

Sept. 9, 1969

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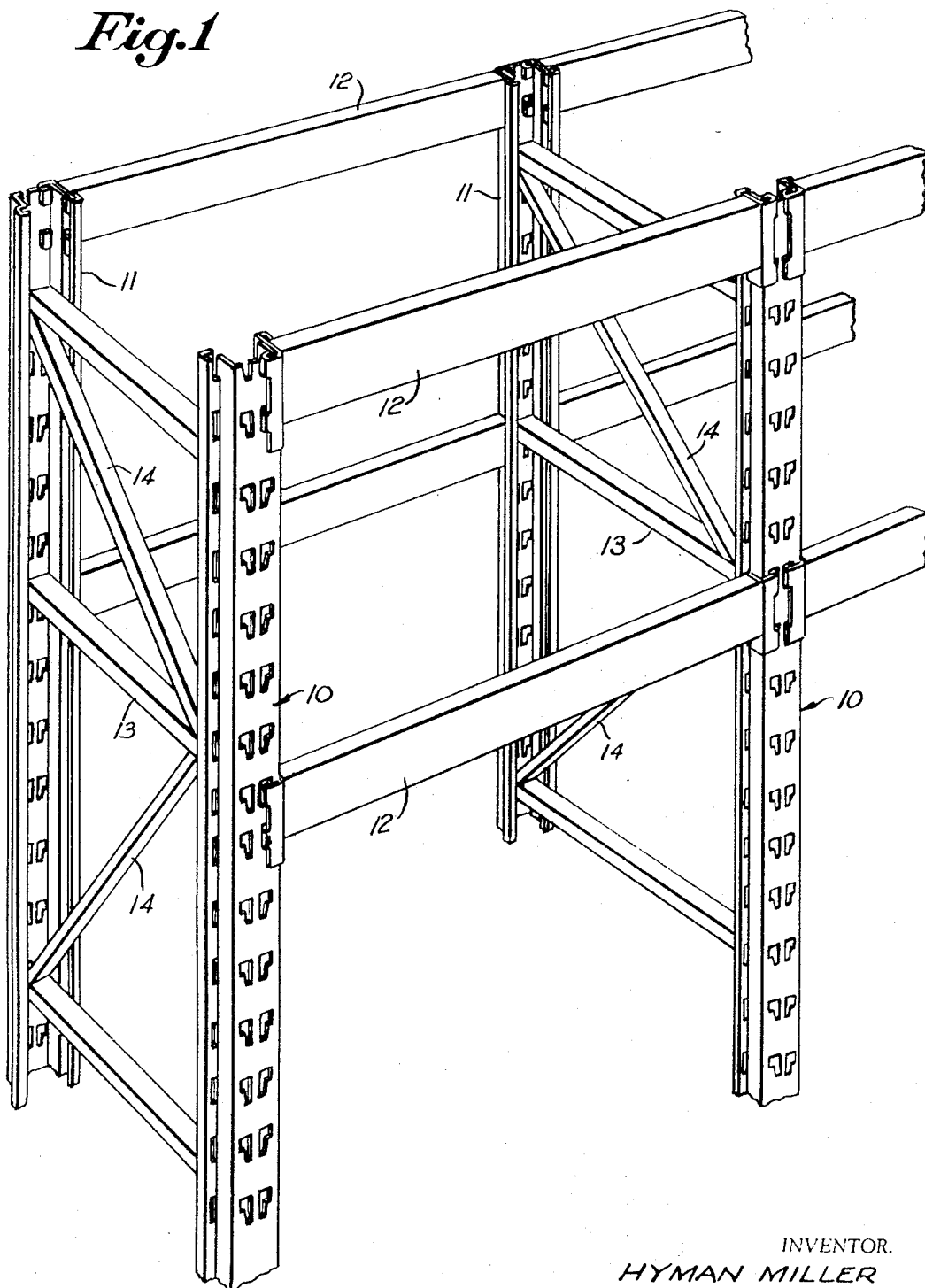
3,465,895

STORAGE RACK

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2 Sheets-Sheet 1

Fig. 1



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Fig. 2

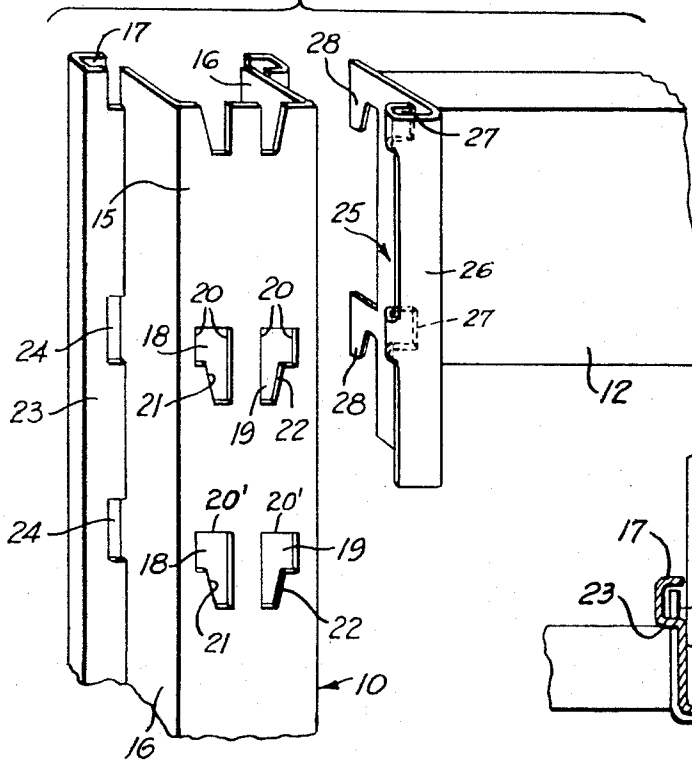


Fig. 4

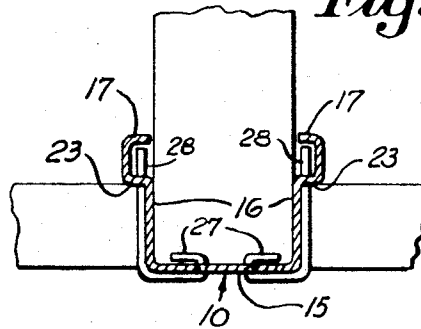


Fig. 3

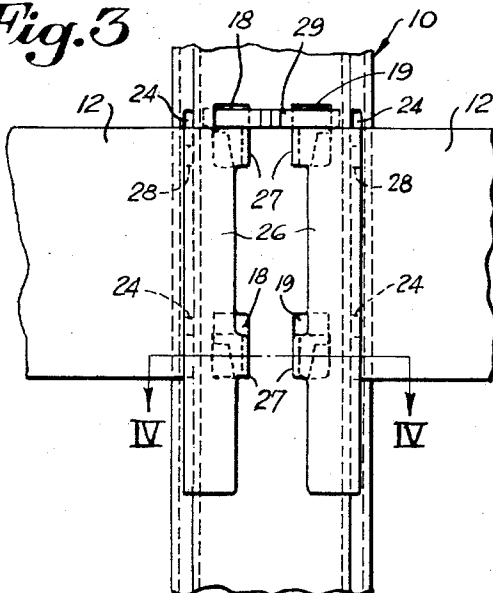
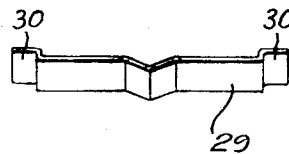


Fig. 5



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STORAGE RACK

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1 Claim

ABSTRACT OF THE DISCLOSURE

A storage rack has a shelf stringer with firmly connected end plates. The front portion of an end plate has two spaced hooks located one above the other and bent at about 180 degrees to extend back toward the stringer. The shelf stringer is attached to a post which is U-shaped and has apertures for the hooks. These apertures have larger rectangular upper portions for the entry of the hooks and narrower, mostly rectangular lower portions. When the hooks are seated in the lower aperture portions, the hooks bear against the inner front wall of the post in the same area in which the front portion of the end plate of the stringer bears against the outer wall close to the corner of the post, thereby providing a very rigid connection.

This invention relates to storage racks and refers more particularly to racks of the adjustable knock-down type composed of detachably connected steel end frames and shelf stringers generally used for the carrying of pallets, skids, dies and various other items. Racks of this type are easily and quickly erected without the use of bolts or tools; they can be quickly dismantled, expanded or adjusted so as to be adapted to various storage requirements.

An object of the present invention is to provide an improved construction for a storage rack of this type which will be more rigid and will have a greater capacity than existing racks.

Another object is the provision of a storage rack which can be more easily constructed at lower costs than previously designed racks of this type.

Other objects will become apparent in the course of the following specification.

A storage rack includes vertical end frames each of which consists of a front post and a back post. These posts are interconnected by horizontal and diagonal cross braces. The width and height of an end frame depends on the size of the posts and cross braces. The end frames are joined by horizontally extending shelf stringers the location of which determines the level of the shelves upon which pallets, skids or other items can be placed.

According to an important feature of the present invention a more rigid connection is provided between each end of a shelf stringer and the post to which that end is to be attached. To attain this more rigid connection an end plate is welded or otherwise firmly connected to an end surface of the stringer. A front portion of the end plate extends in the longitudinal direction of the stringer and beyond the stringer; it has two spaced hooks located one above the other and extending rearwardly toward the stringer. A rear portion of the end plate extends beyond the stringer perpendicularly to the front portion and has two spaced downwardly extending hooks which are preferably in alignment with the front hooks. The post which is to receive these hooks is essentially U-shaped in cross section but its two rear ends are provided with substantially U-shaped channels which face each other so that the post is wider in the rear. Vertically extending slots are located adjacent these channels. The rear hooks of the stringer may be inserted through these slots so

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that they will be enclosed by the channels. The front portion of the post has apertures adapted to receive the front hooks of the stringer. These apertures are mostly rectangular in shape but, according to a feature of the present invention, each aperture has an edge portion which is inclined downwardly toward the center of the post. A steel retainer strip is preferably fitted into each pair of apertures to hold the front hooks firmly within the apertures.

The four hooks of each end plate of a stringer thus provide a four point connection which is much more effective than the two or three points of support of prior art constructions which result in eccentric loading. According to the present invention the load on a post is uniformly distributed between its front and its rear portions. This provides a symmetrical loading, thereby making it possible for the rack to support greater loads. The shape of the posts of the present invention which are wider at the rear than at the front due to the provision of the rear channels, greatly increases the rigidity of the posts, making it possible for them to hold greater weights and to better resist front and side stresses. Furthermore, posts of this construction can better resist impacts should a load hit a post accidentally while it is being placed into the rack. In addition, the open U-shaped construction of the posts makes it possible to use spot welding for the purpose of joining front and back posts by horizontal and diagonal cross braces. Heretofore, these connections had to be made by slower, more expensive arc welding requiring the use of skilled workmen. On the other hand, the channelled posts of the present invention provide direct access for horizontal and diagonal cross braces allowing for an overlap of the vertical portion of the cross braces and the side walls of the upright posts. This makes it easily possible to use spot welding at greater production rates and lower costs, particularly since it may be carried out by unskilled or semi-skilled labor.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawings, showing by way of example, a preferred embodiment of the inventive idea.

In the drawings:

FIGURE 1 is a perspective view showing the general structure of a storage rack constructed in accordance with the present invention.

FIGURE 2 is a perspective view on a larger scale showing portions of a front post and a shelf stringer prior to their assembly.

FIGURE 3 is a front view showing substantially the same portions of the front post and the shelf stringer after they have been assembled.

FIGURE 4 is a section along the line IV—IV of FIG. 3.

FIGURE 5 shows a safety clip.

The storage rack shown in the drawings includes front posts 10, rear posts 11, shelf stringers 12, horizontal cross braces 13 and diagonal cross braces 14.

The front posts 10 and the rear posts 11 are of the same construction. Each post has a central portion 15 and two rearwardly extending flanges 16. Each flange terminates in a U-shaped channel 17, the two channels of each post facing each other. The central portion 15 of each post is provided with apertures 18 and 19. Two of these apertures 18 and 19 are located on the same level. They have horizontal 20' and vertical edges 20 extending at right angles. Apertures 18 also have a slanting edge 21 extending downwardly in the direction toward the middle of the portion 15. Apertures 19 have a similar slanting edge 22 also extending toward the middle of the portion 15. The pairs of apertures 18 and 19 are located one above the other at distances corresponding to possible desired spacings between the shelves.

The flanges 16 and their channels 17 form strips 23 extending parallel to the portion 15 and provided with elongated slots 24. The slots 24 are located on the same level as the pairs of apertures 18, 19.

Each front post 10 is firmly connected with a rear post 11 by horizontal cross braces 13 and diagonal cross braces 14. As already stated, the described shape of the posts makes it possible to connect the posts to the braces by inexpensive spot welding which can be effectively carried out since the ends of the braces can be easily inserted between the flanges of each post. Obviously, the height of the posts and the length of the braces may be varied to provide frames of various heights and widths.

The pairs of posts 10, 11 are removably joined by horizontally extending shelf stringers 12 which may be channel-shaped, rectangular or have a step-down tube structure. Obviously, stringers of other types can be used as well. Each stringer has two opposite flat ends, and a plate 25 is firmly connected to each end. The plate 25 has a front portion 26 extending parallel to the longitudinal direction of the stringer and ending somewhat below the stringer. The portion 26 has two hooks 27 extending rearwardly toward the stringer. The distance between the hooks 27 corresponds to the spacing between two apertures 19 and the size of the hooks corresponds to the size of the apertures.

The plate 25 extends rearwardly beyond its stringer and is provided with two downwardly extending rear hooks 28. The location of the hooks 28 and their size correspond to the size and location of the slots 24.

It is apparent that the rack is assembled by mounting the shelf stringers 12 so that their hooks 27 will enter into the apertures 19 or the apertures 18 and so that their hooks 28 will connect adjacent posts 10 or 11 forming shelf levels on which pallets, skids or other items can rest. The connection is accomplished without the use of bolts, loose clips or any other tools. The two hooks 27 provide a two point connection at the front of each post while the two hooks 28 provide a two point connection at the rear of the post. Thus a four point connection is provided which was found to be most effective, since it provides adequate safety against accidental dislodgment or pull out. Furthermore, the four point connection helps to prevent accidental rotation or disengagement of a stringer if it is accidentally lifted by fork truck operators when moving loads into or out of the rack. The shape of the hooks 27 has a rigidizing effect, since the tab portions of the hooks bear against an inner surface of the post, while the plate portion 26 bears against the outer surface of the post. This protects against a swaying or swiveling action of the stringer or post and provides a secure locking. The rear hooks 28 also have the effect of preventing horizontal twisting and sway and of preventing a vertical bending.

The provision of slanting edges 21 and 22 in the apertures 18 and 19 was found to be most effective. When the hooks 27 are seated in these apertures, the slanting

edges pull the stringer closed to the post, thereby providing a more rigid connection.

After the rack has been assembled, spring steel retaining strips 29, shown in FIG. 5, are preferably snapped into the apertures 18 and 19. Each strip 29 has ends 30 which enter into two adjacent apertures 18 and 19, thereby preventing any possible pull out of the hooks 27.

While the drawings show a conventional rack, it is apparent that the construction of the present invention is equally applicable to drive-in racks, drive-through racks, cantilever racks, as well as racks of many other types. It is also apparent that various other modifications may be made in the illustrated construction within the scope of the present invention.

What is claimed is:

1. In a storage rack having a post and a stringer, said post having a front portion and a rear portion, a device for connecting said stringer to said post, said device comprising a plate upon one end of said stringer and having two superposed hooks fitting into separate apertures formed in the front portion of said post and two other superposed hooks fitting into separate slots formed in the rear portion of said post, said plate having a front portion extending beyond said stringer and parallel to the longitudinal direction thereof, the two first-mentioned hooks being integral with said front portion and extending rearwardly toward said stringer, said plate also having a rear portion extending beyond said stringer perpendicularly to said front portion, the two other hooks being integral with said rear portion and extending downwardly in the plane of said rear portion, each of the first-mentioned hooks being in alignment with a separate second-mentioned hook, and a retaining strip having ends extending into two adjacent apertures and above one of the first-mentioned hooks to prevent disengagement of said hooks.

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