

March 27, 1934.

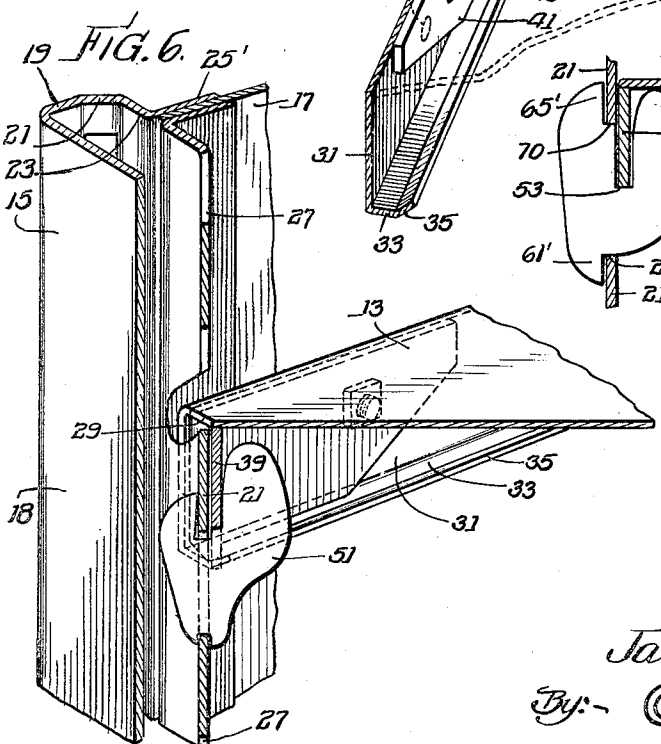
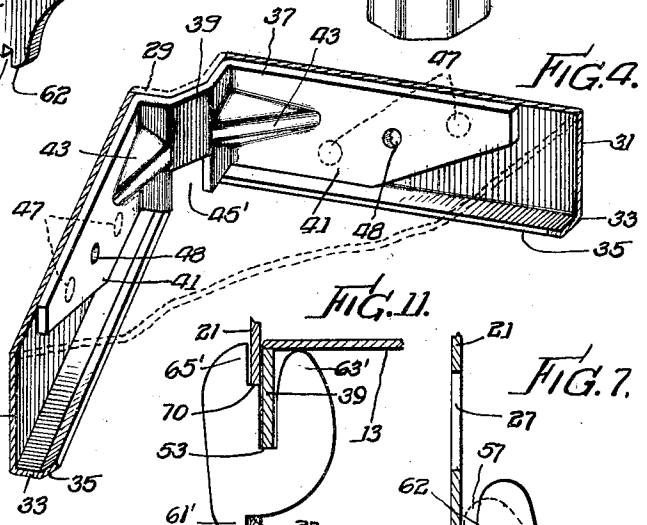
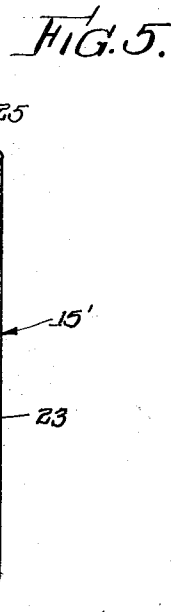
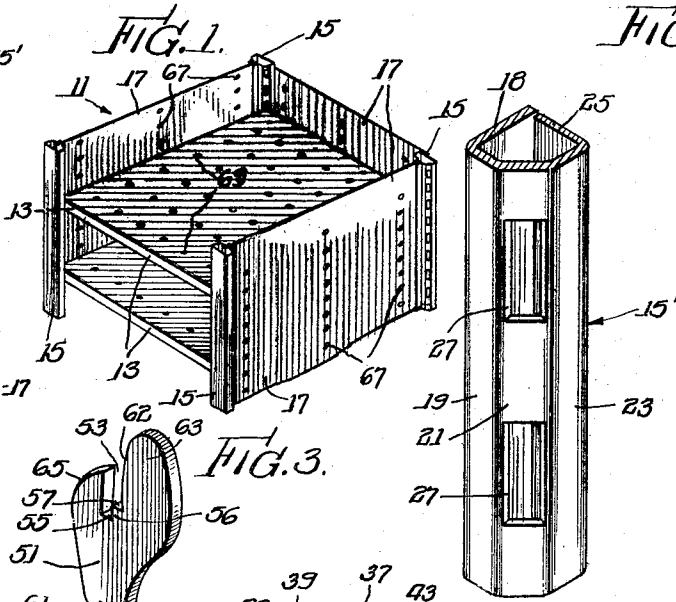
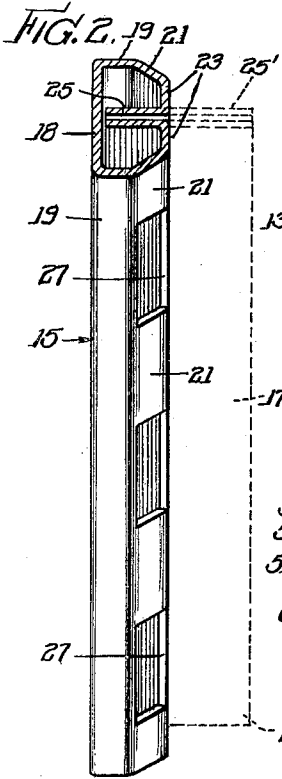
J. E. BALES

1,952,111

SHELVING CONSTRUCTION

Filed July 31, 1931

2 Sheets-Sheet 1



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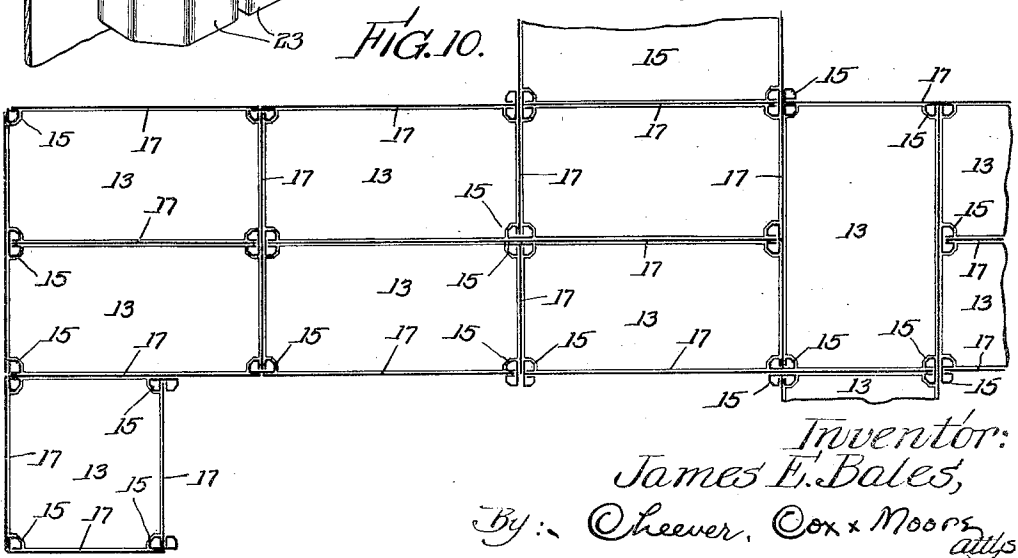
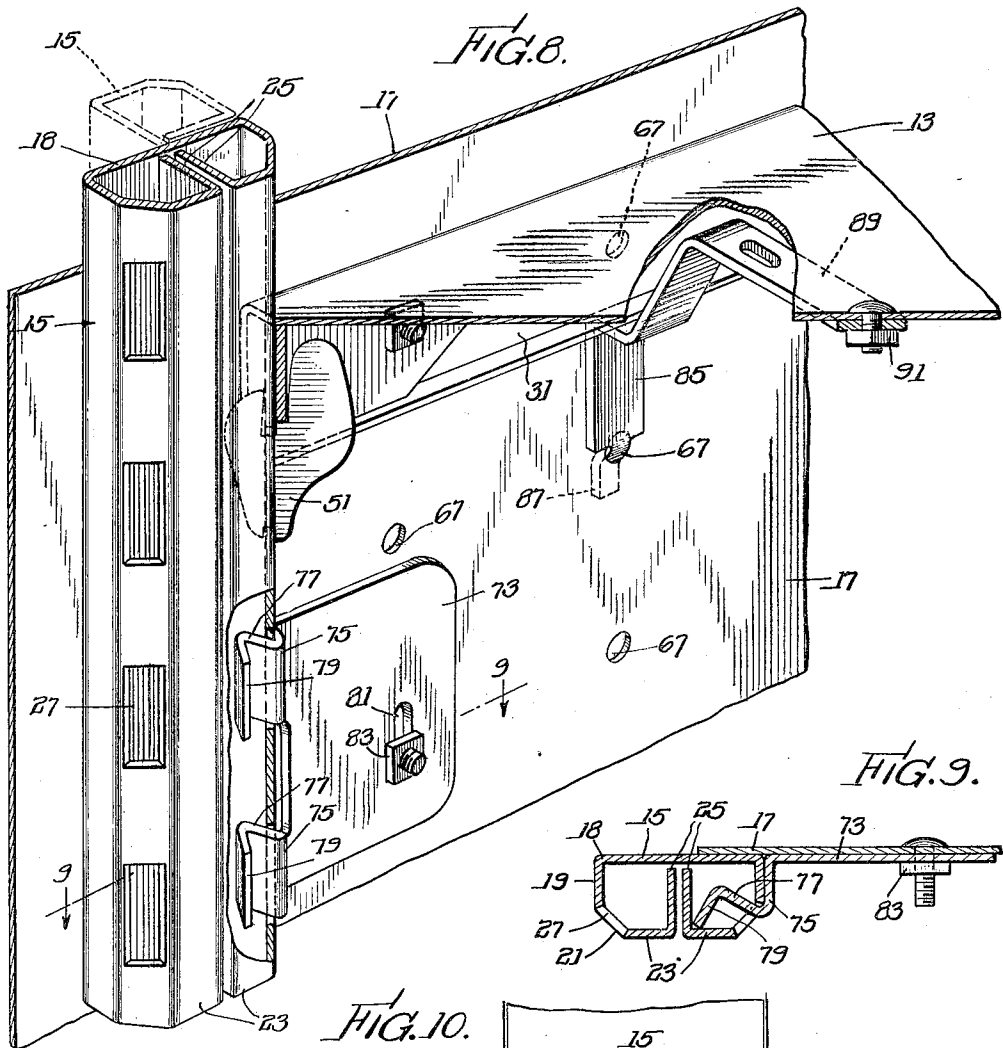
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UNITED STATES PATENT OFFICE

1,952,111

SHELVING CONSTRUCTION

James E. Bales, Aurora, Ill., assignor to Lyon Metal Products, Incorporated, Aurora, Ill., a corporation of Illinois

Application July 31, 1931, Serial No. 554,290

11 Claims. (Cl. 211—136)

My invention relates to shelving, especially sheet metal shelving of the knock-down type, wherein the structure is composed of a number of constituent elements, such as uprights, shelves, back panels, end panels, etc. By the term "shelving," I include all similar structures, including so-called "racks" and "bins."

The general object of the invention is to produce a simple, light, and at the same time rigid structure, which may be readily assembled or taken down, and which consists of a comparatively small number of parts of comparatively simple form.

One of the more specific objects of the invention is to provide a structure wherein the shelf may be drawn obliquely toward the corner upright by means of a single fastening element, and when thus drawn will bear rigidly against the upright in all directions within a ninety degree angle, that is to say will bear rigidly against both in a direction at right angles to the length of the shelving, and in direction of the length of the shelving, and in all intervening directions. By "length of the shelving" or the "line of the shelving" is meant the general direction in which the shelving extends. In this connection it is my purpose to provide simple and powerful means for producing an "angular draw" of the upright towards the central area of the shelf.

Another object is to provide a simple form of upright which lends itself particularly to cooperating with the shelf in the manner just suggested. In the particular form illustrated, and well adapted for this purpose, the upright has a convex portion facing obliquely inward towards the area of the shelf. This may be more or less rounded, but in the form illustrated there is a surface facing forward toward the front of the shelving, another surface at right angles thereto facing along the line of the shelving and an intervening surface arranged approximately at a forty-five degree angle with reference to the other two. These various surfaces are connected together and more or less rounded to suit the convenience of the manufacturer.

Another object of the invention is to provide a simple and efficient key for securing the shelf to the upright.

A further object is to provide an inter-locking knock-down connection such that when the key has been set in place upon the upright and the shelf is lowering into position, the parts will not only be rigidly held assembled but the key will be actually locked in position and cannot be removed without first lifting off the shelf.

Another object is to provide an upright which may be regarded as "universal" in the sense that it may, in the double tubular form, be employed for extending the shelving in any direction. In other words, by properly positioning the upright, it may be used to add to the shelving either at the front or back, or either end. The upright may be of either single or double form, and in the double form is capable of this universal application as just stated.

Another object is to provide, in connection with the upright and the flanged metal shelf, a corner brace which will stiffen and strengthen the shelf flanges, and at the same time co-operate with the key for holding the parts in locked relation and also drawing the shelf tightly and obliquely against the upright.

Another object is to provide simple and efficient means for holding the ends of the panels to the uprights. This is accomplished by providing spaced flanges in the upright between which the ends of the panels may be inserted.

In the accompanying drawings, I have shown a structure embodying the characteristics above described and having additional features contributing toward the strengthening and bracing of the structure, but representing independent concepts which are described and claimed in co-pending applications, Serial Number 566,034, and Serial Number 566,035, both filed by me September 30, 1931.

I accomplish my object by the construction shown in the accompanying drawings, in which:

Figure 1 is a thumb-nail perspective of the shelving embodying my invention;

Figure 2 is a perspective view of the double form of upright;

Figure 3 is a perspective view of a shelf fastener or key embodying my invention;

Figure 4 is a perspective view of the corner brace, showing adjacent fragments of the shelf flanges;

Figure 5 is a perspective view showing a modified form of upright which may be used, if desired, in building the structure. This may be referred to as the single form in distinction to the double or universal form shown in Figure 2, and elsewhere;

Figure 6 is a fragmentary perspective illustrating the relative positions of shelf, upright, and fastener when in assembled position. In this view a modified form of upright is shown, the parallel, spaced flanges extending outward toward the central portion of the panel, instead of being reentrant to simulate the letter "B".

Figure 7 is a sectional view showing how the fastener or key is assembled on the upright;

Figure 8 is a view similar to Figure 7, showing, in addition, a brace and a bracket which may be employed for securing panel to the structure. These, however, form the subject of separate applications, as aforesaid;

Figure 9 is a horizontal sectional view showing the brace in acting position for fastening the panel to the upright;

Figure 10 is a horizontal sectional view showing diagrammatically the manner in which the uprights may be employed for adding sections in various positions.

Figure 11 shows a key of somewhat modified form, but having the same general principle of operation as the key shown in the other figures of the drawings.

Like numerals denote like parts throughout the several views.

I will first describe the double or universal form of upright 15 shown in Figure 2 and elsewhere. This has a flat back 18. Extending forward approximately at right angles to the back are two side sections 19 which connect at their forward edges with oblique sections 21. These in turn connect with front sections 23 which are parallel to the back. It will be understood that these sections 19, 21, and 23, are not necessarily flat nor do they necessarily have defined corners connecting them. They may be rounded if desired, and in any event form two convex tubular portions which in general project obliquely inward toward the central area of the shelf. There is, in the preferred form, an additional section or flange 25 extending from the edge of each section 23. In the shape illustrated these are parallel to each other and arranged at right angles to the back of the upright and are spaced from each other sufficiently to accommodate a panel between them. By panel I mean a sheet capable of forming a back or end wall or partition. It will be observed that in cross section this double type upright, in the form shown simulates the letter "B". It may therefore be referred to as a "B" type upright.

Slots 27 are formed in the uprights at regularly spaced intervals, for supporting the keys 51 by which the shelves 13 are supported upon said uprights.

In the preferred form the shelves 13 have depending flanges 31 at their margins, the latter terminating in inturned flanges 33 and these in turn terminating in finishing flanges 35. The configuration of the flanges may, however, be greatly varied without departing from the spirit of the invention. At the corners the shelves have cut-out 29 corresponding to the cross section of the upright so that the shelf may bear firmly against the upright over substantially the entire convex portion thereof. In this way the shelf will bear against the upright in a direction lengthwise of the shelving and also crosswise thereof, and in all intermediate directions in a horizontal plane. In other words there is a strong angular draw on the upright toward the central portion of the shelf area. This "angular draw" is emphasized by the fact that the middle section 39 is slightly spaced from the cooperating upright oblique face or section 21, even though the wings 41 are perpendicular with the side sections 19 of the upright and even though the same angle of the wings and side sections to their respective elements are the same. Therefore, even though the wings 41 may be arranged at 90° to

each other, and the side sections 19 may be arranged at an angle of 90° to each other, a wedging action will exist because the middle section 39 is spaced from the oblique section 21, and when the section 39 is drawn toward the oblique section 21, a wedging or binding action will occur and exist.

It will be understood that the gauge of the metal in shelving is usually comparatively light and, for the purpose of stiffening the shelf and its flanges, I provide a corner brace 41 shown in perspective in Figure 4 and elsewhere. This corner brace has a middle section 39 from which extend two wings 41 at right angles to each other. When assembled these wings lie adjacent to the inner surface of the depending flanges 31 of the shelves. They may be spot welded to the flanges as shown at 47, Figure 4, or they may have apertures 48 through which the parts may be bolted together. These corner braces are preferably stiffened by means of ribs 43. By preference these braces are notched on the underside of the center section, as shown at 45 in Figure 4.

The key 51, by which the parts are rigidly held together when assembled, is shown separately in Figure 3. At the bottom, the key has a notch 59 located between two shoulders 61 and 62 and adapted to fit over the lower end of the slots 27 in the upright. At the opposite end of the key there is a notch 53 which faces upward. It is located between two shoulders 63 and 65. In the form shown, notch 53 has two bottoms or levels, 55 and 57, forming a shoulder 56. This form, however, is not essential. The distance between the bottom 55 and the lower end of shoulder 61 is less than the vertical length of the slot, the purpose being to enable the lower notched end of the key to be placed astride the lower end of the slot 27 during assembly; but the distance between the bottom of notch 59 and the upper end of shoulder 65 is greater than the length of slots in the upright. The construction is such as to prevent the removal of key 51 when the shoulder 65 is within the upright and the key is seated at notch 59 on the lower end of the slot. Notch 53 is wide enough to accommodate the section 21 of the upright and the midsection 39 of brace 37. The slot 53 is wide enough to permit the tilting of the key, in the manner shown in dotted lines in Figure 7, to enable the shoulder 65 to be inserted through the slot in the upright, and the lower end of the key afterwards brought up to position where the notch 59 may seat upon the metal at the lower edge of slot 27. The inner edge of shoulder 62 is tapered or rounded to effect a camlike or wedging action to draw the shelf tightly against the upright when the shelf flange is lowered into notch 53. The parts are so proportioned that when the notched part 45 of the corner brace 41 is firmly seated on shoulder 57, the parts will be held together very firmly. It will be observed that when the corner brace 41 is in position, the key 51 will be actually locked in place, because, in order to remove the key, it must be tilted as indicated in dotted lines in Figure 7, and, obviously, the presence of the corner brace, when in position between the upright and shoulder 63, prevents the tilting of the key. Thus, when assembled, the parts are not only firmly drawn toward each other, but the key is actually locked in place, and the parts cannot be taken apart without first lifting the shelf off the key.

The key may be somewhat modified in shape as shown, for example, in Figure 11. In this form, the key has a shoulder 61' corresponding to the shoulder 61 in the previous form. There

is a second shoulder 65' extending upward to engage the inside of the upright 21. There is also a third shoulder 63' whose inner surface is camlike or tapered, as in the previous construction. There is also a fourth shoulder 70 which comes beneath the metal at the upper end of the slot 27 in the upright. This forms a secondary lock and prevents vertical movement of the key when the key and shelf are in place. In this form, as in the other, the brace 37 wedges in between the shoulders 63' of the key and the outer convex surface of the upright 21 and holds the key locked in place. In this case, as in the other, it is possible, by removing the shelf and tilting the key, to lift the key far enough to permit the shoulder 61' to pass out of the slot 27 and thus remove the key from the upright.

Now to explain the operation of the parts thus far described and the manner of assembling them; the shoulder 65 of key 51 is first inserted through a slot 27 in the upright, the key being tilted for the purpose as shown in dotted lines in Figure 7. The notch 59 is then brought over the upper edge of the metal at the lower end of the slot whereupon the key is lowered into the position shown in full lines in Figures 6, 7, and 8. The corner of the shelf is then brought into contact with the upright at a point above the key and then lowered so as to bring the notch section 39 of the brace 41 down into the space left in slot 53. As the brace and shelf are lowered, a cam-like or wedging action takes place and by the time the corner brace is actually seated the parts will be firmly drawn together and the shelf and its corner brace will be drawn into close contact with the upright. As the key extends in an oblique direction, approximately midway between the line of the shelving and a line at right angles thereto, and as the shelf, or at least the corner brace 41 closely fits against the upright, the shelf will be tightened against the upright in every direction. It will press against it angularly both at the front and at the inner side. Thus, on account of the shape of the upright and the shape of the shelf and the other features of construction, it is possible for a single fastening element to prevent relative motion of the parts in any direction. A further characteristic of this construction is that there is no danger of accidental dis-assembling, because the key is locked in place when the shelf is in position and the weight of the shelf and the goods carried thereon tends to prevent the shelf from rising out of position.

The universal nature of the double form of upright will be observed by referring to Figure 10. It will be evident that by placing the back of the upright, parallel with the back of the shelving, shelf units may be jointed thereto at the end, thus extending the shelving lengthwise. By placing the back of the upright parallel with the end of the shelf the shelving may be extended in a front to rear direction. In other words, by using this double form of upright and properly positioning the upright, the shelving may be extended in any direction.

If a single column of shelving is desired, or at an end corner of the shelving, the single form of upright may be employed. This is shown in perspective in Figure 5. In cross section it is simply one-half of the double form of upright. It operates upon the same principle as the double form except that it does not provide for adding to the shelving in any direction.

Shelving which is open at the back or at the

ends of the shelves or both is frequently referred to as a "rack." In many situations it is desirable to close the structure at the back or at the ends of the shelves or both. The sheets of metal forming the back of the shelving or the end portions are sometimes referred to as "panels" or "partitions". My shelving is designed to accommodate panels both at the back and at the ends of the shelves if and when desired. It has been already explained that the flanges 25 of the upright in the double form, which flanges may be referred to as "re-entrant" flanges, are spaced apart in order to accommodate between them the end of a panel such as the ones marked 17 in Figures 2 and 6. These panels may also be bolted to the depending flange 31 of the shelf. It is not necessary that the flanges 25 turn inward. They may be turned outward from the upright as the flanges 25' shown in Figure 6.

In order to obtain additional rigidity, and for securing the panels 17 in place, I have provided a clamping member 73, shown in perspective in Figure 8 and in horizontal section in Figure 9. This member and its associated element form a subject matter of a co-pending application. It is sufficient for the present to say that, in case it is desired, it may be formed in the manner illustrated, having a planiform body 73, slotted as at 81 and adapted to be secured by a bolt 83 to the panel. This has a flange 75 which is channeled to fulcrum upon one of the edges of the upright 15. It has also an outer flange or lip 79 adapted to seat in the corner between the sections 23 and 25 of the upright.

I have also provided another bracing member or bracket for increasing the rigidity of the structure if and when desired. This also forms a subject of a separate co-pending application. It consists of a body 85, adapted to lie adjacent to the inner surface of the panel 17. It has an offset tongue 87 adapted to be inserted through any one of a series of holes 67 in the panel. When the bracket is thus in place, it is securely fastened to it without the need of separate fastening devices. The bracket has an upper arm 89 to contact the under surface of the shelf 13. The bracket is apertured to accommodate a bolt 91 for fastening the bracket to the shelf.

By bolting the back panel 17 to the depending flange 31 of the shelf and/or to the corner brace 41, the panel will be held in close contact both with the back of the upright and with the flange of the shelf. Therefore, while a panel is not essential in the structure, it nevertheless adds to the rigidity thereof and also tends to stiffen the shelf.

From the foregoing it will be evident that even without the brace 73 the bracket 85 and/or the panels 17, a structure is obtained which is rigidly held together and resists strain in every direction. The shelving may be readily taken apart, if desired, for all that is necessary where no panels are employed is to lift the shelves from the keys. The keys alone hold the shelves rigidly pressed against the upright and exert a drawing action in every direction throughout the quarter circle contained between the line of the end of the shelf and the line of the back thereof. When the shelf is in position the key is actually locked in place and as the weight of the shelf tends to hold it down in position there is no danger that the shelving may become loose as the result of shocks or jars. Where the parts of steel shelving are secured together merely by bolts the vibration which is present in many industrial build-

ings tends to loosen the bolts. In my structure any vibration will have a tendency to cause the shelves to settle to a still firmer seat in the keys, thus insuring tight joints at all times.

5 What I claim as new and desire to secure by Letters Patent is:

10 1. Metal shelving having an upright provided with a surface oblique to the line of the shelving, a shelf having a surface corresponding to the said oblique surface but spaced therefrom, and reentrant means receiving a part of the shelf and a part of the upright for wedging the shelf toward the oblique surface of the upright.

15 2. Metal shelving including a shelf and an upright having a convex surface facing inward toward the area of the shelf, the shelf having a notch at a corner whereby the corner of the shelf may engage the said convex surface of the upright, and means for wedging the shelf corner into close contact with the upright in a direction oblique to the line of the shelving, said means having a reentrant portion into which a part of the shelf and upright are received.

20 3. Metal shelving having a shelf, a tubular, metal upright back portion, a convex portion designed to face obliquely inward toward the central portion of the shelf area, the upright having a slot in the convex portion, and reentrant means receiving the metal at the slot and a part of the shelf and exerting pressure on the shelf in a horizontal direction toward the convex portion of the upright and in a direction oblique to the back of the upright.

25 4. In a structure, a slotted upright and a shelf having a downward projection, a key having a notch in the upper portion facing upwardly for accommodating the material of the upright above the slot and the downward projection on the shelf, there being shoulders on the key, one extending upward and the other downward for engaging the inside of the upright when inserted through the slot in the upright, the key also having a third shoulder extending upward and lying outside of the upright when the parts are assembled, said third shoulder being in position to be engaged by the downward projection on the shelf for holding the key locked in position.

30 5. Metal shelving having a vertically slotted upright, a shelf adapted to engage the upright, a downward projection at the corner of the shelf, and a key for holding the parts assembled, the key having a shoulder at the bottom for engaging the inside of the upright at the lower end of the slot, and having a seat for resting upon the metal at the lower end of the slot, the key having a second shoulder extending upward for engaging the inside of the upright at the upper end of the slot, and a third shoulder adapted to lie outside of the upright in position to be engaged by the downward projection on the shelf to thereby lock the key in place, the bottom of the notch between the second and third shoulders being at a less distance from the upper edge of the slot than the length of the first shoulder, whereby the key may be lifted sufficiently to enable the first shoulder to pass out through the slot to enable the key to be removed from the upright.

35 6. Metal shelving having shelves, sheet metal panels to form end and side closures of the shelving, an upright approximately the shape of a letter B, the upright having a back and two convex portions facing obliquely toward the central part of two adjacent shelf areas, the upright hav-

ing two parallel, inwardly turned flanges, spaced apart to receive a panel between them, and means receiving parts of the upright and the shelves for drawing a plurality of shelves towards the upright in directions which are horizontal and which are oblique to the back of the upright, and at approximately ninety degrees from each other.

7. Shelving having an upright with a convex portion facing diagonally inward toward the shelf area, a shelf having an oblique surface adapted for engagement with said face but normally spaced therefrom, and a detachable, one-piece element having upper and lower reentrant portions into which the upright and the upright and shelf respectively are received for drawing the shelf against the mid portion of the convex portion of the upright.

8. A clip for demountably wedging a shelf having a flange to an upright having a slot, comprising a plate of a thickness permitting it to enter the slot of the upright, said plate having spaced apart projections providing a notch at one end adapted to receive therebetween the wall of the upright at one end of the slot and having a lug at its other end to engage the inner surface of the upright at the opposite end of the slot, said notch being deep enough to permit the lug to ride through the slot after the clip has been assembled with an edge of the slot received in the notch, said notch being wide enough to receive the wall of the upright adjacent the slot and the flange of the shelf and one of the clip projections defining the notch being adapted to extend out of the upright when the clip is mounted thereon to form a hook for engaging the shelf flange, and said hook having an inclined surface whereby to wedgingly clamp the shelf flange and upright together.

9. In a device of the class described, a tubular integral one-piece upright having an outer straight face and an inner straight face parallel to the outer face, sides bent at right angles from the outer face, inclined faces connecting the sides and the inner face, said inner face being provided with a longitudinal slot therein throughout the entire length of the upright and adapted to receive a panel therein, said inclined faces having spaced openings therein to receive shelf supports, and inwardly extending flanges bent from the inner face at the sides of the slot and extending inwardly of the upright toward the outer face.

10. In a device of the class described having an upright provided with spaced openings, a shelf adapted to be supported, a clip for supporting the shelf and comprising a member having a slot into which the material of the upright surrounding an opening is received, and a second slot of a greater width than the first slot and into which the material of the upright surrounding a said opening and a part of the shelf are received, the length of the clip being greater than the length of its cooperating opening, the distance between the bottoms of the slots being less than the length of its cooperating opening in the upright.

11. A shelf clip adapted to support a shelf to a support and comprising a body having a pair of slots therein, one of said slots being adapted to receive a part of an upright, and the other of said slots being substantially twice as wide as the first slot and adapted to receive a part of the upright and a part of the shelf.

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