

July 17, 1934.

A. C. FRIEDEL

1,966,928

COLLAPSIBLE SHELVING

Filed June 28, 1933

2 Sheets-Sheet. 1

FIG. 1.

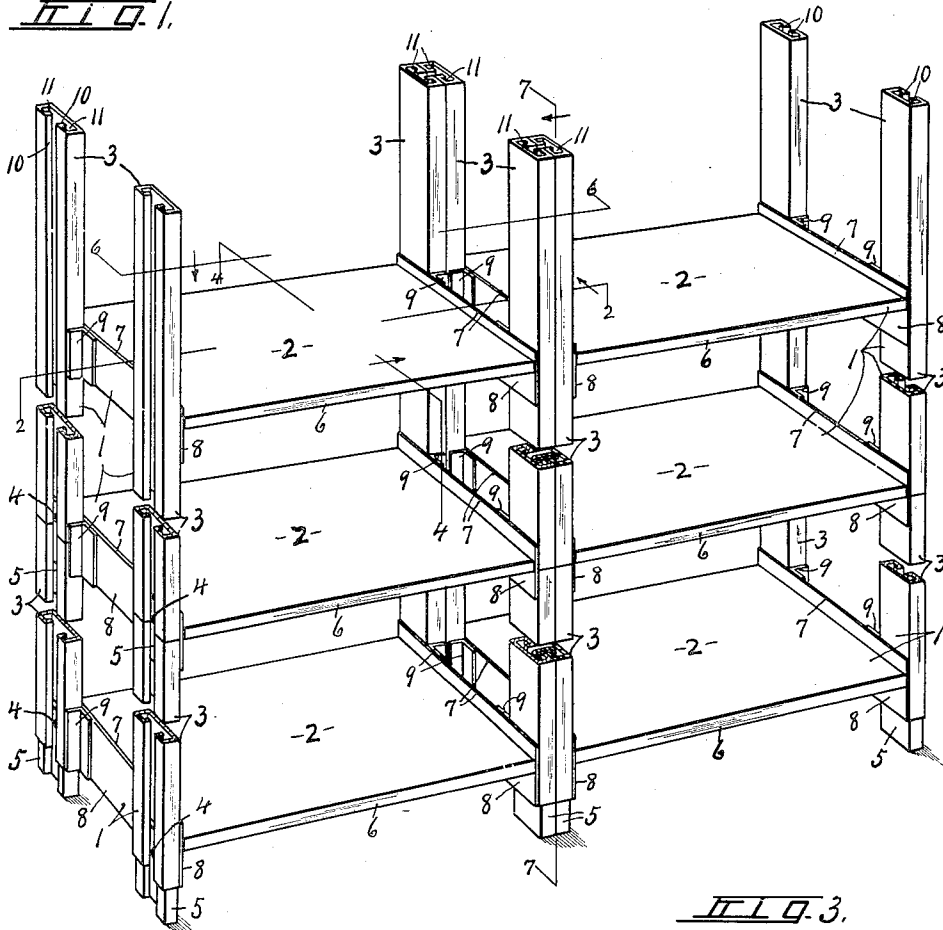
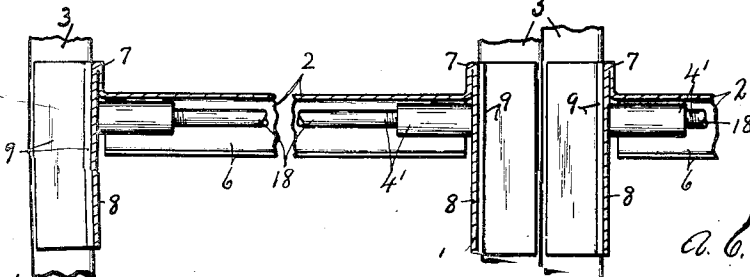
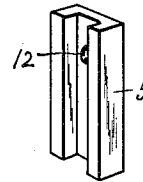


FIG. 2.



WITNESS
J. J. Mains

FIG. 3.



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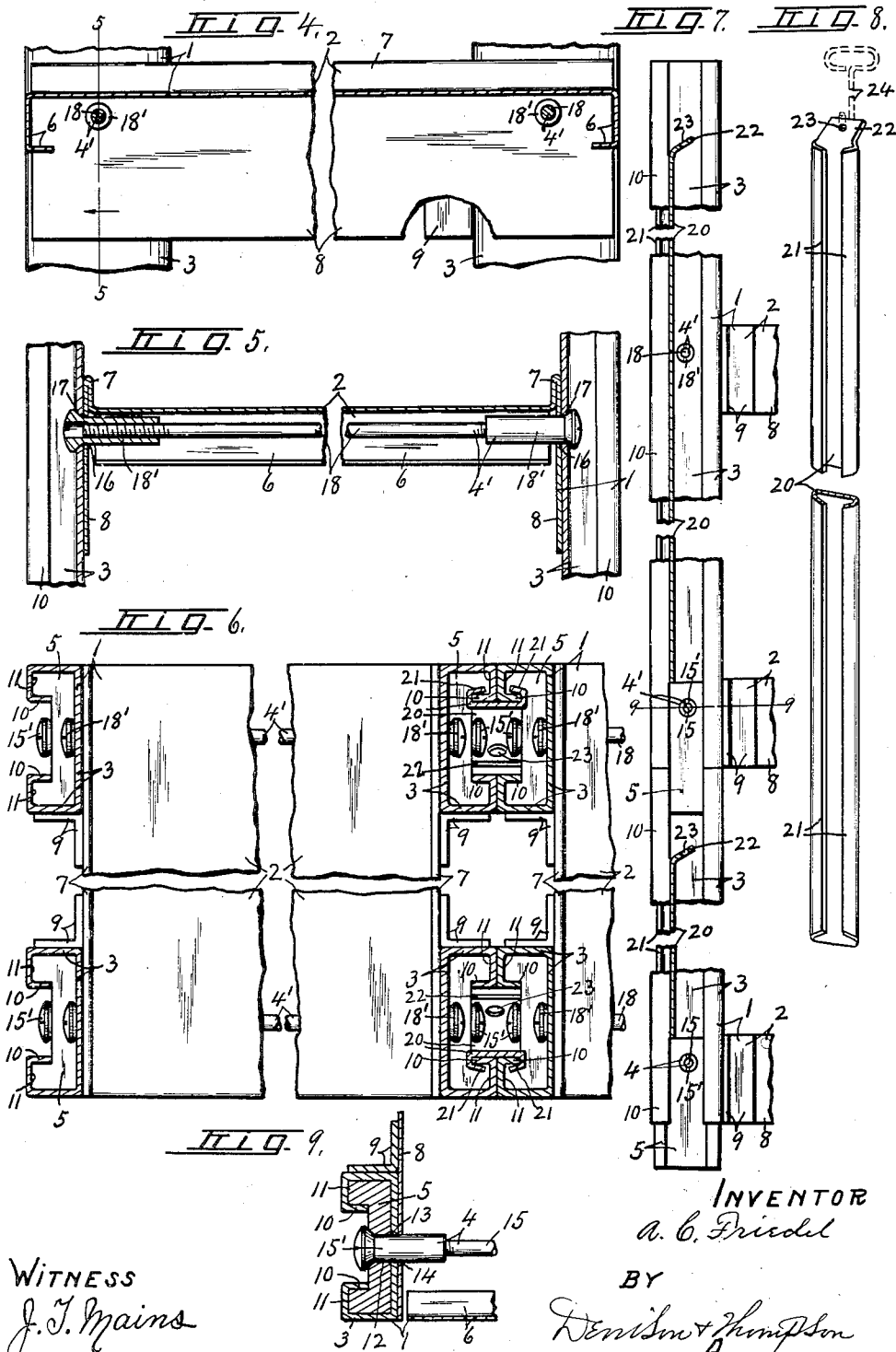
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2 Sheets-Sheet. 2



UNITED STATES PATENT OFFICE

1,966,928

COLLAPSIBLE SHELVING

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7 Claims. (Cl. 211-148)

This invention relates to a collapsible shelving for stores, stock rooms, and other places for receiving and supporting boxes and other cartons or packages containing goods to be stored, sold or displayed.

The main object is to provide a collapsible shelf unit of standardized form and construction having few parts which may be easily and quickly assembled and installed with a minimum expenditure of time, labor and material without special skill or tools to form a light, strong and easily portable unit, the parts of which may be expeditiously disassembled and placed flatwise one upon the other in a relatively small compact space for economy in storage or transportation.

Another object is to construct the units in such manner that any reasonable number of them may be placed side by side in horizontal rows or stacked one upon another in vertical tiers and interlocked with each other with a minimum expenditure of time and labor and without special skill or tools to form a rigid assembly of the units into a complete rack of predetermined size and form.

Other objects and uses relating to specific parts of each unit and to the method of assembling a plurality of the units will be brought out in the following description.

In the drawings:—

Figure 1 is a perspective view, partly broken away and partly in section, of portions of a plurality of, in this instance two, horizontal rows of shelf units arranged vertically one upon the other to form a plurality of, in this instance two vertical tiers of shelf units together with means for holding the adjacent sides of the units of each row against lateral displacement and also showing means for holding the units of each tier in vertical alinement against lateral displacement.

Figure 2 is an enlarged vertical sectional view, partly broken away, taken on line 2-2, Figure 1.

Figure 3 is a perspective view of one of the detached post-supporting legs which also forms one of the couplings or locking members for holding the adjacent ends of the posts of the several units for each tier together.

Figure 4 is an enlarged transverse vertical sectional view, partly broken away, taken on line 4-4, Figure 1.

Figure 5 is a detail longitudinal vertical sectional view, partly broken away, taken in the plane of line 5-5, Figure 4, showing more particularly the means for clamping the posts to opposite ends of the shelf.

Figure 6 is an enlarged horizontal sectional

view, partly broken away, taken on line 6-6, Figure 1, showing more particularly the cross sectional construction of the posts and the means for locking adjacent posts of the units of each row to each other.

Figure 7 is an enlarged detail vertical sectional view, partly broken away, taken in the plane of line 7-7, Figure 1.

Figure 8 is a perspective view of one of the clamping members for locking adjacent posts of the shelf units of each row to each other.

Figure 9 is an enlarged detail horizontal sectional view taken on line 9-9, Figure 7.

As illustrated, this shelf rack or shelving system comprises one or more similar and interchangeable shelf units 1 adapted, when used in multiple, to be arranged side by side in sequence to form horizontal rows and also to be arranged one upon the other in vertical tiers together with releasable means for locking the adjacent sides of the units to each other against relative lateral displacement and additional releasable means for locking the adjacent portions of the units of each tier to each other against relative lateral displacement.

Each unit preferably comprises one or more substantially rectangular sheet metal shelves 2 and a plurality of, in this instance four, upright posts 3 which are adapted to be clamped to the end edges of the shelf or shelves 2 by releasable means consisting in this instance of tie rods or bolts 4 and 4' arranged near the four corners of each shelf and in parallel spaced relation as shown more clearly in Figures 2 and 5, the lower end of each post being provided with a downwardly projecting leg or coupling 5 releasably held in place by the adjacent clamping bolt 4, in a manner hereinafter described, and shown more clearly in Figures 6, 7 and 9.

In Figure 1 I have shown each of the lower units 1 as provided with a single shelf 2 while each of the superposed units are shown as provided with two shelves, but obviously each unit may be provided with a plurality of shelves arranged in vertically spaced parallel relation the same distance or different distances apart according to the nature of the articles to be supported thereon, as will be hereinafter more fully described.

The several shelves 2 are preferably rectangular in top plan and of uniform size and shape so that they may be interchanged without modification, each shelf being elongated in one direction or of greater length than transverse width.

That is, each shelf is preferably made of sheet

metal and constitutes a unitary article of manufacture having its opposite lengthwise edges bent downwardly and inwardly to form reinforcing flanges 6, while the opposite end edges are bent upwardly and returned downwardly to form upper and lower flanges 7 and 8, the upper flanges 7 being relatively shallow vertically as compared with the depth of the flanges 8 to form transverse guides for the articles resting upon the upper horizontal surface of the shelf.

The flanges 7 and 8 are disposed in vertical planes at right angles to the upper surface of the main body of the shelf, the flanges 8 being extended downwardly equal distances below the horizontal planes of the lower edges of the flanges 4 to form flat surfaces adapted to abut against the inner faces of the posts 3 of the corresponding shelf unit, as shown more clearly in Figures 5, 6 and 9.

A pair of sheet metal angle plates or flanges 9 are spot welded or otherwise rigidly and permanently secured to the outer faces of each end of the shelf 2 in transversely spaced relation equal distances from the front and rear sides of the shelf corresponding approximately to the transverse width of the posts 3, the angle plates of each pair being disposed in parallel vertical relation and are provided with outturned flanges at right angles to the adjacent end of the main body of the shelf to form abutments for engaging the adjacent upright faces of the posts, the vertical height of each angle plate being substantially equal to the combined vertical height of the flanges 7 and 8, as shown more clearly in Figure 2.

The posts 3 for each shelf unit are identical in construction and therefore interchangeable and each preferably consists of a sheet metal channel iron arranged with its open side facing outwardly and provided with inturned ribs or flanges 10 disposed in transversely spaced parallel relation in planes at substantially right angles to the inner upright sides of the post, said flanges being also arranged in spaced relation to the opposite upright side walls of the posts to form channels 11, for a purpose hereinafter more fully explained, see Figures 6 and 9.

These posts are preferably arranged in pairs, one pair for each end of each shelf unit with their inner upright sides abutting against the outer faces of the adjacent upright flanges 7 and 8 and their inner upright edges abutting against the adjacent outturned flanges of the angle plates 9, as shown more clearly in Figures 6 and 9.

The shelf or shelves of each rack unit are releasably secured to and between its posts 3 by the clamping bolts 4 and 4' which are passed horizontally and lengthwise of the shelves through registering apertures in the opposite ends of the shelf and inner upright walls of the adjacent posts, so as to directly underlie the tops of the shelves adjacent the opposite lengthwise flanges 6 thereof, as shown more clearly in Figures 2, 5 and 9.

One of the legs or coupling members 5, Figures 3 and 9, is adapted to be secured in the lower end of each of the posts 3 of each unit and preferably consists of a channel iron of about the same cross sectional form and size of the interior channel in the post so as to fit snugly therein by sliding movement from the bottom upward, the vertical height of each leg or coupling being somewhat greater than the vertical depth of the combined flanges 7 and 8 so that when the leg

or coupling is inserted in its post with its upper end in about the horizontal plane of the upper surface of the shelf, its lower end will project downwardly below the lower end of the post, as shown more clearly in Figures 1 and 7.

That is, each leg or coupling member 5 is arranged in the lower end of its corresponding post with the open side of its channel facing outwardly and in registration with the open side of the channel in the post, as shown in Figures 6, 7 and 9.

The lower ends of the posts of each shelf unit are, therefore, provided with legs or coupling units 5, the legs of the lower units being adapted to rest upon the floor while the legs or coupling members of the super-posed units are adapted to enter the upper ends of the corresponding posts of the next adjacent lower unit for holding the units of the adjacent tier in vertical alinement against relative lateral movement, as shown more clearly in Figures 1 and 7.

The legs or coupling members at opposite ends of each of the front and rear sides of each shelf unit are provided with apertures or bolt openings 12 registering with similar apertures or bolt openings 13 and 14 in the adjacent portions of corresponding posts 3 and flanges 8 of the shelf 2 for receiving the adjacent ends of one of the clamping bolts 4 by which the opposite ends of the lower shelf of each unit is secured to its supporting posts, as shown more clearly in Figures 7 and 9, and Figure 3.

The clamping bolts 4 for the lower shelves 2 of each unit are arranged in transversely spaced parallel relation directly under the top portions of the lower shelf and closely adjacent thereto at the inner sides of the front and rear shelf flanges 6 where the major portions thereof are concealed from view.

Each of these clamping bolts 4 comprises a lengthwise rod 15 of sufficient length to extend into the openings 14 in the flanges 8 and is threaded at both ends for receiving internally threaded cylindrical nuts 15' which are passed from the outside through the registering openings 12, 13 and 14 and engaged with the adjacent threaded ends of the rod 15, the outer ends of the nuts 15' being enlarged to engage the outer faces of the adjacent legs 5 and are adapted to receive a screw driver whereby the bolts may be tightened and released at will for clamping and releasing the posts upon and from opposite ends of the lower shelf of the unit, see Figure 9.

When each unit is provided with additional shelves above the lower shelf thereof, as shown in the upper units in Figure 1 in which the leg sections 5 are shown, the opposite end flanges 8 near the front and rear sides of the shelf and also the adjacent portions of the corresponding posts 3 are provided with registering bolt openings 16 and 17 for receiving the adjacent ends of the clamping bolts 4', each of which consists of a rod 18 similar to the rod 15 in that its opposite ends are threaded and engaged by internally threaded tubular nuts 18' similar to the nuts 15' in that their outer ends are enlarged to engage the outer faces of the inner walls of the posts 3, as shown more clearly in Figures 2, 4, 5, 6 and 7.

It will be observed that the bolts 4' are also arranged in transversely spaced parallel relation lengthwise of and directly beneath the tops of the shelves 2 along the inner sides of the adjacent flanges 6 where they are mainly concealed from view.

When the parts of the lower units of each tier

are assembled in the manner described with the legs 5 resting upon the floor, the next superposed unit of the same tier may be placed in operative position with the lower ends of its posts resting upon the upper ends of the corresponding posts of the underlying unit in which case the coupling members 5 of the upper unit will be inserted into the upper ends of the channels of the posts of the lower unit, thereby holding both units against relative lateral movement while the weight of the upper unit automatically holds it in place upon said lower unit but may be removed at will by upward displacement when it is desired to disassemble the units of that tier.

If the units of the shelving system are to be extended lengthwise horizontally beginning with the longitudinal extension of the lower units, the channel sides of the posts at one end of the additional unit will be brought against the channel sides of the previously installed unit with their channels in registration whereupon each pair of abutting posts may be clamped to each other by means of a channeled clamping bar 20, as shown in Figures 6, 7 and 8.

This clamping bar preferably consists of a vertically elongated sheet metal plate having its channel of about the same width as the combined widths of the registering flanges 10 on the abutting upright sides of the posts adjacent the outer edges thereof, said channel bar 20 having its opposite edges provided with inturned parallel flanges 21 forming channels for receiving the adjacent edges of the flanges 10 of the posts, as shown more clearly in Figures 6, 7 and 8.

Each of these clamping bars 20 is adapted to be interlocked with the outer abutting flanges 10 of adjacent posts through sliding movement of the bar from the top downwardly, as shown more clearly in the right hand of Figure 6 and also in Figure 7, it being understood that two of these clamping bars 20 will be used for securing together the adjacent ends of adjacent units end to end and that when adjusted for use their upper ends will be below the upper ends of the adjacent posts, as shown more clearly in Figure 7.

In other words, the vertical length of each clamping bar 20 is preferably less than the distance between the upper ends of the legs or coupling members 5 and upper ends of the posts of each unit so that the coupling members may be moved from the top downwardly into engagement with the adjacent flanges 10 until limited by the engagement of the lower end thereof with the upper end of the corresponding leg or coupling 5.

In order that these coupling members may be removed to permit disassembling of the previously joined units of the same horizontal row, the upper end of each coupling member is provided with a lateral offset portion 22 having an aperture 23 therein to be engaged by a hook or similar member 24, shown by dotted lines in Figure 8, whereby the insertion of the hook from the top of the post downwardly allows said hook to be engaged in the aperture 23 and then by drawing upwardly on the hook will effect a corresponding upward displacement of the clamping bar from the upper end of the corresponding posts, thus permitting the previously joined units to be separated one from the other.

Operation

When assembling the parts of each unit, the legs or coupling members 5 will be slidably inserted into corresponding lower ends of four of the posts which will then be successively placed

in an upright position with their flat sides abutting against the outer faces of the flanges 7 and 8 of the lower shelf 2 and their inner edges abutting against the adjacent outturned flanges of the angle plates 9, the lower shelf and also the legs or coupling members 5 being then adjusted to bring their bolt openings into registration for receiving opposite ends of the clamping bolts 4 and their respective nuts 15', which when tightened serve to draw the four legs tightly against opposite ends of the lower shelf.

Under these conditions the four posts of the unit will be held in an upright position with the legs or coupling members 5 resting upon the floor.

If another shelf is to be added to the same unit, the posts of that unit will be provided with the bolt openings 17 at the proper level from the previously installed shelf so that the second shelf may be placed in operative position between the posts with its bolt openings 16 registered with those in the post to receive the clamping bolts 4', as shown in Figure 5.

In like manner, additional shelves may be added to the same unit one above the other and additional units with one or more shelves may be assembled one upon the other vertically in tiers or horizontally in rows, in the manner previously explained.

That is, the assembled units may be arranged in tiers by simply placing one upon the other with their legs or coupling members 5 of the superposed units slidably inserted in the upper ends of the posts of the next underlying unit. Or, if the units are to be arranged horizontally in rows, they may be brought together end to end, as shown in Figures 1 and 6, whereupon the clamping bars 20 may be inserted from the top downwardly into the abutting posts for engagement with the corresponding flanges 10, thereby locking the adjacent units of the row to each other.

On the other hand, in order to disassemble the units of any row, it is simply necessary to withdraw the clamping bar upwardly from its operative position. Or, if the units have been assembled in tiers and it is desired to disassemble them, this may be accomplished by simply lifting the superposed units sufficiently to disengage their coupling members 5 from the posts of the underlying units.

Again, when it is desired to disassemble the parts of any one of the units, it may be accomplished by simply releasing the nuts 15' or 18', thus permitting the corresponding bolts 15 or 18 to be withdrawn endwise from their operative positions.

When the units have been disassembled from each other and the parts of each unit taken apart, all the parts may be placed flatwise one upon the other in relatively small compact space for storage or transportation.

The shelving system shown and method of assembling the parts thereof are particularly simple, practical and efficient in that all of the parts are made of relatively thin sheet metal and that they may be assembled or disassembled without special skill or tools.

It is evident, however, that various changes may be made in the detail construction without departing from the spirit of the invention.

What I claim is:

1. A shelf-rack unit comprising a shelf having opposite downturned flanges, channeled posts engaging said flanges and having their channels facing outwardly, legs seated in said channels, sleeve-nuts passed through registering openings

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in the flanges, legs and posts, and a bolt connecting said nuts for holding the shelf-posts and legs in fixed relation.

2. A shelf-rack unit comprising a rectangular sheet metal shelf having its opposite ends provided with pendant flanges, plates secured to and projecting outwardly from said flanges at right angles thereto, opposite pairs of posts engaging the outer faces of the flanges and also engaging the plates, and clamping bolts passed through registering openings in said posts and flanges for clamping them together.

3. A shelf-rack unit comprising a rectangular sheet metal shelf having its opposite ends provided with pendant flanges, plates secured to and projecting outwardly from said flanges, opposite pairs of posts abutting against said flanges and plates, sleeve-nuts passed through registering openings in said posts and flanges and turnable therein, and bolts connecting said sleeve-nuts.

4. A shelf-rack unit comprising a sheet metal shelf having each of its opposite ends provided with upright flanges at right angles to each other, posts engaging said flanges, and a clamping bolt extending under the shelf and through registering openings in said posts and one of the adjacent flanges.

5. A shelf-rack unit comprising a sheet metal shelf having its opposite sides provided with forwardly and rearwardly extending parallel flanges and additional outwardly projecting flanges, posts engaging said flanges, and clamping bolts extending under the shelf and through registering openings in the posts and parallel flanges.

6. A shelf-rack composed of separable units arranged side by side, the contiguous sides of the units being provided with registering upright channels and with upright ribs projecting into their respective channels, and channeled locking bars slidably engaged with said ribs for clamping adjacent sides of the units to each other.

7. A shelf-rack composed of separable units arranged side by side and provided with vertically channeled supporting posts adjacent their contiguous sides and arranged with their open sides facing each other, one of the walls of each channel being provided with oppositely projecting flanges, and channeled locking bars engaged by vertical sliding movement with the flanges of contiguous posts for locking them to each other against lateral displacement.

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