Dec. 26, 1961 C. E. GINGHER ETAL 3,014,596

ADJUSTABLE SUPPORTING SURFACES

Filed July 29, 1958 4 Sheets-Sheet 1

Fig. 1

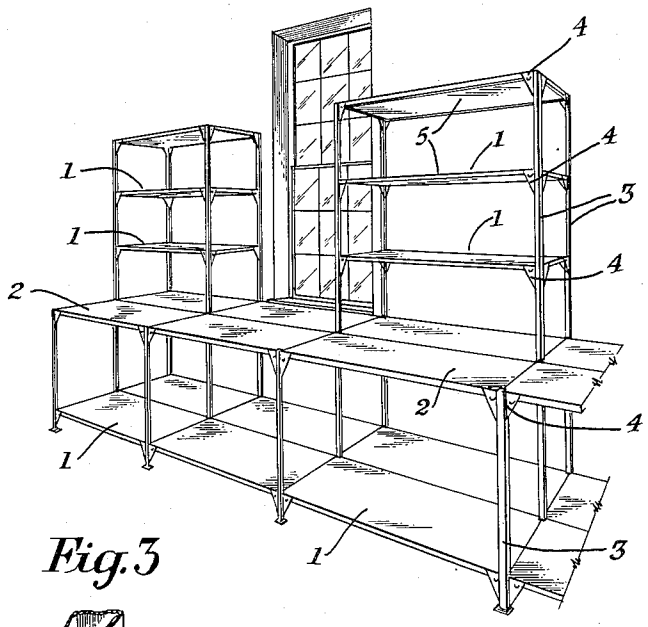


Fig. 2 Fig. 3

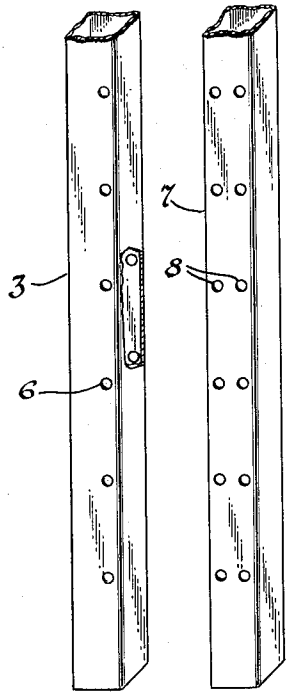


Fig. 4

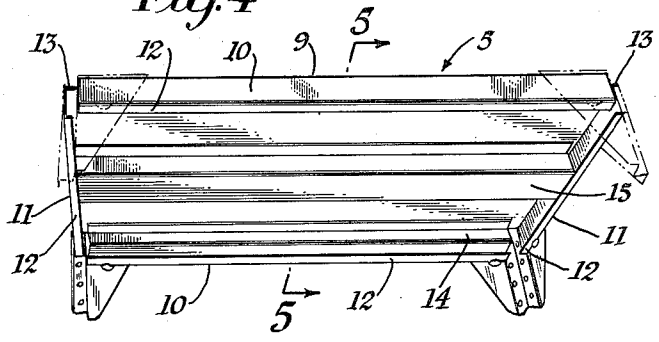
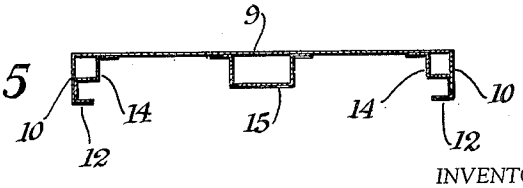


Fig. 5



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Dec. 26, 1961 C. E. GINGHER ETAL 3,014,596

ADJUSTABLE SUPPORTING SURFACES

Filed July 29, 1958 4 Sheets-Sheet 2

Fig. 6

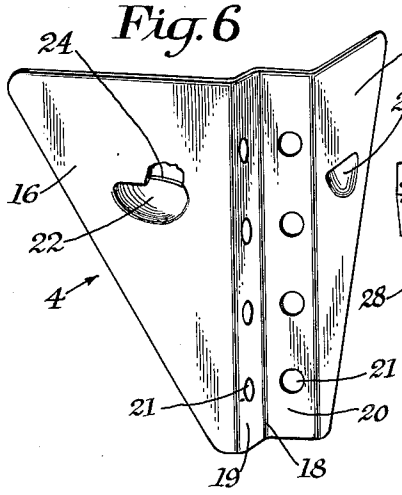


Fig. 7

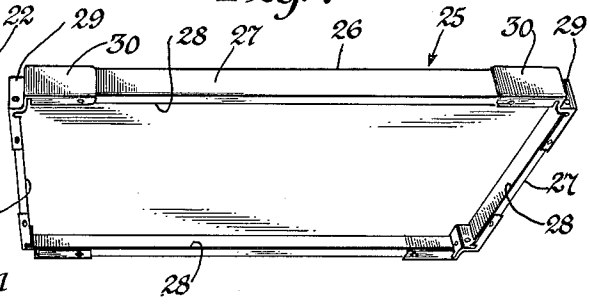


Fig. 8

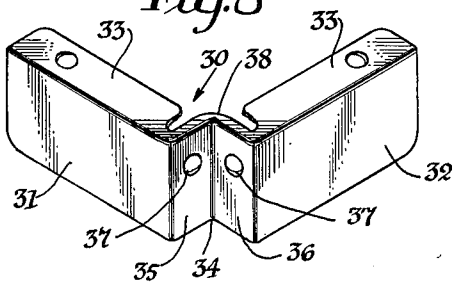


Fig. 9

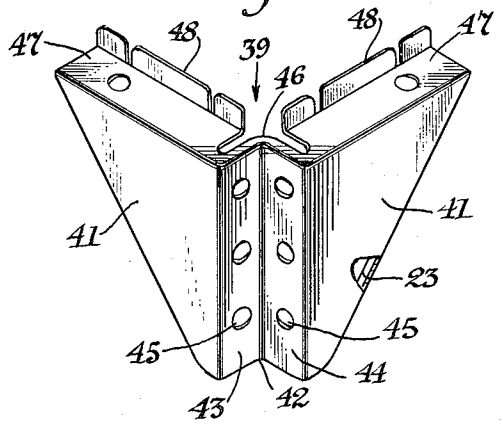
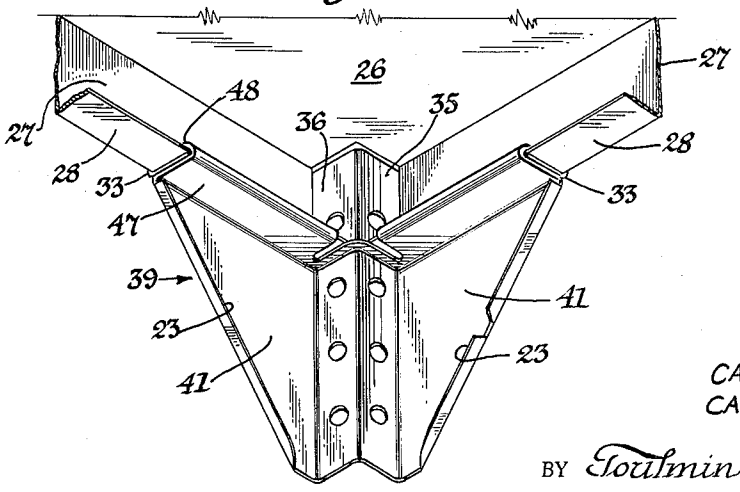


Fig. 10



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Dec. 26, 1961 C. E. GINGHER ETAL 3,014,596

ADJUSTABLE SUPPORTING SURFACES

Filed July 29, 1958 4 Sheets-Sheet 3

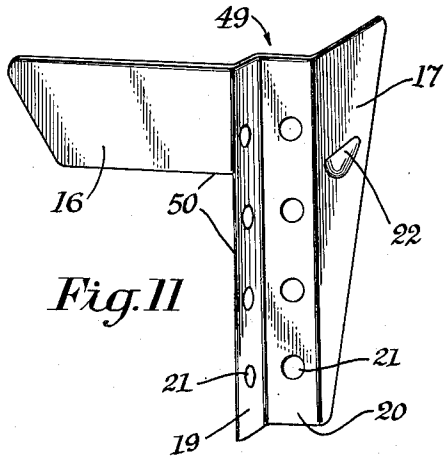


Fig. 11

Fig. 12

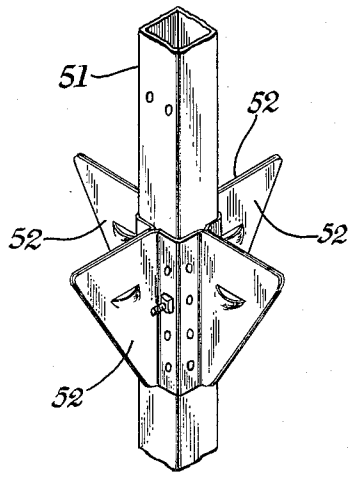


Fig. 14

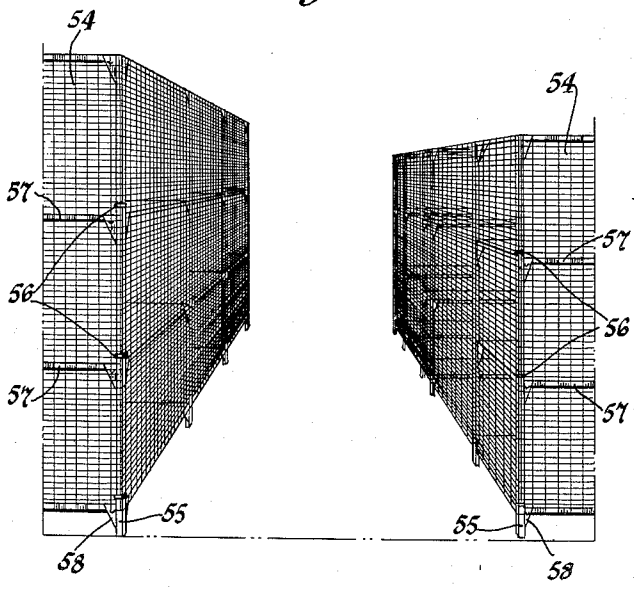
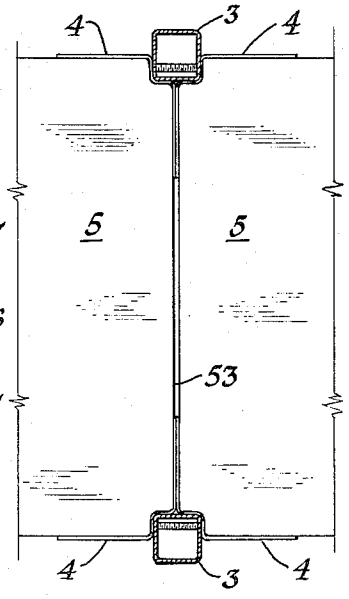


Fig. 13



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Dec. 26, 1961 C. E. GINGHER ETAL 3,014,596

ADJUSTABLE SUPPORTING SURFACES

Filed July 29, 1958 4 Sheets-Sheet 4

Fig. 15

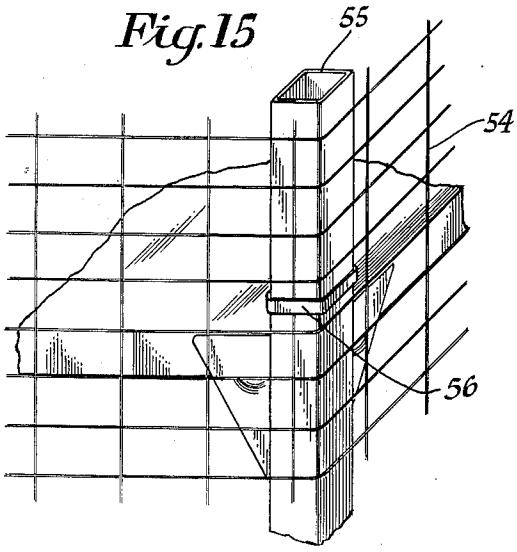


Fig. 16

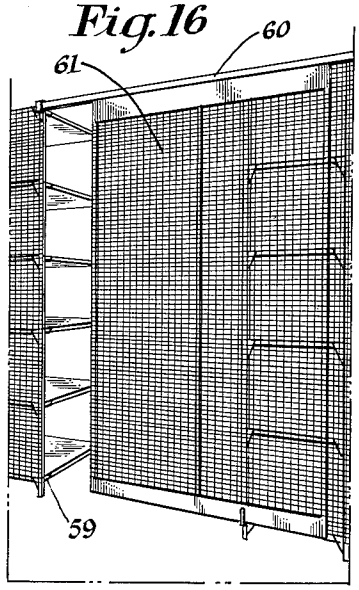


Fig. 17

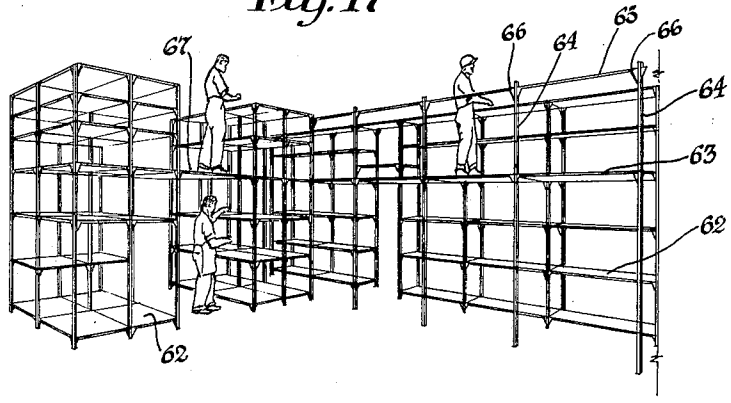
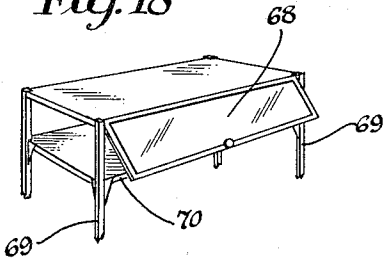


Fig. 18



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3,014,596

ADJUSTABLE SUPPORTING SURFACES

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6 Claims. (Cl. 211—148)

The present invention relates to all-purpose adjustable metallic supporting surfaces, more particularly, to uprights, shelf and bracket structures which may be readily assembled into various arrangements to provide adjustable shelving, table surfaces, and work tops for numerous operations as may be desired.

Although, previously, various shelving arrangements were provided, invariably all of these arrangements were characterized by requiring cross-braces in order to impart a rigidity to the structure. If cross-braces were not employed, the shelf and bracket structures were invariably of complex and cumbersome design in order to adequately support heavy loads thereon. Further, these shelving arrangements were specifically designed as shelves to be used as shelving, namely, for the storage of goods. They were so constructed that when once erected, they could not be readily changed into different shapes as their requirements might desire. Hence, these previous arrangements were not adaptable or versatile for uses other than as shelving. Most of the prior art shelving arrangements were intended as permanent installations. In addition, the complexity of some of the bracket and shelf arrangements was such that it was difficult and time-consuming to erect these structures. Furthermore, the erection of these shelving arrangements required the use of skilled workmen with special tools.

A problem also arose where it was desired to support a number of shelves from a single common upright. This supporting arrangement in most instances involved complicated brackets, shelf and upright arrangements. These brackets could not be secured to any corner of an upright but usually were designed for mounting on a specific surface of the upright. Thus, there was lacking a simple arrangement for attaching four shelf corners to a single vertical upright using detachable brackets of a simple structure.

Those few arrangements which provided for the attachment of shelves to a common upright usually required different brackets for securing the outer edges of the shelves than for securing the inner corners of the shelves to the common upright. The necessity for these specialized brackets increased the cost of the structure and the time consumed in erecting the shelving arrangement.

It is therefore the principal object of this invention to provide strong, versatile, all-purpose supporting surfaces.

It is another object of this invention to provide an improved supporting-surface arrangement whereby the surface can be utilized as shelves, work tables, desks, steps, cat-walks, pallets and the like.

It is a further object of this invention to provide a supporting surface arrangement which eliminates cross-braces but which is strong, rigid, and can be readily assembled and, if desired, disassembled.

It is an additional object of this invention to provide a supporting surface arrangement comprising uprights and shelves detachably secured to uprights by brackets.

Other objects and advantages of this invention will become readily apparent upon reference to the accompanying description and the following drawings wherein:

FIGURE 1 is an over-all perspective view of the supporting surface arrangement of this invention showing the arrangement utilized as shelving and work surfaces;

FIGURE 2 is an over-all perspective view of the vertical upright employed in the supporting-surface arrangement;

FIGURE 3 is an over-all perspective view of a modified form of the vertical upright illustrated in FIGURE 2 wherein a double row of holes are used to permit the assembly of units back-to-back;

FIGURE 4 is a perspective view looking at the under surface of a shelf;

FIGURE 5 is a transverse sectional view taken across the lines 5—5 of FIGURE 4 and showing the reinforcing strips on the undersurface of the shelf;

FIGURE 6 is an over-all perspective view of a corner support bracket;

FIGURE 7 is an over-all perspective view of a flat shelf which is a modification of the shelf shown in FIGURE 4;

FIGURE 8 is an over-all perspective view of a corner bracket utilized on the flat shelf illustrated in FIGURE 7;

FIGURE 9 is an over-all perspective view of a partial corner bracket used to support the flat shelf of FIGURE 7 from a vertical upright;

FIGURE 10 is a perspective view looking at the under surface of a shelf to illustrate the manner in which the shelf is attached to the bracket, which in turn is attached to an upright;

FIGURE 11 is an over-all perspective view of a modified shelf-corner supporting bracket;

FIGURE 12 is an over-all perspective view showing the manner in which four brackets are secured to the corners of a vertical upright in order to permit the securing of four separate shelf corners to a single vertical upright;

FIGURE 13 is a top plan view of the ends of adjacent shelves showing the slot therebetween;

FIGURE 14 is a perspective view showing a supporting surface arrangement wherein the shelf areas are screened to protect the goods upon the shelves;

FIGURE 15 is an over-all perspective view showing the manner in which the screening of FIGURE 14 is secured to the vertical uprights by clips;

FIGURE 16 is a perspective view illustrating a hanger bar for supporting a sliding door from the supporting-surface arrangement;

FIGURE 17 is a perspective view showing the supporting-surface arrangement formed to comprise shelves and a cat-walk with a guard hand-rail; and

FIGURE 18 is a perspective view showing the manner in which a door is pivotally supported between a pair of uprights so as to form, with shelves attached to the uprights, a cabinet or the like.

The invention essentially comprises a supporting-surface arrangement wherein the shelves are secured to square vertical uprights by brackets which are detachably secured to corners of the uprights. The shelves embody various structural features which enable the shelves to support considerable weight even when unevenly distributed upon the shelf surface. Various modifications of the bracket are also disclosed for particular applications. The shelf may be either spot-welded to the bracket or a special shelf may be used with a particular form of bracket.

For a description of a specific embodiment of this invention, reference is made to FIGURE 1 wherein an over-all shelving arrangement has been assembled to form shelves 1 and a work table 2. The arrangement comprises a plurality of vertical uprights of various lengths dependent upon the use of a particular portion of the arrangement. Brackets 4 are detachably secured to the uprights 3, and shelves 5 have the brackets attached to the corners thereof by spot-welding.

Proceeding next to FIGURE 2, there is illustrated an

upright 3 which comprises square tubing formed from cold-rolled steel. There is a single row of holes 6 on opposed sides of the upright. Holes on the opposed sides are in alignment with each other. These holes are regularly spaced and here are shown approximately three inches apart, although any other regular spacing may be employed.

A modified form of the upright is illustrated at 7 in FIGURE 3 in that it comprises a double row of holes illustrated at 8. The upright 7 is used where it is desired to assemble units back-to-back in a manner which will be presently described.

The shelf 5 is illustrated in FIGURE 4 and is formed from 20-gauge sheet steel. The shelf comprises a top 9, longitudinal edges 10, and transverse edges 11. All of the edges are rolled under to form a lip 12. The corners of the shelf are removed as indicated at 13 to form square notches. The shelf may be reinforced on its longitudinal edges by Z-strips 14. These strips are spot-welded to the top and edge surfaces of the shelf and provide additional support for the edges against downwardly applied forces in a vertical direction. Shelves in such arrangement are often subjected to carrying the weight of personnel who utilize the shelves as steps. Also, this reinforcing permits the use of these shelves specifically as steps.

The use of the Z-reinforcing-strip provides 300% more strength on the edges over angle or channel reinforcing members. These Z-strips are usually applied on the front edges but may also be applied along the front and rear longitudinal edges or along all four edges of the shelf.

Intermediate braces 15 are spot-welded to the under surface of a shelf in a longitudinal direction thereof. These braces stop short of the transverse ends of the shelf. The cross-section of the braces is substantially that of a channel with flanges and is illustrated in FIGURE 5. The use of the Z-reinforcing-strips and the intermediate braces reinforces the shelves to permit them to readily support unevenly distributed loads.

The bracket 4 is illustrated in FIGURE 6 and is essentially a shelf-corner support which is formed in one piece from sheet metal. The bracket comprises arms 16 and 17 which extend at right angles to each other. Each arm is essentially in the shape of a right triangle with the longer sides forming the right angle being adjacent each other. A groove 18 which is square in cross-section is formed at the intersection of the bracket arms 16, 17. The groove comprises faces 19 and 20, each of which has a series of spaced holes 21 therein which are approximately one inch apart. The depth of each face of the groove is substantially one-half of the width of the vertical upright, as illustrated in FIGURE 2. This arrangement of the holes on both faces of the groove, together with the particular relationship between the depth of the groove and the width of the square upright, enables a bracket to be secured to one corner of an upright having double rows of holes therein.

Each of the arms has an indentation 22 therein, and each edge of an arm, which is essentially the hypotenuse of the triangle, is rolled under as illustrated at 23. The lip of the indentation shown at 24 supports the bottom of the shelf edge. The arms of the bracket are spot-welded to the edges of the shelf. As a result, the shelf is mechanically supported on the bracket in two ways by the lip of the indentation and by the spot-welds. The use of the mechanical support comprising the lip adds about 7% more support for the shelf since some of the shear stress on the spot-welds is relieved.

The above-described elements constitute the basic components of the shelving arrangement of this invention. Various modifications of each of these elements are possible for specific purposes. Several of these purposes will be described.

Proceeding to FIGURE 7, there is shown at 25 a flat shelf which is a modification of the shelf illustrated in FIGURE 4. The flat shelf is primarily used when it is desired to ship the shelves flat without any projecting

brackets. This would most likely be done when the buyer of the shelving arrangement orders a sufficient quantity of shelves so that shipping in flat bundles would result in a considerable saving in freight charges.

The flat shelf similarly comprises a top 26 and edges 27, each of which has a rolled-under lip 28. Similarly the corners are removed so as to form square notches 29. A corner bracket 30 as shown in FIGURE 8 is spot-welded at each corner of the flat shelf. The bracket 30 comprises a pair of arms 31 and 32 which extend outwardly from each other at a right angle and have a height which is substantially the same as the height of the shelf edge. Each arm has a flange 33 along its top edge. Similarly, there is a groove 34 having a square cross-section formed at the intersection of the arms 31 and 32. This groove has faces 35 and 36, each of which has a hole 37 therein. There is a short flange 38 on the top end of the groove, which flange serves to cover the space between the end of the lip and the bracket. The arms of the bracket are then spot-welded to the edges of the shelves. This corner bracket serves both to reinforce the shelf and as a spacer element, since it can be seen that in a regular bracket as shown in FIGURE 6, the arms are adjacent the edges of the shelf and hence do not permit adjacent shelves to be in contact with each other.

Illustrated in FIGURE 9 is a partial corner bracket 39 which is used to support the flat shelf 25 from a vertical upright. The bracket 39 also comprises triangularly shaped arms 41 which extend outwardly from each other to form a right angle. Also, there is a groove 42 which has a square cross-section and comprises faces 43 and 44, each of which has a series of spaced holes 45 therein. These holes are spaced substantially one inch apart. There is a flange 46 on the top end of the groove. Further, each of the arms has a top flange 47 with an upturned lip 48.

In assembling the partial corner bracket 39 with the flat shelf 25, the under-turned lips on the edges of a corner of the shelf are positioned upon the bracket and the upturned lips 48 on the bracket are bent over the lips of the shelf to secure the partial bracket to the shelf corner. This arrangement is illustrated in FIGURE 10.

A further modification of the shelf-corner supporting bracket is shown in FIGURE 11. This modified bracket 49 is used when it is desired to store square items on the shelves and it is desired that the entire front of each shelf be open. This bracket 49 is similar in all respects to the bracket illustrated in FIGURE 6 except that a portion of one arm is removed as shown at 50. Thus, when the bracket 49 is secured to the edge of the shelf, the removed portion 50 enables the entire front of the shelf to be open.

Proceeding next to FIGURE 12, there is illustrated the arrangement by which four shelves may be secured to a single upright. In this arrangement, an upright 51 has a bracket 52 attached to each corner thereof. The upright is of the two-hole type as illustrated in FIGURE 3. All of the brackets 52 are similar and are initially attached to the shelf edges by spot-welding at the factory. A single bolt is used to secure a pair of brackets to the upright. This bolt passes through a hole in one of the bracket grooves, through the aligned holes in the upright, and through the hole in the groove of another bracket. Although not illustrated in this figure for purposes of clarity, the shelves are initially attached to the brackets, and the result is a very simple and effective arrangement for attaching four shelf corners to a single vertical upright. Also four flat shelves 25 which already have the corner brackets 30 spot-welded thereto can be attached to a single upright. In this case brackets 39 are bolted to corners of the upright and the edges 48 then bent over the flanges 33 of the corner brackets 30 on the shelves 25.

All of the elements of the supporting surface arrangement as described above may be finished in any desired manner, such as by applying a coating of baked enamel which may be of any desired color.

It is pointed out that an assembled supporting surface

arrangement such as illustrated in FIGURE 1 has a built-in fire-resistant feature. When a plurality of shelves are assembled in an arrangement, none of the shelf edges are in contact with each other. As can be seen in FIGURE 13, the edges of the shelves are spaced from each other by the width of two bracket arms. This spacing arrangement will form a slot 53 between adjoining edges of the shelves. In actual tests with a sprinkler system, it was found that when the system began operating, the water poured through the slots to form curtains of water between the adjoining edges of shelves. This curtain of water effectively prevented fires from spreading from one shelf to another and also permitted the access of water to the lower shelves and under portions of the shelving of the supporting surface arrangement. As a result of this fire-resistant feature, it is possible for users of the supporting surface arrangement to obtain reduced fire coverage rates.

In addition to the various supporting surface arrangements as described above, other applications of these arrangements are possible. Several of these additional arrangements will be described in order to further illustrate the adaptability and versatility of this invention.

In FIGURE 14 there is illustrated a supporting surface arrangement which forms a shelf area with the entire shelf area, except for the fronts which are not shown, being covered over with a screening 54 so as to deny unauthorized access to the material upon the shelves. Doors may be provided to deny access to the shelf area. The screening is secured to the uprights 55 by clips 56. The shelves 57 are substantially the same as the shelves 5, and the brackets 58 are similar to the brackets 4 shown in FIGURE 6.

The manner in which the clips 56 secure the screening 54 to the uprights 55 is shown in greater detail in the enlarged view of FIGURE 15.

In FIGURE 16 there is illustrated a shelving arrangement similar to that of FIGURE 14 but showing the fronts of the shelves being open. The brackets 59 at the fronts of the shelves are similar to the brackets 49 shown in FIGURE 11. These brackets facilitate the storage of rectangular boxes on these shelves. Also, there is a hanger bar 60 to permit a door 61 to be installed across the opening in the arrangement. The door 61 is of the sliding type and is suspended from the hanger bar by rollers in the conventional manner.

In FIGURE 17 there is illustrated a shelving arrangement of this invention which provides both supporting shelves and cat-walks for personnel to have ready access to the material upon the shelves. This arrangement clearly demonstrates the strength of the supporting surfaces of this invention. The shelves are illustrated at 62 and various equipment can be stored thereon. Along the edge of the shelving arrangement there is illustrated at 63 a cat-walk. A guard rail for the cat-walk is formed by extending the uprights 64 above the surface of the cat-walk and securing tubular members similar in configuration to the uprights at 65 to form the handrails. An offset hinge 66 is used on each end of the rail member to secure the same between the pair of uprights. If desired, two hinges can be used at the end of a rail member. A covering of plywood, linoleum or the like may be applied on the surface of each cat-walk, so as to afford better footing for the personnel.

In the same FIGURE 17 there is illustrated at 67 a cat-walk constructed between shelving arrangements to provide access to the upper tiers of shelves.

When the supporting surface arrangement of this invention is utilized as a desk or other working surface, closed cabinets may be formed in the arrangement. This is done as shown in FIGURE 18 by pivotally mounting a door 68 between a pair of uprights 69. As described previously, the flanges of the uprights protrude forwardly of the front edge of the shelf 70. The door 68 has a thickness substantially one-half the width of the uprights. Consequently, the front surface of the door is flush with the front surfaces of the uprights 69.

Thus it can be seen that the present invention provides a versatile and adaptable supporting arrangement which can be assembled to fulfill a variety of uses. Further, the arrangement has sufficient strength so that heavy loads may be unevenly distributed upon the shelves, and the front edges of the shelves have sufficient strength so as to be used as steps by personnel in obtaining access to the upper tiers of shelves. The entire assembly of a supporting surface arrangement is secured merely by detachably securing partial brackets, or brackets which have already been spot-welded to the shelf, to the corners of uprights by a nut-and-bolt arrangement. Thus, relatively unskilled personnel with a minimum of tools can quickly assemble a supporting surface arrangement regardless of its shape.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions, and, accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

What is claimed is:

1. In a supporting surface arrangement, a rectangular shelf having four corners with a square notch at each corner thereof and the shelf edges bent downwardly and inwardly to form a turned-in lip, a sheet metal bracket bent to form a right angle with a square groove at the angle thereof having a cross-section similar to that of said shelf notch, means securing said bracket to the outer faces of said downwardly bent edges of said shelf with the top edges of the bracket being substantially even with the top surface of said shelf, a dimple in each face of said bracket and engaging the bottom of the turned-in lips on said shelf to support the same, a square vertical upright positioned in each of said shelf notches and bracket grooves, and detachable means securing said brackets to said uprights.

2. In a supporting surface arrangement, a plurality of spaced vertical uprights of substantially square cross-section and having flat faces, a rectangular shelf between each successive pair of uprights with each of said shelves having four corners with a square notch in each corner thereof, a sheet metal bracket bent to form a right angle with a square groove at the angle thereof having a cross-section similar to that of said shelf notch, means securing said bracket to the edges of said shelf, there being a dimple in each face of said bracket and engaging the bottom of said shelf to support the same, and detachable means securing said brackets to the faces of said uprights.

3. A supporting surface arrangement comprising a shelf having four corners with a square notch at each corner thereof and the shelf edges bent downwardly and inwardly to form a lip, a bracket bent to form a right angle with a square groove at the angle thereof and having a cross-sectional shape corresponding to that of said shelf notch, means securing the bracket to the outer faces of said downwardly bent edges of said shelf, the top edges of the bracket being substantially even with the top surface of said shelf, means on each face of said bracket engaging the bottom of the lip on said shelf to support the same, a square vertical upright positioned in each of said shelf notches and bracket grooves, and detachable means securing said bracket to said uprights.

4. In a supporting surface arrangement as described, a shelf having four corners with a notch at each corner thereof, said shelf having its edges bent downwardly and inwardly to form a lip, a right angle bracket with a groove at the angle thereof having a cross-sectional shape corresponding to that of said shelf notch, means securing said bracket to the outer faces of said downwardly bent edges of said shelf with the top edge of the bracket being substantially even with the top surface of said shelf, means on each face of said bracket engaging the bottom of the lips on said shelf to support the same, a vertical upright positioned in each of said shelf notches and bracket grooves, and detachable means securing said brackets to said uprights.

5. In a supporting surface arrangement as described, a plurality of spaced vertical uprights of substantially square cross-section and having flat faces, said uprights having a series of pairs of holes in opposed faces which are aligned, a rectangular shelf arrangement between each successive pair of uprights with each of said shelves having four corners with a square notch in each corner thereof, a right angle bracket with a square groove at the angle thereof and having a cross-sectional shape corresponding to that of said shelf notch, a series of spaced holes in each face of said bracket right angle groove, means securing said bracket to the edges of said shelf, means on each face of said bracket supporting said shelf, and detachable means engaging through the holes in said uprights and aligned holes in the grooves of said brackets positioned on said opposed faces of the uprights to secure said brackets and shelves to said uprights.

6. A supporting surface arrangement comprising a right angle sheet metal bracket having two faces meeting at a right angle groove at the angle of the sheet metal bracket, the top edges of each face of said sheet metal bracket being inwardly bent to form flanges, an upturned lip on each of the flanges of said sheet metal bracket, a rectangular shelf having four corners with a right angle notch in each corner thereof corresponding to the groove in said sheet metal bracket and having the shelf edges bent downwardly and inwardly to form a turned-in lip, a corner bracket on the outer faces of the downwardly bent edges of the shelf adjacent each corner thereof and formed from sheet metal to have a right angle groove

at the corner thereof to correspond to the groove in said first mentioned bracket, a flange on said corner bracket positioned under the turned-in lip of said shelf, a substantially square vertical upright being positioned in the groove of said sheet metal bracket, detachable means securing said sheet metal bracket to said upright, said bracket flange up-turned lip being bent inwardly over said turned-in lip of the shelf whereby the flanges on the corner bracket rest upon the flanges of said sheet metal bracket so that said bent up-turned lip will secure said shelf in position on said sheet metal bracket.

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