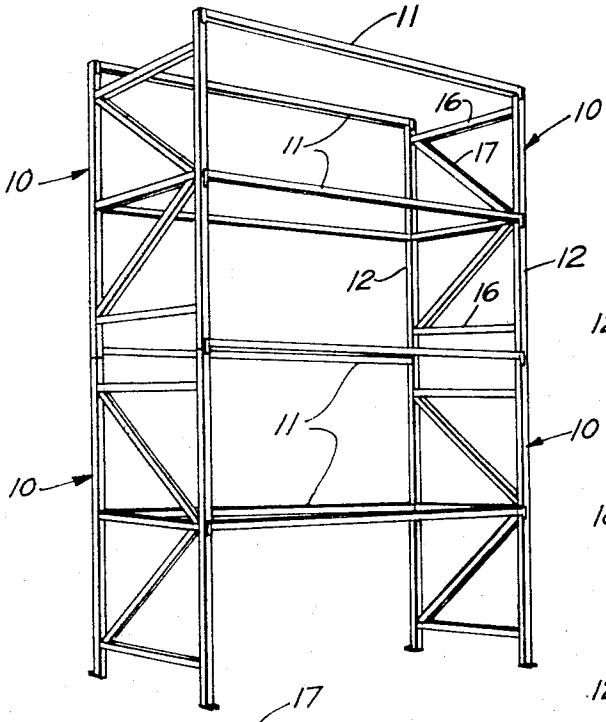
Sept. 9, 1969 H. H. KLEIN 3,465,898

CONNECTIONS FOR TIERED STORAGE RACK UNITS

Filed May 19, 1967

Fig. 1



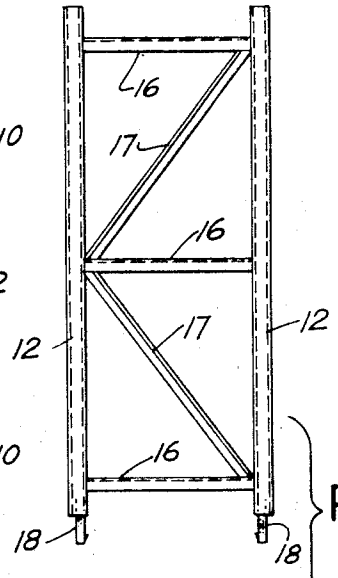


Fig. 2

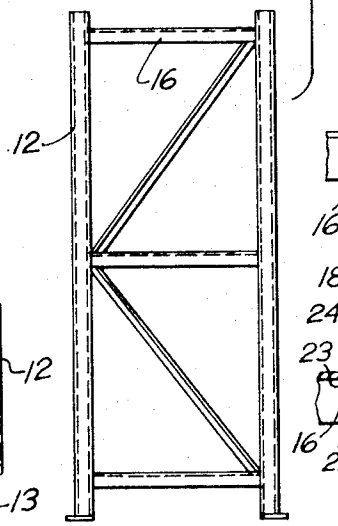
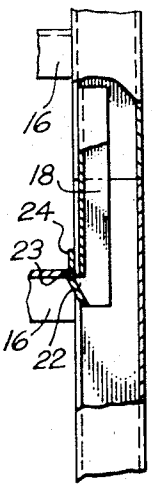


Fig. 4



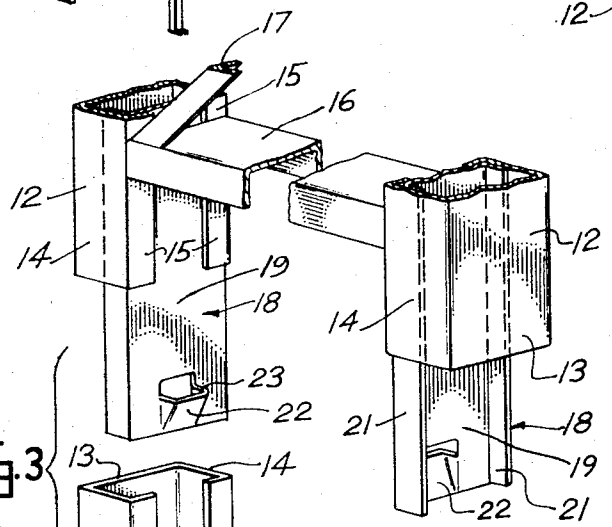
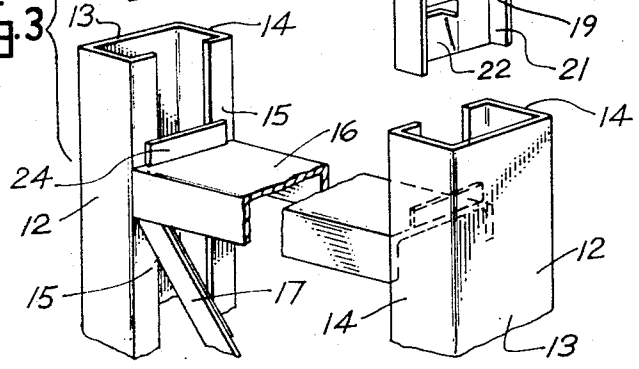


Fig. 3



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CONNECTIONS FOR TIERED STORAGE RACK UNITS

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U.S. Cl. 211—177 3 Claims

ABSTRACT OF THE DISCLOSURE

A storage rack is formed by similar rack units that each include vertical hollow posts with an improved connector between the mating posts of adjacent rack units. Pairs of posts in each rack unit have elongated slots therein facing each other, and a perpendicular cross-member serves both as a brace between the posts and also to provide retaining shoulders spaced from the terminal ends of the posts and bridging the posts' slots for cooperation with connector shoulders defined on connector tongues that project from the posts on an adjacent rack unit. The connectors rigidify the ends of the posts on one rack unit and are arranged to be sprung past the retaining shoulders on the other rack unit during tiering assembly of a pair of rack units.

This invention relates to storage racks, and more particularly to connector means between vertically aligned posts of vertically stacked rack sections.

Storage racks as heretofore used in warehouses and the like are normally made of a standard height such as 8 feet, with end frames formed of vertical posts connected by cross members and which support horizontal rails or beds on which products are stored on pallets or the like. In many installations standard rack sections are stacked, one above the other, with the posts of their end frames in vertical alignment to achieve a desired storage height.

Heretofore various types of connectors have been used to secure the posts in vertical alignment. In most cases separate connector members are required which are assembled with the racks during erection thereof. The handling and installation of such connector members slows the erection of the racks and also leads to the possibility of accidental displacement of a connector member in use of the racks in the warehouses.

It is accordingly one of the objects of the present invention to provide a storage rack in which the connection between vertically aligned posts is made without the use of separate connector members and without requiring the use of any tools for erection.

Another object is to provide a storage rack in which the connectors secure the posts rigidly in alignment with no exposed parts which could accidentally be engaged to loosen the connections between the posts during use in the warehouse.

According to a feature of the invention, the connectors automatically latch the posts in alignment by springing of the parts during erection of the racks.

The above and other objects and features of the invention will be more readily apparent from the following description when read in connection with the accompanying drawing, in which:

FIGURE 1 is a perspective view of stacked storage rack sections embodying the invention;

FIGURE 2 is an end view showing two end frames in disassembled relationship;

FIGURE 3 is a partial perspective view showing the aligned posts and connector plates; and

FIGURE 4 is a partial section through a connection between the aligned posts.

The racks, as shown in FIGURE 1, are in standard sections, each of which is formed of a pair of end frames indicated generally at **10**, connected by horizontal rails or support beams **11** which extend between the end frames and are connected to the vertical posts thereof. Each end frame is formed by a pair of vertical posts **12** which are of identical construction and which are preferably formed of sheet metal. As best seen in FIGURE 3, each post **12** has a web **13** which faces outwardly of the end frame, a pair of side flanges **14** which extend inwardly at right angles to the web and which terminate in inwardly turned edge flanges **15** at the inner faces of the posts. The edge flanges, as are shown spaced apart to leave a vertically elongated slots therebetween.

The end frames are completed by horizontal cross members **16**, extending between and secured to the inner faces of the posts and preferably by diagonal braces **17** so that each end frame forms a rigid structure. As best seen in FIGURE 3, each of the horizontal cross members **16** is a channel section sheet metal strip mounted in inverted position with its ends abutting against and secured to the edge flanges **15**, as by welding. The diagonal braces **17** may be relatively thin angle bars secured at their ends, as by welding, to the cross members **16** and the posts **12**, as shown. Preferably the endmost cross members **16** are spaced a short distance from the ends of the posts.

In order to connect the posts of vertically aligned end frames, connector strips **18** are secured in the ends of the posts of one connector frame and project therebeyond to extend into the ends of the posts of the other end frame. As shown, the connector strips are of channeled section with a solid web **19** abutting against and secured, as by welding, to the edge flanges of the upper rack section posts with side flanges **21** projecting outwardly at right angles to the web **19**. The side flanges are relatively narrow to extend approximately half the width of the side flanges **14** of the posts. In order to secure the connector plates in the posts against endwise movement, each connector plate is formed adjacent its free end with an inwardly projecting shoulder to engage under a complementary shoulder in the posts which do not carry the connector strips. As shown, the shoulder is formed by cutting the web of each connector strip adjacent to the lower end thereof and pressing out a wedge-shaped projection **22** which tapers toward the free end of the connector strip and terminates in shoulder portions **23**. The wedge-shaped projection **22** is of a width to extend through the slot between the edge flanges **15** of the posts and the projecting shoulder portions **23** and are of a length to project through the slot and to engage under the top web of the cross members **16** which span the slot and which define a complementary shoulder on the post. The spacing of the projecting shoulder portions **23** from the lower edge of the post **12** is just greater than the spacing of the lower surface of the web **16** from the lower edge of the post **12** to insure that the wedge shaped projection **22** will properly project beyond, snap in and engage the underside of the web **16**.

In use, when it is desired to stack one rack section above the other as shown in FIGURE 1, the rack sections may be preassembled with the rails **11** connected thereto at desired positions, and one rack section may then be elevated above the other and brought into alignment therewith as shown in FIGURE 2. Alternatively, the end frames of the rack sections may be connected in alignment and may then be raised to a vertical position and may have the support bars **11** mounted thereon. Other variations or the erection techniques may be used and the invention is not limited to use with any particular manner of erecting the racks.

Alternatively, the telescoping connector strips **18** may be attached to the lower rack assembly and project upwardly into the post **12** of the upper rack assembly and lock into a properly positioned cross member **16** as if the view in FIG. 3 was inverted. The advantage of this alternative is that each rack may serve as a base section for support on a floor without damaging the connector strips **18**.

However the erection is accomplished, the posts of end frames which are to be vertically stacked are brought into alignment and the ends of the connector strips **18** projecting from one set of posts are inserted into the ends of the other set of posts. By exerting endwise pressure to move the end frames together, the wedge surfaces on the projections **22** engaging the edges of the cross members **16** will cause a slight springing of the posts and connector strips which will allow the projections to pass the shoulders defined by the cross members **16**. After the projections have passed the shoulders and reached the position shown in FIGURE 4, the parts will spring back and cause the shoulders to interengage each other thereby to latch the posts securely against endwise separation.

It will be noted that in the latched position the posts are held securely in alignment by the connector strips. Sidewise movement is limited by the fact that the connector strips at opposite edges of an end frame are pulled tightly against the edge flanges **15** of the posts by springing of the end frame assemblies. It will furthermore be noted that the connector strips are completely concealed and protected by the structure of the posts and cross members themselves so that they cannot be accidentally engaged and released when erected in a warehouse.

An additional optional cross member **24** may be welded to the edge flanges **15** to reinforce the post **12**. The cross member **24** provides additional resistance against pullout of the connector strips from the posts **12**.

What is claimed is:

1. An improved connection for use with storage-rack units that are to be vertically tiered, said rack units and connection comprising, in combination: each rack unit having a pair of elongated, vertical, hollow posts positioned in a plane and each post with an elongated slot formed therein in alignment with the slot in the opposite hollow post, a cross-member in the plane of the posts rigidly affixed perpendicularly to the pair of hollow posts adjacent one set of terminal ends of said posts and providing thereon retaining shoulders bridging the slots in the posts and spaced from the adjacent terminal ends of the posts, a pair of elongated connectors secured one each within the pair of hollow posts of one of the rack

units, each connector having a portion thereof readily secured to its posts in bridging relation to the slot therein and having the remainder thereof projecting ouptwardly of the terminus of the post with a connector shoulder formed thereon, the posts with connectors extending therefrom being capable of slight springing apart to allow the connector shoulders of one rack unit to pass the retaining shoulders of an adjacent rack unit when a pair of units are being tiered and then springing back toward each other to cause latching engagement between the two sets of shoulders so that they cannot be accidentally released, the elongated connectors being channel-shaped in cross-section and serving to rigidify the terminal ends of the posts to which the connetcors are secured, and reinforcing means bridging the slot in the post on the exterior of the post and being located between the retaining shoulder and the adjacent terminal end of the post.

2. An improved connection as in claim **1** wherein the cross-member is channel-shaped in cross-section with the web of the channel bridging the posts' slots to provide said retaining shoulders, and the legs of the channel being positioned to extend away from the adjacent terminal ends of the posts to provide concealment and protection for the connector shoulders when a pair of rack units are tiered.

3. An improved connection as in claim **1** wherein the elongated connectors are channel-shaped in cross-section with the web of the channel bridging the slot in the corresponding post, and the connector shoulder is formed by a punched out portion of the channel's web having an outer surface tapering toward the outwardly distal end of the connector to provide a cam surface that assists in springing the connector during tiering assembly of rack units.

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U.S. Cl. X.R.

182—178; 211—148; 287—189.36