July 21, 1959 H. D. THOMPSON 2,895,620

SHELVING UNIT

Filed Feb. 3, 1955 3 Sheets-Sheet 1

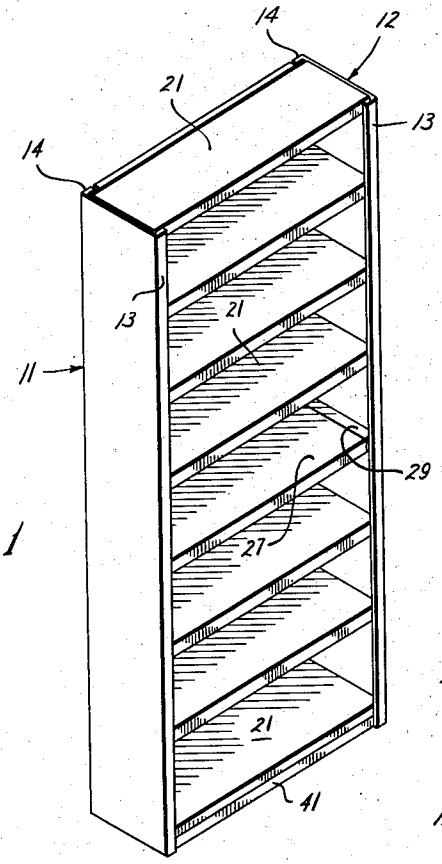

Fig. 1

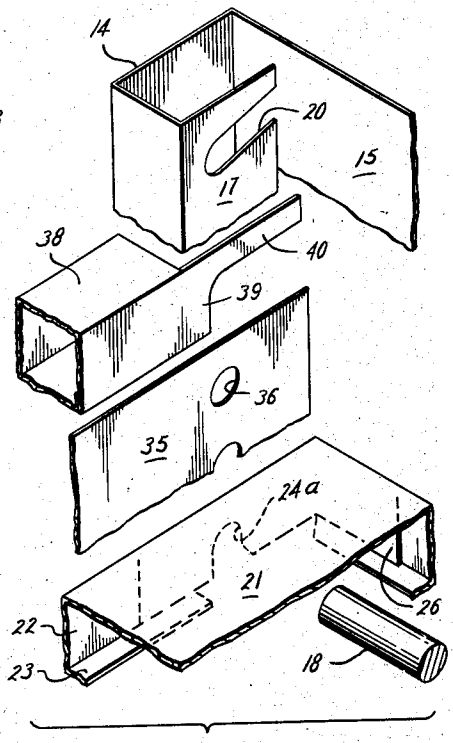

Fig. 4

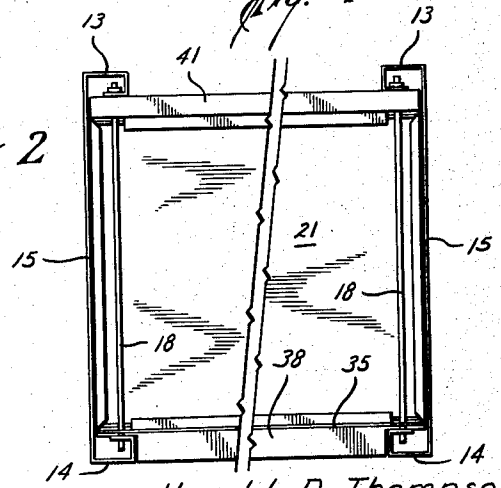

Fig. 2

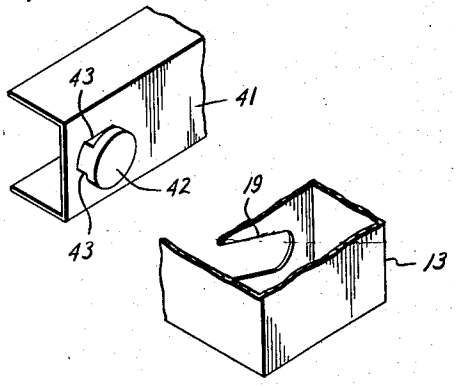

Fig. 5

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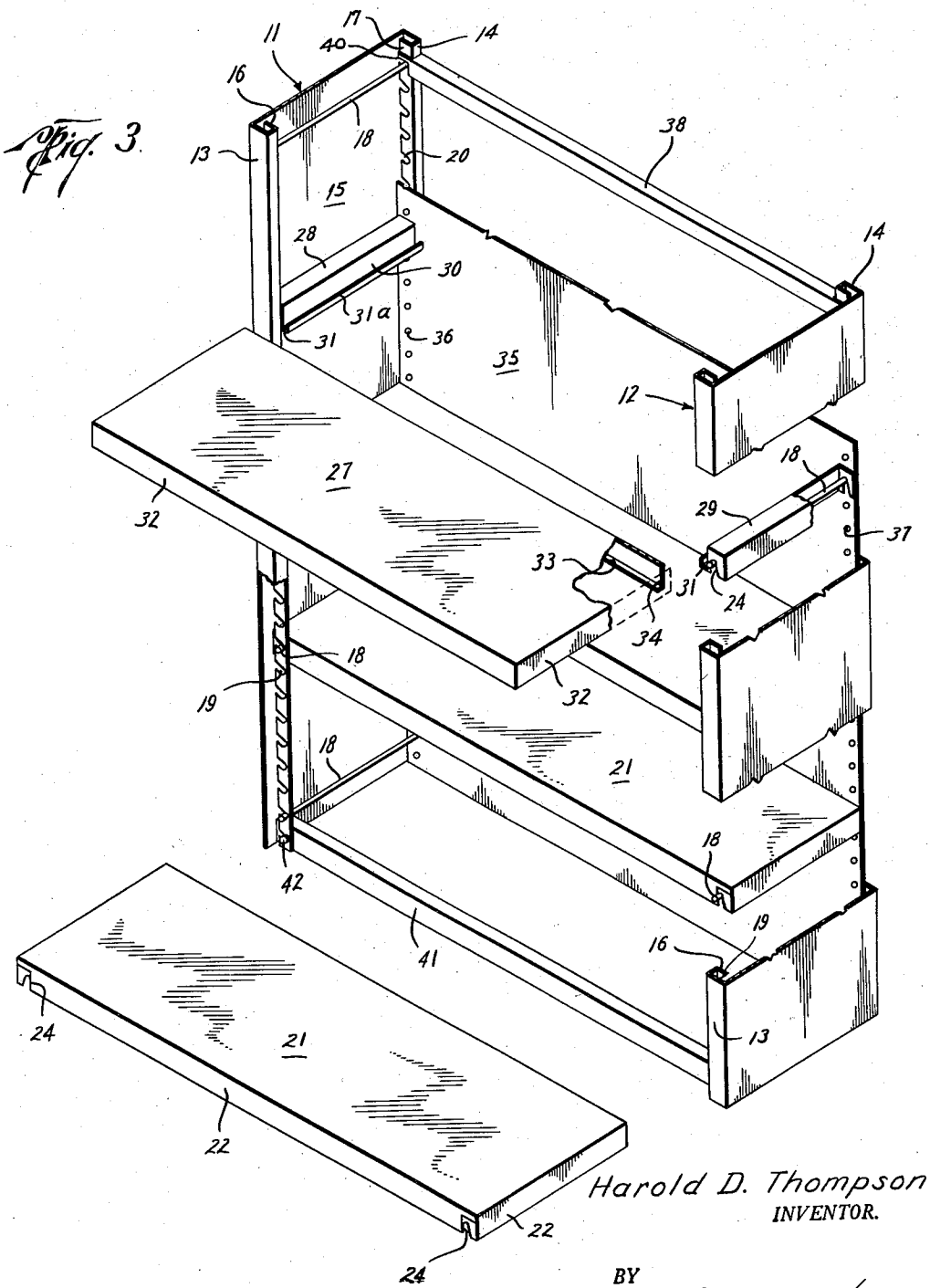
July 21, 1959 H. D. THOMPSON 2,895,620

SHELVING UNIT

Filed Feb. 3, 1955 3 Sheets-Sheet 2

Fig. 3.



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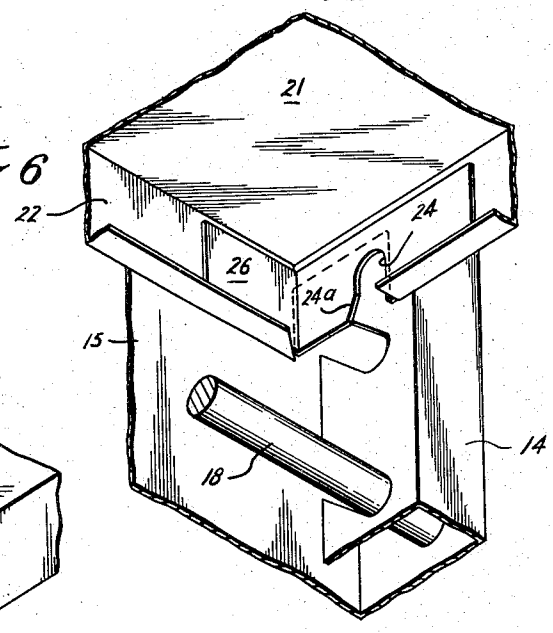
Filed Feb. 3, 1955 3 Sheets-Sheet 3

Fig. 6



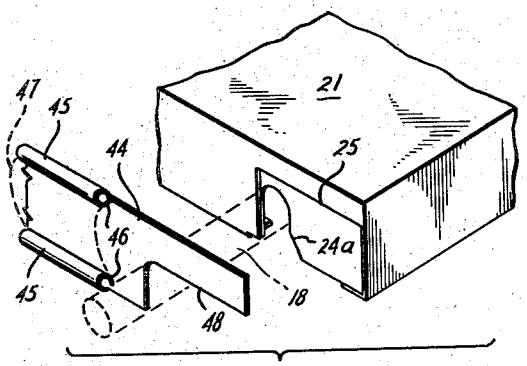


Fig. 7

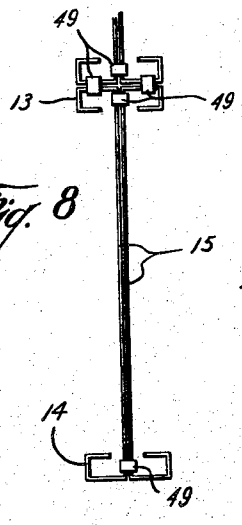


Fig. 8

Fig. 9

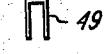
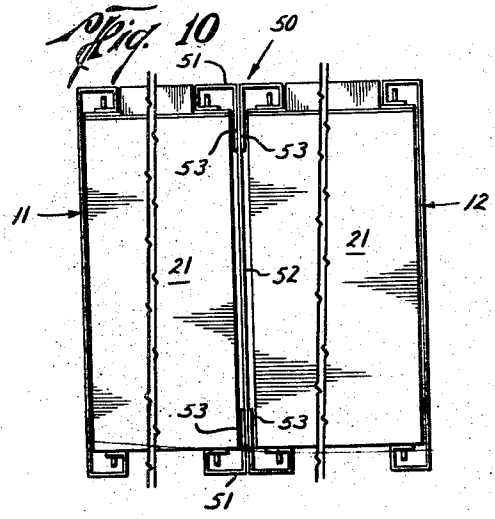


Fig. 10



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United States Patent Office

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SHELVING UNIT

Harold D. Thompson, Houston, Tex.

Application February 3, 1955, Serial No. 485,884

6 Claims. (Cl. 211—148)

This invention relates to metal shelving and, more particularly, to a metal shelving unit in which the means for securing the shelves to the uprights is concealed. In one important aspect, it relates to a shelving unit assembled without the use of bolts, screws or the like.

Metal shelving heretofore available has generally been held together with bolts and nuts. Such construction is rugged and highly serviceable where the aesthetic appeal of the unit is of minor importance. However, it would be highly desirable to have a metal shelving unit in which the means for securing the elements of the shelving unit together are concealed from view.

In adjustable height shelf units, the bolt and nut construction necessitates a large number of exposed, unsightly holes in the uprights and back panel of the unit to permit a shelf to be bolted to the sides and back panel at a selected height. From an aesthetic view, it would be highly desirable to have an adjustable shelf unit which does not employ bolts and nuts to hold the shelving in place and hence permit the elimination of these unsightly holes.

It is an object of this invention to provide a metal shelving unit in which there are no exteriorly visible bolts, screws or the like to mar the aesthetic appeal of the unit.

Another object is to provide a metal shelving unit in which no bolts, screws or the like are employed in assembling the unit.

Another object is to provide a metal shelving unit of the adjustable shelf type in which there are no exteriorly visible bolt holes, bolts, screws or the like.

Another object is to provide a metal shelving unit in which no tools are required to assemble or dismantle the unit.

Another object is to provide a shelving unit which may be assembled with sufficient speed and ease to make it economical to deliver the unit knocked down and erect it in the purchaser's building.

Another object is to provide a boltless shelving unit in which the several elements of the shelving are interdependent upon each other for support and which when assembled form a rigid unit.

Another object is to provide a metal shelving unit which does not employ bolts, screws or the like in assembling the unit in which one or more sliding shelves are provided which may be removed from the unit without unloading the sliding shelf.

Other objects, features and advantages of the invention will be apparent to one skilled in the art from the drawings, the specification and the appended claims.

In the drawings wherein like reference numerals indicate like parts and wherein there is shown by way of illustration a preferred embodiment of this invention:

Fig. 1 is an isometric view of a shelving unit constructed in accordance with this invention;

Fig. 2 is a bottom plan view of the shelving unit of Fig. 1 on an enlarged scale;

Fig. 3 is an isometric view of the lower portion of the shelving unit of Fig. 1 on an enlarged scale with parts broken away and shelves removed to illustrate details of construction of the shelving unit;

Fig. 4 is an exploded isometric fragmentary view on a greatly enlarged scale of the right-hand rear corner of the shelving unit of Fig. 1 at the top of the unit;

Fig. 5 is an exploded isometric fragmentary view on a greatly enlarged scale of the front left-hand corner post of the shelving unit of Fig. 1 and a portion of the dust molding underlying the lowermost shelf in the unit;

Fig. 6 is an exploded isometric view on a greatly enlarged scale of a portion of the left, rear corner post of the shelving unit of Fig. 1 showing a fragment of a hanger rod and of one of the shelves;

Fig. 7 is an exploded isometric fragmentary view illustrating the relationship of a shelf, hanger rod and a label support which extends along the front border of the shelf and has a portion resting upon a rod and held between the front corner post and the shelf;

Fig. 8 is a plan view illustrating a means of clipping adjacent shelving units together;

Fig. 9 is a side view of the clip used in tying two shelving units together as illustrated in Fig. 8; and

Fig. 10 is a plan view of a two section unit in which adjacent sides are replaced by a single intermediate upright.

The shelving unit illustrated includes two sides and a plurality of shelves extending therebetween with the shelves fastened to the sides to form an integral structure by a novel form of latch which does not employ bolts, screws or the like and in which the entire latch is concealed from the exterior of the shelving units. Each side is provided with spaced hollow posts, one at the front and one at the rear of the side. The confronting walls of the posts of each side are provided with registering openings. A hanger rod is supported in these registering openings and the shelf is provided with downwardly extending openings or slots which are received over the hanger rods. When the rods are received in the slots in the shelf, the end faces of the shelf will be held in firm abutment with the webs of material between the two posts of each side and a rigid interconnection between the sides and shelf will result. Where a back is employed, the sheet which forms such back will be provided with openings which register with openings in the back post on each side and the hanger rods will extend through these holes in the back plate. The shelves will act as spreaders and hold the back plate against the two back posts.

Referring now in more detail to the drawings, the sides of the shelving unit are provided with spaced front and rear posts which have concealed means for supporting shelving. The sides are indicated generally at **11** and **12** and are identical in construction and may be interchangeable, i.e., either the left or right side of the unit. Each side is provided with a front, hollow post **13** and a rear, hollow post **14**. The two posts are held in spaced relationship by an intermediate web of material **15**. Preferably, each side is formed from a single piece of sheet metal bent on opposite sides to form box-like posts **13** and **14**. The terminal portions **16** and **17** of the bent sheet which forms posts **13** and **14**, respectively, form confronting walls and terminate short of the web of material **15** to provide a space between the portions **16** and **17**, and the web **15** into which a hanger bar **18** may be inserted. Each confronting face **16** and **17** is provided with a plurality of spaced registering openings into which hanger bar **18** may be inserted and suspended from the two posts. Preferably, the openings are provided by slots **19** in post **13** and slots **20** in post **14**, said slots opening into the spaces between portions **16** and **17** and the web of material **15**. The slots preferably extend from said spaces at a slight negative angle so that the bars **18** will be

maintained in the slots 19 and 20 under the influence of gravity. In addition to acting as a spacer for posts 13 and 14, the web of material 15 also serves as an abutment for the end faces of the shelves when the shelving unit is assembled and this abutting relationship assists in perfecting a rigid structure. However, it should be pointed out that as small a number as two of the shelves positioned at spaced points in the unit and in engagement with web 15 will serve to obtain a rigid structure and the other shelves do not necessarily have to abut web 15. With this in view, it will be appreciated that web 15 need not be a solid member from top to bottom of the unit but might be supplied by bracing which would engage the end faces of two or more of the shelves.

The sides 11 and 12 are secured together at the top and bottom of the unit and at as many intermediate positions as desired by a one-piece shelf 21 which is dimensioned to extend between and abut web 15 of each side and to rest upon a pair of hanger rods 18 which are positioned at the same selected height in both sides. Shelf 21 has its peripheral edge portion turned down at 22 and inwardly at 23 to form with the main body of the shelf a channel extending about the periphery of the shelf. The web portion 22 of this peripheral channel is provided with downwardly opening slots 24 in both the front and rear channel adjacent each end of the shelf. These slots receive rods 18 when the shelf is assembled with the two sides. The outboard wall 24*a* of each slot adjacent its closed end is perpendicular to the end face of the shelf to provide a positive lock for holding the shelf and sides assembled. The lower section of wall 24*a* diverges downwardly so as to provide a cam surface for drawing the sides in snug against the shelf. When assembling the unit these cam surfaces engage rods 18 and as the shelves are forced downwardly over the rods the sides will be brought into firm abutment with the end faces of shelf 21 provided by the down-turned channel 22. Further downward movement of the shelf will seat rods 18 in the top of the slot where the straight section of wall 24*a* will lock the shelf in place.

To simplify fabrication, a notch 25 may be cut in the turndown portions 22 and 23 of the shelf at each corner. A right angle corner member 26 having notch 25 formed therein may be secured in the corner as by spot welding or the like. By fastening the channels together at the corners there will be provided a continuous channel around the entire periphery of the shelf 21 imparting considerable strength to the shelf. The distance from slot 24 to the end of shelf 21 should be the same in the case of all of the shelves so that the shelves will all fit down snugly and be firmly in abutment with the sides of the shelving unit. Thus, the positioning of slot 24 is rather critical. It will be appreciated that this critical dimension can be more readily controlled by utilizing a separate angle member 26 into which the slot is cut. In many instances, the shelving proper will be fabricated from light gauge metal as for instance 20-gauge sheet metal. By employing separate heavier gauge angle members 26 in which slot 24 is cut, the slot may be formed in a heavier gauge metal to provide additional strength at this point of stress.

From the preceding explanation it is believed apparent at this point in the description that when a shelf is positioned between the sides 11 and 12 and moved downwardly into firm engagement with hanger rods 18 the end faces of the shelf formed by channel web 22 are parallel to and will be wedged into tight engagement with the sides of the shelving unit to form a rigid joint. Positioning one of the shelves 21 at the bottom of the unit and one at the top of the unit will form a substantially rigid structure. This type of shelf may also be employed at spaced intermediate points in the shelving unit and each shelf will impart additional rigidity to the structure.

Slots 19 and 20 may be spaced at closely adjacent points along posts 13 and 14 and permit the rods 18 and shelves 21 to be selectively positioned at any desired height along the sides. It will also be appreciated that the relative positioning of the several shelves may be varied at any time during the life of the unit to select a different arrangement of spacing.

It will also be appreciated that the externally exposed portions of posts 13 and 14 are imperforate and that the means of securing the shelves and sides together is entirely concealed. The down-turned portion 22 of the shelves will conceal rods 18 and a very close inspection will be necessary to notice the cooperating rod 18 and slots 24. The rod 18 is preferably of sufficient length that it will abut the outside wall of one post before it is free from the slot in the other post so that the rod cannot slip out of position once placed in a pair of registering slots 19 and 20. The shelves once positioned will maintain the rods in position and will, in fact, bias them away from the spaces between the portions 16 and 17 and web 15.

It is sometimes desirable to have a shelf which may be quickly and easily removed from a shelving unit without unloading the shelf. For this purpose, one or more three-piece shelves constructed in accordance with this invention may be employed in the shelving unit. Referring particularly to Fig. 3, it will be seen that the three-piece shelf comprising center section 27, and end sections 28 and 29 is practically identical with shelf 21 except that the intermediate and two end pieces are provided with cooperating slide parts which extend parallel to rods 18 and are spaced inwardly toward each other a slight distance beyond the two front posts of the shelving unit to permit the intermediate section of the shelf to be slid into and out of the shelving unit. End portions 28 and 29 are provided with downwardly opening slots 24 which receive rods 18 in the manner explained hereinabove with the end portions 28 and 29 in firm abutment with sides 11 and 12, respectively. End portions 28 and 29 terminate at a point slightly inboard of the front post of the shelving unit in a down-turned flange 30 which in turn has its extremity bent inwardly and upwardly to form a J-slot 31 extending parallel to hanger rod 18 and providing a slideway. The intermediate shelf portion 27 of the sliding shelf is provided about its periphery with a down-turned flange 32 forming a slide part which terminates at the front and rear of the shelf in an inturned portion 33 to form with the supporting surface of shelf 21 a channel extending along the front and rear of shelf portion 27 to impart strength thereto. This channel is notched at the back of the shelf adjacent each end as at 34 to receive the short upstanding leg 31*a* of the J-shaped slide. The down-turned flanges 32 at the ends of the shelf section 27 slide in the trough of the J-slot 31. Preferably, the width of trough in J-slot 31 is just slightly wider than the gauge of the material of which the intermediate portion 27 is formed so that the cracks in the three-piece sliding shelf will be as small as possible.

It is frequently desirable to provide the shelving unit with a back both for appearance and to prevent articles falling out the back of the shelving unit. For this purpose, there is provided a back wall or plate 35 of light gauge sheet metal. The plate is provided along two opposite edges with vertically spaced holes 36 and 37 which are in register with and overlie the holes 20 in each of the back posts of sides 11 and 12. Rods 18 extend through selected ones of holes 36 and 37 and the several shelves act as spacers and hold the back plate 35 against the back posts of the two sides. When the back plate is employed, it will be appreciated that in positioning rod 18 the rod will be inserted endwise through a selected hole 36 or 37 as the case may be and the underlying slot 20. The other end of the rod, that is, the front end of the rod, will be extended into the space between portion 16 of post 13 and web 15 while at a positive angle relative to the back plate 35. The front end of rod 18 may then be moved downwardly and into the slot 19 which is in reg-

ister with the selected slot 20 of the back post 14. The two rows of holes 36 and 37 will overlie posts 14 and will not be visible from the back of the unit. While they are visible from the interior of the shelving unit, they will not be noticeable as they are in a corner where they will be covered by articles on the shelves. Thus the objectionable holes in the back panels of prior art structures have been eliminated.

Back plate or panel 35 is preferably formed from a thin gauge sheet metal and due to the distance between the two back posts of the shelving unit the back may have a tendency to bow out easily. To offset this tendency, a box shaped structural member 38 may be extended between the two back posts of the sides 11 and 12 with back panel 35 between the structural member 38 and a shelf 21. The box shaped structural member 38 has a hook portion 39 which is a continuation of a portion of one wall of the box which extends into the space between a shelf 21 and back post 14 of side 11. This portion 39 acts as a catch and as best shown in Fig. 4 extends the entire width of the wall of the structural member. A finger 40 of lesser width than hook portion 39 extends from the portion 39 and overlies hanger bar 18 as best shown in Fig. 3 to support the reinforcing bar 38 immediately behind a shelf. Preferably, reinforcing bar 38 is employed at the bottom of the shelving unit, at the top of the shelving unit, and behind one or more intermediate shelves 21. Where the back plate 35 is subjected to frequent pressure from the inside of the shelving unit, reinforcing bars 38 may be positioned behind each shelf of the unit.

Preferably, the lowermost shelf of the unit is spaced a short distance from the floor to protect the contents of the shelf during cleaning of the room in which the shelving unit is located. This positioning leaves a space below the shelf and between the front posts of the two sides which should preferably be closed to prevent dust collecting under the unit. For this purpose there is provided a channel 41 having a web of proper width to occupy the space between the floor and the lowermost shelf when the shelf is spaced the desired distance from the floor. Channel 41 is provided at each end with a pin 42 on the open side of the web of the channel which is adapted to be received in the lowermost slot 19 of each front post 13 as best shown in Figs. 3 and 5. Pin 42 is cylindrical with a pair of generally horizontally extending opposed flats 43 formed transversely of the pin and spaced from the free end of the pin 42 to provide opposed slots. The construction and arrangement is such that the pin 42 may be first inserted into the space between the perforated walls 16 of each post 13 and web 15. The pin may then be moved into the lowermost slots 19 in these walls by moving the sides 11 and 12 away from each other. The side walls of slot 19 will, of course, be received about flats 43 and the free end of pins 42 will hold the channel 41 in place. Spacing channel 41 will also provide a means in addition to the shelves for preventing the front post 13 of the two sides 11 and 12 from spreading apart after the shelving unit has been assembled. A channel 41 might also be employed at the back of the shelving unit in the same manner as explained above. If the shelving unit is properly assembled a lock against outward spreading of the side walls in addition to the shelves will not be necessary but the use of channel 41 at the front and at the rear of the shelving unit will dispel any question in a user's mind on this point. In assembling the unit channel 41 should be first extended between sides 11 and 12 as the sides must be free to move relative to each other to position pins 42 in slots 19.

It is frequently desirable to label the various shelves or sections of shelves so as to readily identify the contents of a particular shelf. For this purpose, a label holder 44 is provided. Label holder 44 is formed of a long, thin section of sheet metal and is rolled along both of its lengthwise edges as shown at 45 to impart rigidity to the label holder and to provide walls which form acute angles as at 46 with the main body of the label holder. A label shown in dashed outline at 47 having a width dimension slightly greater than the distance between the apex of the two acute angles 46 may be curved and positioned between the two acute angles 46 as illustrated in Fig. 7. The label holder 44 has a length dimension comparable to that of shelf 21 and is supported by the hanger rods 18 which support the shelf with which the label holder is used. In order that the label holder overlie the front edge of the shelf, the label holder is notched at each end to provide a finger 48 which engages the hanger rod 18.

Shelving units such as shown in Fig. 1 are frequently employed in side by side banks and may also be arranged back to back depending upon the arrangement of the shelving desired by the user. In order to add additional stability to the several shelving units when they are employed in multiples, a U-shaped clip 49 (Fig. 9) may be employed to tie adjacent sections together by arranging the sections with their posts in abutment and positioning a leg of the U-shaped clamp 49 in each of two adjacent posts as shown in Fig. 8. This procedure may be followed with units which are arranged side by side or back to back.

It is not infrequent that a user will know in advance that he will employ the shelving unit in side by side multiple banks. In this case, it may be desirable to have the several side by side units erected as an integral structure and for this purpose one or more uprights indicated generally at 50 in Fig. 10 may be employed with the sides 11 and 12 to advantage. The intermediate upright 50 comprises two pairs of vertically extending posts, each indicated by the numeral 51, and a means such as a sheet metal plate 52 spacing the two pairs of posts apart. The means 52 extends in a plane which lies between the two posts of each pair. In other words, the two posts on each side of the interconnecting means 52 will correspond to posts 13 and 14 of one of the sides. The confronting walls of these two posts will be provided with slots 19 and 20 and constructed in a manner identical with the posts of the sides. For ease in fabrication each post of the intermediate upright is constructed with a side 53 which corresponds to the portion of web 15 of sides 11 and 12 immediately adjacent the posts. Opposite edge portions of sheet metal plate 52 are interposed between sides 53 of the two pairs of posts 51 and the legs and plate secured together in any desired manner as by spot welding. It will be appreciated that shelves 21 will be received over rods 18 carried in the posts of the intermediate upright and will abut sides 53 to form a locking assembly identical with that employed with sides 11 and 12. While only one of these intermediate uprights 50 is illustrated in Fig. 10, it will be appreciated that as many as desired might be used to form a long bank of shelving units. By combining two adjacent sides into one intermediate upright, a more stable structure is obtained. One intermediate upright may be fabricated at less cost than two sides as one sheet 52 replaces two webs 15 and multiple units may be fabricated at less cost than single units of the same capacity.

From the above it will be seen that all of the objects of this invention have been attained. There has been provided a shelving unit in which the means for assembling the unit are entirely concealed from view and in which not one bolt or screw or the like is employed in the entire unit. The exposed edges of the various elements of the unit are rolled so that the sharp edges of the sheet metal used in forming the unit will be turned under and there are no exposed sharp edges upon which a user might injure himself. There has also been provided with such a unit a sliding shelf which may be removed without unloading the shelf. The shelves are adjustable and may be arranged at different heights at any time.

It will be appreciated that in shelving units constructed

in accordance with this invention the load carried by the shelves is transmitted directly to the corner posts of the shelving unit. This eliminates the necessity of forming the web **15** between the posts, and the back **35** of sufficiently heavy gauge material to permit the shelves to be fastened thereto as has been the practice in the past with the bolt type of construction.

From the foregoing it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth, together with other advantages which are obvious and which are inherent to the apparatus.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the claims.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

The invention having been described, what is claimed is:

1. A metal shelving unit comprising, vertically extending sides each formed from a continuous piece of sheet metal bent on opposite sides to box form to provide hollow posts with the terminal portions of said opposite sides forming confronting walls, at least one of said terminal portions terminating short of the portion of the sheet which joins the two posts together to provide a space therebetween, a plurality of registering slots in said confronting walls with the slots in said one terminal portion opening into said space, removable hanger rods extending between and supported by selected pairs of said registering slots at the same height in both sides, said rods insertable and removable through said space, and a shelf dimensioned to extend between said sides having end faces which are rigidly carried by the shelf and extend parallel to and abut the portions of the sides interconnecting the posts, said shelf having flanges with downwardly opening slots receiving said rods and locking the two sides and shelf together with the end faces in firm abutment with the sides.

2. A metal shelving unit comprising, vertically extending sides each formed from a continuous piece of sheet metal bent on opposite sides to box form to provide hollow posts with the terminal portions of said opposite sides forming confronting walls and terminating short of the portion of the sheet which joins the two posts together to provide a space therebetween, a plurality of registering slots in said confronting walls opening into said space, removable hanger rods extending between and supported by selected pairs of said registering slots at the same height in both sides, said rods insertable and removable through said spaces, and a sheet metal shelf dimensioned to extend between and abut the portions of the sides interconnecting the posts, the peripheral edges of said shelf turned down and under to form with the main body of the shelf a channel extending about the periphery of the shelf with its web forming rigidly carried end faces in abutment with the sides, said shelf having downwardly opening slots in the web portion of said channels for receiving said rods and locking the two sides and shelf together with the end faces in firm abutment with the sides.

3. A metal shelving unit comprising a pair of vertical sides each in the form of a channel member having a flange on each leg of the channel extending toward the opposite leg and each flange having its free edge turned and forming a portion extending toward the web of the channel, said last-mentioned portions each having spaced registering openings therein, hanger bars removably positioned in registering pairs of registering openings at the same height in both sides, and a shelf interposed between and abutting said sides and having downwardly extending flange parts with inclined surfaces wedgingly engaging said bars respectively between the bars and the web of the channel to lock the sides and the shelf together.

4. A metal shelving unit comprising a pair of vertical sides each having a pair of posts and means fixedly spacing said posts from each other, registering openings spaced along the confronting walls of the posts of each side, hanger bars removably positioned in registering pairs of registering openings at the same height in both sides, and a shelf interposed between and abutting said sides and having adjacent each post downwardly extending flange parts inclined downwardly and toward said means spacing the posts wedgingly engaging said bars respectively between the bars and the means spacing the posts to lock the sides and the shelf together.

5. A metal shelving unit comprising a pair of vertical sides each having a pair of posts and means fixedly spacing said posts from each other, registering openings spaced along the confronting walls of the posts of each side, hanger bars removably positioned in registering pairs of registering openings at the same height in both sides, and a shelf interposed between and abutting said sides and having adjacent each post downwardly extending flanges with downwardly opening slots therein engaging over said bars, the edge of each slot which is closest the means spacing the posts from each other, being inclined downwardly and toward said means to wedgingly engage between the bars and said means and lock the sides and the shelf together.

6. A metal shelving unit comprising vertically extending sides each including a pair of vertically extending posts and means holding said posts in spaced relationship, registering openings spaced along the confronting walls of the posts of each side, hanger rods removably extending between and supported by selected pairs of said registering openings at the same height in both sides, means interengaging between and fixing said sides relative to each other adjacent the top and bottom of the unit to form a rigid structure, a three-piece shelf carried by hanger rods extending between and supported by selected pairs of said registering openings at an intermediate level in said unit and comprising end portions adapted to abut said means and having downwardly opening slots receiving said rods and wedging between said rods and said sides, said end portions having confronting slide parts extending parallel to the rods and spaced inwardly of said posts, and an intermediate shelf portion extending between and supported by the end portions, said intermediate portion having slide parts mating with those of the end portions whereby the intermediate portion of the shelf may be slid into and out of the shelving unit.

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