objects of the invention contemplate a shelving unit wherein the principal constituent parts thereof are susceptible to conventional production processes and require for their completion no machining operations to the ends that the shelving as a whole may be manufactured at a low cost; a unit is provided which is rugged and durable and which will withstand rough usage and heavy loads; the unit may be assembled and disassembled readily by hand without any tools and by one person with little effort or experience; the assembled product possesses no sharp edges or corners and is devoid of abrupt protrusions; it allows for wide manufacturing tolerances; is attractive in its appearance and pleasing in its design; and is otherwise 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 an illustrative embodiment of the invention has been shown.

In these drawings:

FIG. 1 is a perspective view of knockdown steel shelving embodying the invention;

FIG. 2 is a fragmentary enlarged front elevational view of a post and fastening region of the shelving unit constructed in accordance with the principles of the present invention;

FIG. 3 is an enlarged sectional view taken substantially on the horizontal plane indicated by the line **3—3** of FIG. 1 in the direction of the arrows;

FIG. 4 is an enlarged sectional view taken substantially on a horizontal plane indicated by the line **4—4** of FIG. 1 in the direction of the arrows;

FIG. 5 is a vertical sectional view taken on line **5—5** of FIG. 4; and

FIG. 6 is a horizontal sectional view similar to FIG. 4 showing the spring carried fastener buttons in their normal position.

A knockdown steel shelving construction **8** is shown in FIG. 1 and involves in its general organization a series of four posts **10** (FIG. 1) and two or more shelves **12** with end panels **14** closing exposed ends of the shelving space, and finishing strips **16** on the front of the front posts. The various corner posts **10**, shelves **12**, panels and finishing strips are identical in structural characteristics, thereby reducing the number of different items inventoried.

The shelves **12** and corner posts **10** are rigidly secured together in their operative assembled relationship by means of fastening devices each of which includes a

T-shaped spring blade member **18** (FIG. 2) carrying self-tightening tapered buttons **20** on the arms of the T form with the leg portion terminally secured to a side of a box flange on the shelf.

The shelf **12** is generally of rectangular configuration and it includes a horizontal planar shelf top portion **21** 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. 6) at their lower edges for reinforcing purposes.

The longitudinal flanges **24** are box flanges and, as best seen in FIG. 2, each flange includes inside and outside walls **28** and **30** respectively, a bottom wall **32** and a dual thickness top wall **34**. The upper edge region of the box flange **24** projects a slight distance above the horizontal plane of the planar body portion **21** 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 and as shown herein has a wood finish plastic sheet finishing surface **38** adhered thereto. The four corners of the shelf **12** are notched or cut-away as indicated at **42** (FIG. 3) for reception of selected regions of the corner posts **10** therein in a manner that will be described, and adjacent to the posts the inner wall **28** of the box flange is perforated as at **19** to receive rivets or screws as indicated at **23**.

The details of the corner posts **10** are best illustrated in FIGS. 2 to 4. Each post is of rolled sheet metal construction, preferably of a heavier gauge metal than that of the shelf **12** and comprises a main body tubular-type member having parallel side walls **50** and **52**, a front wall **54** and a longitudinal slot **58** between two halves **60** of the rear wall. The front wall **54** has two parallel rows of key hole perforations **62** therethrough with the narrow portion **64** of the perforation extending downwardly. The perforations are vertically spaced in pairs and at spaced points along the length of the post single smaller key hole perforations **66**.

As already noted tapered buttons **20** are riveted to the arms of the T-blade **18** and these buttons engage in the key hole perforations with their taper engaging in the narrow portions **64** tighter and tighter with downward pressure. The front surface of the inner wall **28** of the box flange **24** is coplanar with the front wall **54** of the post. Therefore, as the buttons **20** tighten in the key hole perforations, the flat of the blade **18** is drawn against the walls **28** and **54** tending to hold them coplanar.

As seen in FIG. 6, the spring blade **18** is bent as at **70** which with the end of the leg thereof secured to the inner face of the inner wall **28** by screws **23** operates to urge the buttons away from the face **54** of the post **10**. Accordingly, with spring blades in the front and rear, box flanges at the shelf ends, it would seem that the posts are urged fore and aft away from each other. However, the end panels **14** are marginally grooved as at **72** to be received in the slots **58** and prevent this movement at least in the early stages of shelf assembly. Then when a shelf is located at a desired level, the head portions of the T-blade are finger pressed towards the posts to move the buttons with the key hole perforations and the shelf is pulled downwardly to tighten the buttons in the narrow portions **64** as described. Later, whenever it is desired to change the shelf level the shelf is pushed upwardly and the buttons pop out of engagement. The shelf is then moved to its new location on reinsertion of the buttons and a new location is made as described.

The vertical spacing of the engaged buttons square and rigidify the T-blade. The T-blade in turn is exactly the same width as the inside height of the box flange **24** and as secured by screws **23** thereto, the rigidity is transmitted to the shelf at all four corners with an end result that the greater the shelf weight is, the more firmly the shelving is rigidified against end sway. The panel **14** supports the shelving against leaning or a looseness fore and aft.

Once all the buttons **20** are lodged in their working positions in the shelving, the finishing strips **16** are attached to hold the buttons in operative position. As shown, the finishing strip is of finished wood with wood screws **76** carrying washers **78** (FIG. 4) secured at heights corresponding to the location of the key-hole apertures **66** in the post **10**. The V-contour of the screw **76** provides a self tightening action in cooperation with the apertures **66** when the heads are inserted therethrough and the strip has been pulled down to its desired position.

The assembly of the strip **16** to the post **10** is characterized by the ends edges of the T blades **18** being notched as at **80** to provide clear access to the apertures **66** (FIG. 2) in event they are located where they overlap the aperture as illustrated in FIG. 2. Furthermore, the notching is enough to receive the washer **78** therebetween against the front face **54** of the posts to serve as a spacer both there and anywhere the aperture **66** is not at a shelf level so that the finishing strip is kept vertically straight with no curves where the strip passes over the heads of the T-blades **18** wherever they may be. However, any looseness of the strip can be remedied by removal and further tightening the wood screws **76** to the extent desired. The strip not only holds the buttons **20** in their post engaging positions but also cover the open ends of the box flanges **24** where they extend outwardly beyond the front face **54** of the posts **10**, thus completing the shelving assembly as a mechanically coordinated unit of pleasing appearance with or without the finishing veneer members **38** (FIG. 2) covering the top face of the shelves.

In is also to be noted that with sides of the T-blade coextensive with the inside vertical dimension of the box flange **24**, rivets or spot welding can be easily substituted for screws **23** since with a jig carrying the T-blade and filling the box flange pressure can be transmitted through the walls of the box flange adequate for either purpose without marring the exposed surfaces.

In assembly, the panels **14** are slipped into place in the slots **58** of two pairs of opposing posts, a shelf is then located in a temporary or its ultimate position on the posts and the T-blade ends are pressed inwardly to insert the buttons **20** through the selected key hole apertures, first of one pair of posts at one end and then the other pair of posts at the other end of shelf. Thereafter further shelves can be added the same way at levels desired and if any adjustments are desired, the shelf corners are pushed up whereby the resiliency in the T-blade automatically releases the buttons **20**. When the shelf is repositioned the T-blades are again pressed towards the posts and the shelf corners pulled downwardly to engage the buttons snugly in their new location. The strips are then slipped into place as described and the shelving unit located where it will be used.

Having thus described the preferred embodiment of the invention and the advantages of the arrangement of the parts and their elements for the objects and results stated including concealing all fastening devices, it will be understood by others how various and further modifications can be provided without departing from the spirit of the invention, the scope of which is commensurate with the appended claims.

What is claimed is:

1. In a knockdown steel shelving unit, the combination of an elongated upright corner post having a face provided with a vertical row of key hole perforations therethrough with the narrow portion disposed downwardly, a generally rectangular horizontally disposed shelf having a depending rectangular box flange extending along one longitudinal edge thereof and terminally opening in front of said face, and fastening means comprising a spring element mounted at one end within said box flange and normally extended beyond said opening and resiliently urged

out of contact with said face, said fastening means having a tapered button in registration with one of said perforations received through the larger portion thereof when finger pressed towards said face, said button being tapered on its side wall to engage the walls of the narrower portion of the perforation exerting in connection therewith a downward weight bearing tightening movement, said button being automatically released and withdrawn when the shelf flange is pushed upwardly.

2. In a knockdown steel shelving unit, the combination of an elongated upright corner post having a face provided with a vertical row of key hole perforations therethrough with the narrow portion disposed downwardly, a generally rectangular horizontally disposed shelf having a depending rectangular box flange extending along one longitudinal edge thereof and terminally opening in front of said face, and fastening means comprising a spring element mounted at one end within said box flange and normally extended beyond said opening and resiliently urged out of contact with said face, said fastening means having a tapered button in registration with one of said perforations received through the larger portion thereof when finger pressed towards said face, said button being tapered on its side wall to engage the walls of the narrower portion of the perforation exerting in connection therewith a downward weight bearing tightening movement, said button being automatically released and withdrawn when the shelf flange is pushed upwardly, and a finishing strip means releasably secured to said front face for holding said spring and button against outward movement from said perforations and closing said flange opening.

3. In a knockdown steel shelving unit, the combination of a plurality of elongated upright corner posts having two side walls, a rear wall which has a longitudinal medial slot and a front wall provided with a vertical row of equally spaced key hole perforations therethrough with the narrow portions of the key holes disposed downwardly, a generally rectangular horizontally disposed shelf having depending rectangular box flanges extending along the longitudinal edges thereof, said shelf and depending flanges being cut away at the corner regions to receive a corner post in each cut away corner with the flanges terminally opening in front of said front faces of said posts, a fastening means including a spring element mounted at one end within each box flange and normally extended beyond said opening and resiliently urged in opposite directions out of contact with said front faces on opposite edges of said shelf, each of said fastening means having a tapered button disposed in registration with one of said perforatons of each post at the same level and receivable through the larger portion thereof when finger pressed towards said front face, said button being tapered on its side wall to engage the walls of the narrower portion of the perforation and exerting in connection therewith a downward weight bearing tightening movement with the buttons automatically released and withdrawn when the shelf flanges are pushed upwardly.

4. In a knockdown steel shelving unit, the combination of a plurality of elongated upright corner posts having two side walls, a rear wall which has a longitudinal medial slots and a front wall provided with a vertical row of equally spaced key hole perforations therethrough with the narrow portions of the key holes disposed downwardly, a generally rectangular horizontally disposed shelf having depending rectangular box flanges extending along the longitudinal edges thereof, said shelf and depending flanges being cut away at the corner regions to receive a corner post in each cut away corner with the flanges terminally opening in front of said front walls of said posts, fastening means including a spring blade portion mounted at one end within each box flange having the same width as the inside width of the flange at the flange opening, and normally extended beyond said opening and resiliently urged in opposite directions away from contact with said front faces at the front and rear of said shelf,

each of said fastening means having a wide exposed end portion spanning two adjacent perforations, tapered buttons secured to said end portion and disposed in registration with said spanned perforations on each post at the same level and receivable through the larger portions thereof when finger pressed towards said front faces, each button being tapered on its side wall to engage the walls of the narrower portion of the perforation and exerting in connection therewith a downward weight bearing tightening movement, said buttons being automatically released and withdrawn from said perforations when the shelf flanges are pushed upwardly and finishing strip means releasably covering said exposed end and said buttons to prevent withdrawal of the buttons from the key hole perforations.

5. In a knockdown steel shelving unit, the combination of a front and back elongated upright corner posts, each having two side walls, a rear wall which has a longitudinal medial slot and a front wall provided with a vertical row of equally spaced key hole perforations therethrough with the narrow portions of the key holes disposed downwardly, an end panel marginally grooved received in said medial slots and holding the corner posts in predetermined spaced parallel relationship, a generally rectangular horizontally disposed shelf having depending rectangular box flanges extending along the longitudinal edges thereof, said shelf and depending flanges being cut away at two end corner regions to receive a corner post in each cut away corner with the flanges terminally opening in front of said front walls of said oppositely facing posts as supported by said end panel, fastening means including a spring blade portion mounted at one end within each box flange having the same width as the inside width of the flange at the flange opening said fastening means normally extended beyond said opening and resiliently urged in opposite directions away from contact with said front faces at the front and rear of said shelf, each of said fastening means having a wide exposed end portion spanning two adjacent perforations, tapered elements secured to said end portion and disposed in registration with said spanned perforations on each post at the same level and receivable through the larger portions thereof when finger pressed towards said front faces, each element being tapered on its side wall to engage the walls of the narrower portion of the perforation and exerting in connection therewith a downward weight bearing tightening movement, said elements being automatically released and withdrawn from said perforations when the shelf flanges are pushed upwardly, and finishing strip means releasably covering said exposed end and said elements to prevent withdrawal of the elements from the perforations.

6. In a knockdown steel shelving unit, the combination of a plurality of elongated upright corner posts each having two side walls, a rear wall and a front wall provided with a vertical row of equally spaced key hole perforations therethrough and a plurality of key hole slots located between selected pairs of key hole perforations, the narrow portions of the keyholes disposed downwardly, a generally rectangular horizontally disposed shelf having depending rectangular box flanges extending along the longitudinal edges thereof, said shelf and depending flanges being cut away at the corner regions to receive a corner post in each cut away corner with the flanges terminally opening in front of said front faces of said posts, a fastening means including a spring element mounted at one end within each box flange and normally extended beyond said opening and resiliently urged in opposite directions out of contact with said front faces on opposite edges of said shelf, each of said fastening means having a tapered button disposed in registration with one of said perforations of each post at the same level and receivable through the larger portion thereof when finger pressed towards said front face, said button being tapered on its side wall to engage the walls of the narrower portion of the perforation and exerting in connection therewith a

downward weight bearing tightening movement with the buttons automatically released and withdrawn when the shelf flanges are pushed upwardly, and finishing strip means having headed studs on the back side, releasably engaging in said key hole slots covering said spring element extending beyond said opening to prevent withdrawal of the buttons from the key hole perforations.

7. In a knockdown steel shelving unit, the combination of a plurality of elongated upright corner posts having two side walls, a rear wall which has a longitudinal medial slot and a front wall provided with a vertical double row of equally spaced perforations therethrough, an end panel marginally grooved and received in said medial slots and holding front and back corner posts in predetermined spaced parallel relationship, two generally rectangular horizonally disposed shelves having depending rectangular box flanges extending along the longitudinal edges thereof, each shelf and depending flanges thereof being cut away at the corner regions to receive a corner post in each cut away corner with the flanges terminally opening in front of said front walls of said posts, fastening means at each shelf corner including a spring T-shaped blade with the leg portion thereof mounted at one end within the adjacent box flange and having the same width as the inside width of the flange at the flange opening, said arm portion of the blade being disposed beyond said

opening to span two adjacent perforations and resiliently urged away from contact with said front faces, tapered elements secured to said arm portions and disposed in registration with said spanned perforations on each post at the same level and receivable through the larger portions thereof when finger pressed towards said front faces, each element being tapered to engage the wall of the perforation and exerting in connection therewith a downward weight bearing tightening movement, said elements being automatically released and withdrawn from said perforations when the shelf flanges are pushed upwardly, and finishing strip means releasably covering said arm portions and said elements to prevent withdrawal of the elements from the perforations.

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