Aug. 4, 1964 R. J. EVANS 3,143,088

SHELVING STRUCTURE

Filed June 13, 1962 2 Sheets-Sheet 1

FIG. 1

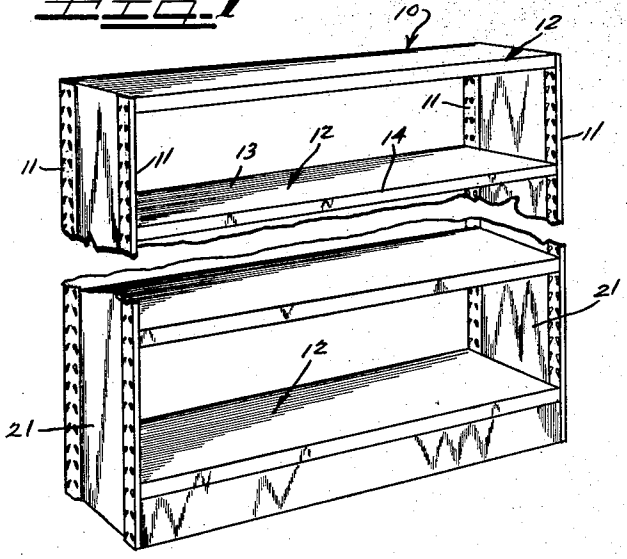

FIG. 2

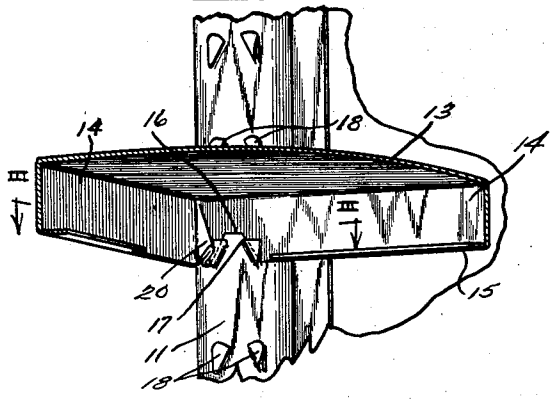

FIG. 3

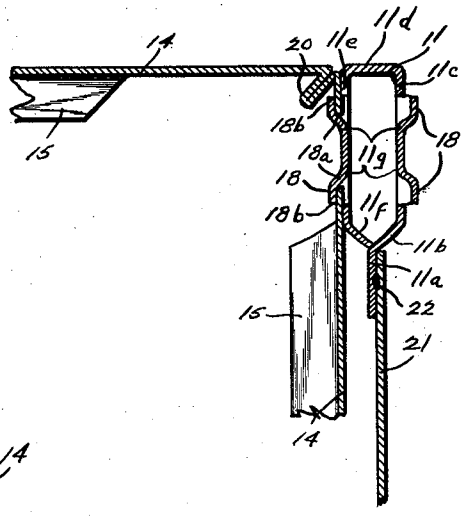

FIG. 4

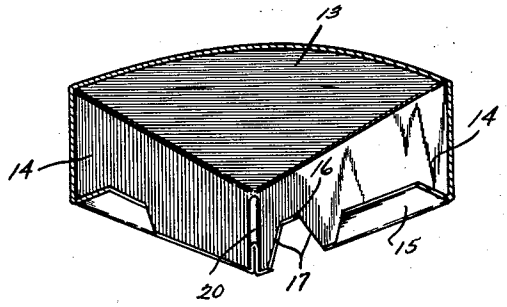

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FIG. 5

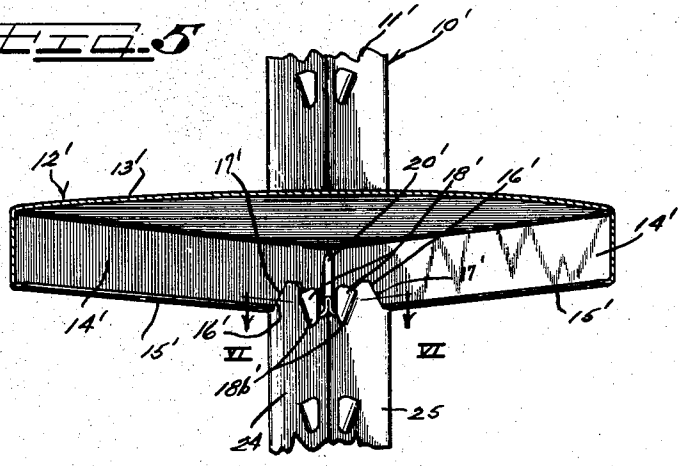


FIG. 6

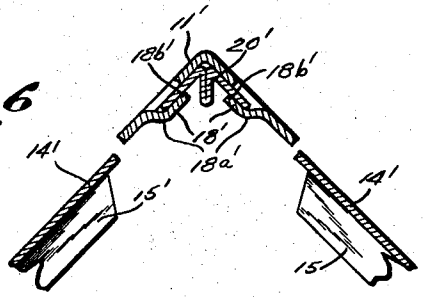
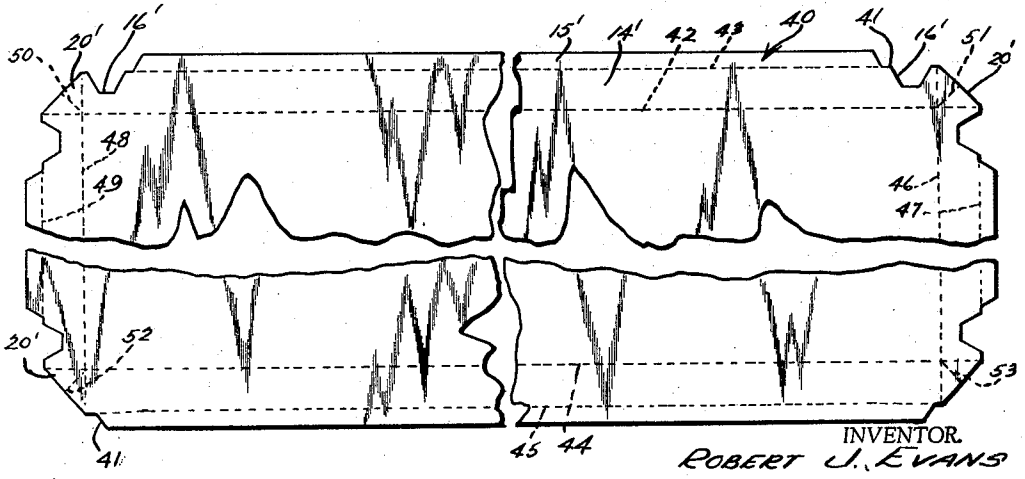


FIG. 7



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3,143,088

SHELVING STRUCTURE

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11 Claims. (Cl. 108—144)

The present invention relates generally to a shelf or shelving structure. More particularly, the present invention concerns a new and improved post construction as well as a new and improved technique for mounting shelves on the posts.

In the past, it has been the practice to mount shelves on posts by means of locking keys such as shown in the U.S. Patent Nos. 2,675,287 and 2,824,775. More recently, in order to reduce manufacturing costs, efforts have been made to eliminate the use of keys, at least in some types of shelving structures. It has been found that the locking keys may be eliminated where shelf supporting embossments are formed directly on the shelf posts from the material of the posts for supporting shelves thereon.

It has further been found that the provision of embossments on angular type posts disposed at the four corners of the shelving structure has certain undesirable features in that it has been necessary to tilt the shelves with respect to the angular posts in order to mount the shelves on the posts and to remove the shelves from the posts. Where it is necessary to tilt the shelves to mount or remove them, the shelves cannot be disposed as closely together and the embossments must be spaced a greater distance apart in order to provide sufficient clearance for the shelves to be tilted.

According to the present invention, a new and improved post construction has been developed which enables the shelves to be mounted on the post embossments without having to tilt the shelves when mounting or removing the shelves on or from the posts. Important advantages are gained through the use of the new and improved post construction and shelf mounting technique as the post embossments can be located more closely together and the shelves can be mounted more closely together where desired.

Accordingly, an important object of this invention is to provide a new and improved shelving post.

Still another object of this invention is to provide a new and improved means for mounting a shelf on shelf supporting posts.

Yet another object of this invention is to provide a new and improved shelf structure where the components can be assembled without the use of locking keys whereby the manufacturing costs may be reduced.

Another and still further object of this invention is to provide a new and improved shelving structure having posts with embossments on each side so that shelves may be supported from both sides of the posts to minimize the post expense in shelving structure and to permit usage of a maximum amount of shelf area per square foot of floor area.

An important feature of this invention is to provide shelf supporting means where the posts and the shelves are wedged more tightly in assembly together as the load on the shelf is increased.

According to still other important features of the present invention, the posts are each provided with vertically spaced pairs of embossments and the embossments are cut free of the posts except along inclined shelf edge support embossment portions and the shelf is provided with inclined shelf edges for wedged engagement therewith.

Other objects and features of the present invention will

more fully become apparent in view of the following detailed description taken in conjunction with the accompanying drawings illustrating therein several embodiments and in which:

FIGURE 1 is a fragmentary perspective view of a shelf structure;

FIGURE 2 is an enlarged fragmentary perspective view illustrating the manner in which a shelf is mounted on a post leg;

FIGURE 3 is an enlarged fragmentary cross sectional view taken substantially on the line III—III looking in the direction of the arrows, as shown in FIGURE 2;

FIGURE 4 is a fragmentary perspective view of a corner of the shelf by itself;

FIGURE 5 is an enlarged fragmentary perspective view similar to FIGURE 2 only illustrating a modified form of my invention;

FIGURE 6 is an enlarged fragmentary cross sectional view taken substantially on the line VI—VI looking in the direction indicated by the arrows, as shown in FIGURE 5; and

FIGURE 7 is an enlarged fragmentary plan view of a shelf blank.

As shown on the drawings:

The reference numeral **10** indicates generally a shelf structure. The shelf structure has four corner posts **11** that embody important features of the present invention. The posts **11** are all identical in construction. Disposed between the posts and secured in assembly with the posts are a series of vertically spaced rectangular shelves indicated generally at **12**.

The shelves **12** are identical to one another and a description of one of them will suffice the other. The shelf **12** includes a main shelf panel portion **13** as well as underturned marginal shelf flanges or portions **14** and inturned reinforcing shelf flanges or portion **15**. The flanges **15** are inturned from the flanges **14**. Adjacent the corners of the rectangular shelf the underturned and inturned marginal shelf portions **14** and **15** are cut away to provide recessed areas **16** which recessed areas each include a pair of confronting inclined edges **17**. The edges **17** are inclined in a direction toward the main panel portion **13** for engagement with embossments **18** on the posts **11**.

The posts **11** are of a hollow construction and manufactured from a single piece of material which is rolled to shape. The posts **11** each include an attachment post leg **11***a*, a first inclined post leg **11***b*, a flat embossment bearing post leg **11***c*, a spacer post leg **11***d*, a second embossment bearing post leg **11***e* and a terminal inclined post leg **11***f* having a tip end engaged in endwise relation against the inclined post leg **11***b*. Pairs or sets of the embossments **18** are vertically spaced along the lengths of the post legs **11***c* and **11***e*. Each of the embossments **18** are formed in such a way that only a single inclined shelf edge supporting portion **18***a* is left integral with the associated post legs **11***c* or **11***e*. In other words, the embossment is cut away from the post leg except at its integral juncture **11***g* with the leg which juncture is located at the area of the portion **18***a*. The embossment further includes an embossment flap or leg **18***b* for lapping engagement to hold the flange **14** in snug contact with the post leg **11***e*.

It has been found that the vertically spaced pairs of embossments **18** may be spaced as little as 1½ inches apart where the shelf structure is provided with new types of posts **11** which are disclosed herein. Where angular posts are provided at the four corners of the shelf structure, it has been found that the sets or pairs of embossments must be spaced about nine inches apart in order to provide ample working area for the shelf to be

tilted as it is mounted in a horizontal plane between the angular posts. Where posts of the type indicated at **11** are employed, the shelves **12** can be moved in a horizontal plane with respect to the posts in assembling and disassembling the shelves with the embossments **18**. When the shelf **12** is disposed between the four posts **11** with the recessed areas in vertical alignment with the pairs of embossments on the posts **11**, the shelf can be moved downwardly so that the inclined edges **17** are engaged with the inclined shelf edge supporting portion **18***a*.

The post construction and shelf mounting arrangement is particularly advantageous for it is no longer neces- to tilt the shelf in order to mount the shelf on the posts or remove the shelf from the posts. Thus, the shelves **12** can be spaced more closely and through a more selective range than formerly.

An important advantage of the instant construction is that the heavier the load carried by the shelf the tighter the fit between the inclined shelf edges **17** with the inclined shelf edge supporting portions **18***a*. In other words, where the shelf load is increased, the inclined shelf edges are wedged more tightly against the shelf edges supporting portions **18***a*.

Each of the posts **11** can be provided with embossments **18** on its opposite flange portions **11***c* and **11***e* so that shelves may be mounted on opposite sides of the same pair of posts **11**. This construction is advantageous in reducing the cost of multiple shelf structures for the number of posts may be kept to a minimum and further since the space required for an extra pair of posts is eliminated permitting a maximum amount of shelf area per square foot of floor area.

In order to reinforce the corners of the shelf **12**, the underturned flanges **14** are provided with inwardly angled triangularly shaped metal folds **20**. If desired, however, the folds **20** may be eliminated and the flanges **14** may be welded together at the corners.

At the ends of the shelf structure **10**, each pair of posts **11** are joined together by end closure panels **21** which are welded at **22** (FIGURE 3) to attach to post legs **11***a* in assembly therewith. The panels **21** may be bolted or secured by clips at **22** to secure the legs to the panels, if desired.

FIGURES 5, 6 and 7 indicate a modified form of my shelf structure **10'**. Primed reference numerals have been employed to designate parts which are similar to those parts already described in connection with the shelf structure **10**. In this instance, a pair of angular posts **11'** are disposed at the rear of the shelf structure **10'** and rearwardly of posts of the type indicated at **11** in FIGURE 1. In other words, it is contemplated that posts identical to the posts **11** be provided at the front edge of the shelving structure **10'** as was employed on the shelving structure **10**. If angular posts similar to posts **11'** were provided both at the back corners as well as the front corners of the shelf **12'**, vertically spaced pairs or sets of embossments **18'** could not be spaced as close together as desired, for it would be necessary to tilt the shelf **12'** in order to mount the shelf on the angular posts such as indicated at **11'**. It will therefore be appreciated that angular posts **11'** can be employed at the rear of the shelf structure so long as posts of the type indicated at **11** are disposed at the front edge of the shelf structure **10**. By constructing the shelf structure **11'** in this manner, the embossments **18'** may be spaced closely together and the shelves can be moved directly inwardly in a horizontal plane and downwardly into assembly with the embossments **18'** without having to tilt the shelf **12'**.

It will be noted each embossment **18'** in each pair or set is disposed in angular relation with respect to one another and carried by angular post legs **24** and **25**. The embossments **18'** carried by the post legs **24** and **25** are slightly different than the embossments **18** on the posts **11** in that shelf supporting portions **18***a'* are inclined and diverge in a direction away from the main panel portion **13'**. The embossments **18'** further include embossment legs **18***b'* for lapping engagement with flange **14'** to hold the flanges **14'** in snug engagement with the post legs **24** and **25** on the post **11'**.

The shelf **12'** is identical to the shelf **12** except that recessed areas **16'** are provided on the underturned flanges **14'** on opposite sides of their corner juncture or an opposite sides of flap **20'**. If the load on the shelf **12'** is increased, the shelf edges **17'** are wedged more tightly against the shelf edge supporting portions **18***a'*.

In FIGURE 7, a metal shelf blank **40** is illustratd in full and dotted lines, the dotted lines indicating where the metal is folded in order to form the shelf **12**. To this end, the blank **40** is initially cut in order to recess and cut away portions of the blank **40** at its four corners, as indicated at **41** in the formation of the shelf recessed area **16'**. The dotted lines **42–49** show where the blank is folded in the formation of the flanges **14'** and **15'**. At the corners of the blank **40**, the dotted lines **50–53** indicate diagonal fold lines where the blank is folded in the formation of the reinforcing folds **20'**. It will thus be perceived how the shelf **12'** can be manufactured from a single piece of stock.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. In combination,
a shelf having a main shelf portion and underturned shelf flanges along four sides of the shelf,
the shelf having cut-out recessed areas in said underturned shelf flanges at opposite ends of said shelf which define pairs of opposed converging shelf edges, and
four rectangularly arranged posts confronting said underturned shelf flanges disposed at opposite ends of said shelf and having pairs of vertically spaced embossments,
each pair of the embossments having opposed converging inclined shelf supporting edge portions and flap portions for supporting a shelf thereon and with said shelf supporting edge portions being engaged in unitary assembly with said opposed converging edges of said embossments and with said flap portions holding the associated shelf flange against the associated post.

2. In combination,
a shelf having a main shelf portion and underturned shelf flanges along four sides of the shelf,
the shelf having cut-out recessed areas in said underturned shelf flanges at opposite ends of said shelf which define pairs of opposed converging shelf edges, and
four rectangularly arranged posts confronting said underturned shelf flanges disposed at opposite ends of said shelf and with each post having a post leg having pairs of vertically spaced embossments,
each pair of the embossments having opposed converging inclined shelf supporting edge portions and flap portions for supporting a shelf thereon and with said shelf supporting edge portions being engaged in unitary assembly with said opposed converging edges of said embossments and with said flap portions holding the associated shelf flange against the associated post,
said converging shelf edges converging in a direction extending toward said main shelf portion,
each of the pairs of the edge portions being disposed in planes generally normal to the associated post leg and each of the pairs of said flap portions being disposed in planes generally parallel to the associated post leg.

3. In combination,

a shelf having a main shelf portion and underturned shelf flanges along four sides of the shelf,
the shelf having cut-out recessed areas in said underturned shelf flanges at opposite ends of said shelf which define pairs of opposed converging shelf edges, and
four rectangularly arranged posts confronting said underturned shelf flanges disposed at oposite ends of said shelf and having pairs of vertically spaced embossments,
each pair of the embossments having opposed converging inclined shelf supporting edges and flap portions for supporting a shelf thereon and with said shelf edges being engaged in unitary assembly with said opposed converging edges of said embossments and with said flap portions holding the associated shelf flange against the associated post,
said converging shelf edges converging in a direction extending toward said main shelf portion,
the posts at rear corners of said shelf being angular and having post legs with each leg having one of said embossments in each pair,
a rearmost of said underturned shelf flanges also having cut-out recessed areas and inclined shelf supporting edges engaged with the shelf supporting edges on the embossments of said legs of the angular posts.

4. In combination,
a shelf having a main shelf portion and underturned shelf flanges along four sides of the shelf,
the shelf having cut-out recessed areas in said underturned shelf flanges at opposite ends of said shelf which define pairs of opposed converging shelf edges, and
four rectangularly arranged posts confronting said underturned shelf flanges disposed at opposite ends of said shelf and having pairs of vertically spaced embossments,
each pair of the embossments having opposed converging inclined shelf supporting edge portions and flap portions for supporting a shelf thereon and with said shelf supporting edge portions being engaged in unitary assembly with said opposed converging edges of said embossments and with said flap portions holding the associated shelf flange against the associated post,
said converging shelf edges converging in a direction extending toward said main shelf portion,
each pair of the shelf supporting edge portions on the embossments on the posts at the rear corners of the shelf diverging in a direction forward the main shelf portion.

5. In combination,
a shelf having a main shelf portion and underturned shelf flanges along four sides of the shelf,
the shelf having cut-out recessed areas in said underturned shelf flanges at opposite ends of said shelf which define pairs of opposed converging shelf edges, and
four rectangularly arranged posts confronting said underturned shelf flanges disposed at opposite ends of said shelf and having pairs of vertically spaced embossments,
each pair of the embossments having opposed converging inclined shelf supporting edge portions and flap portions for supporting a shelf thereon and with said shelf supporting edge portions being engaged in unitary assembly with said opposed converging edges of said embossments and with said flap portions holding the associated shelf flange against the associated post,
each of said underturned shelf flanges terminating in inturned reinforcing flanges and with corner flaps disposed at each of the corners and each joined integral with the associated underturned shelf flanges.

6. In a shelving structure of an improved type having

shelves which can be mounted on shelf supporting posts without tilting the shelves,
each shalf having a main shelf portion and underturned shelf flanges along its four sides,
the shelf having cut-out recessed areas in said underturned shelf flanges at opposite ends of said shelf which define pairs of opposed converging shelf edges,
each post confronting said underturned shelf flanges disposed at opposite ends of said shelf and having pairs of vertically spaced embossments,
each pair of the embossments having opposed converging inclined shelf supporting edges supporting portions and flap portions for supporting a shelf thereon and with said shelf supporting edge portions being engaged in unitary assembly with said opposed converging edges of said embossments and with said flap portions holding the associated shelf flange against the associated post,
each shelf being insertable in a horizontal plane and lowered directly downwardly into supported assembly with said posts while in a horizontal plane.

7. A one-piece tubular type post on which shelves can be mounted comprising
an attachment post leg,
a first inclined post leg joined at one end with said attachment post leg,
a first flat post leg joined at one end with an opposite end of said inclined post leg,
a spacer leg joined at one end with an opposite end of said first flat leg and extending transversely thereof,
a second flat post leg joined at one end with an opposite end of said spacer leg,
a terminal inclined post leg joint at one end with an opposite end of said second flat post leg and abutted at its opposite end against said first inclined leg, and
pairs of vertically spaced embossments extending outwardly of said first and second flat post legs,
each pair of the embossments having opposed inclined shelf supporting edge portions and flap portions for securing a shelf flange is assembly therewith.

8. A one-piece tubular type post on which shelves can be mounted comprising
an attachment post leg,
a first inclined post leg joined at one end with said attachment post leg,
a first flat post leg joined at one end with an opposite end of said inclined post leg,
a spacer leg joined at one end with an opposite end of said first flat leg and extending transversely thereof,
a second flat post leg joined at one end with an opposite end of said spacer leg,
a terminal inclined post leg joined at one end with an opposite end of said second flat post leg and abutted at its opposite end against said first inclined leg, and
pairs of vertically spaced embossments extending outwardly of one of said first and second flat post legs,
each pair of the embossments having opposed downwardly diverging shelf supporting edge portions and flap portions for securing a shelf flange in assembly therewith,
the edge portions being disposed in planes generally normal to said first and second flat post legs and said flap portions being disposed in planes generally parallel to said first and second post legs.

9. In a shelving structure, a pair of spaced one-piece tubular type posts on which shelves can be mounted each comprising
an attachment post leg,
a first inclined post leg joined at one end with said attachment post leg,
a first flat post leg joined at one end with an opposite end of said inclined post leg,
a spacer leg joined at one end with an opposite end

of said first flat leg and extending transversely thereof,
a second flat post leg joined at one end with an opposite end of said spacer leg,
a terminal inclined post leg joined at one end with an opposite end of said second flat post leg and abutted at its opposite end against said first inclined leg,
pairs of vertically spaced embossments extending outwardly of said first and second flat post legs,
each pair of the embossments having opposed inclined shelf supporting edge portions and flap portions for securing a shelf flange in assembly therewith, and
an end closure panel attached at opposite ends with said attachment post legs of said spaced posts.

10. In a shelving structure, four rectangularly spaced one-piece tubular type posts on which shelves can be mounted each comprising
an attachment post leg,
a first inclined post leg joined at one end with said atachment post leg,
a first flat post leg joined at one end with an opposite end of said inclined post leg,
a spacer leg joined at one end with an opposite end of said first flat leg and extending transversely thereof,
a second flat post leg joined at one end with an opposite end of said spacer leg,
a terminal inclined post leg joined at one end with an opposite end of said second flat post leg and abutted at its opposite end against said first inclined leg,
pairs of vertically spaced embossments extending outwardly of one of said first and second flat post legs,
each pair of the embossments having opposed inclined shelf supporting edge portions and flap portions for securing a shelf flange in assembly therewith,
a pair of end closure panels joined at opposite ends with the attachment post legs of said posts, and
a shelf movable in a horizontal plane between the posts without tilting the shelf and downwardly engaging its four sets of opposed inclined shelf edges in assembly with said inclined shelf supporting edge portions and with said flap portions.

11. In combination,

a shelf having a main shelf portion and underturned shelf flanges along four sides of the shelf,
the shelf having cut-out recessed areas in said underturned shelf flanges at opposite ends of said shelf and at opposite ends of a rearmost shelf flange, said recessed areas defining pairs of opposed inclined shelf edges, and
four rectangularly arranged posts including a pair of angular posts disposed at the rear of the shelf and a pair of tubular type posts confronting said underturned shelf flanges disposed at opposite front ends of said shelf,
said posts all having pairs of vertically spaced embossments,
each pair of the embossments having opposed inclined shelf supporting edge portions and flap portions for supporting a shelf thereon and with said shelf supporting edge portions being engaged in unitary assembly with said opposed inclined edges of said embossments and with said flap portions holding the associated shelf flange against the associated post,
the angular posts at rear corners of said shelf having post legs with each leg having one of said embossments in each pair,
the inclined shelf supporting edges at the side flanges and the rear flange of the shelf being engaged with the shelf supporting edge portions on the embossments of said legs of the angular posts.

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