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MATERIALS HANDLING AND STORAGE RACKS

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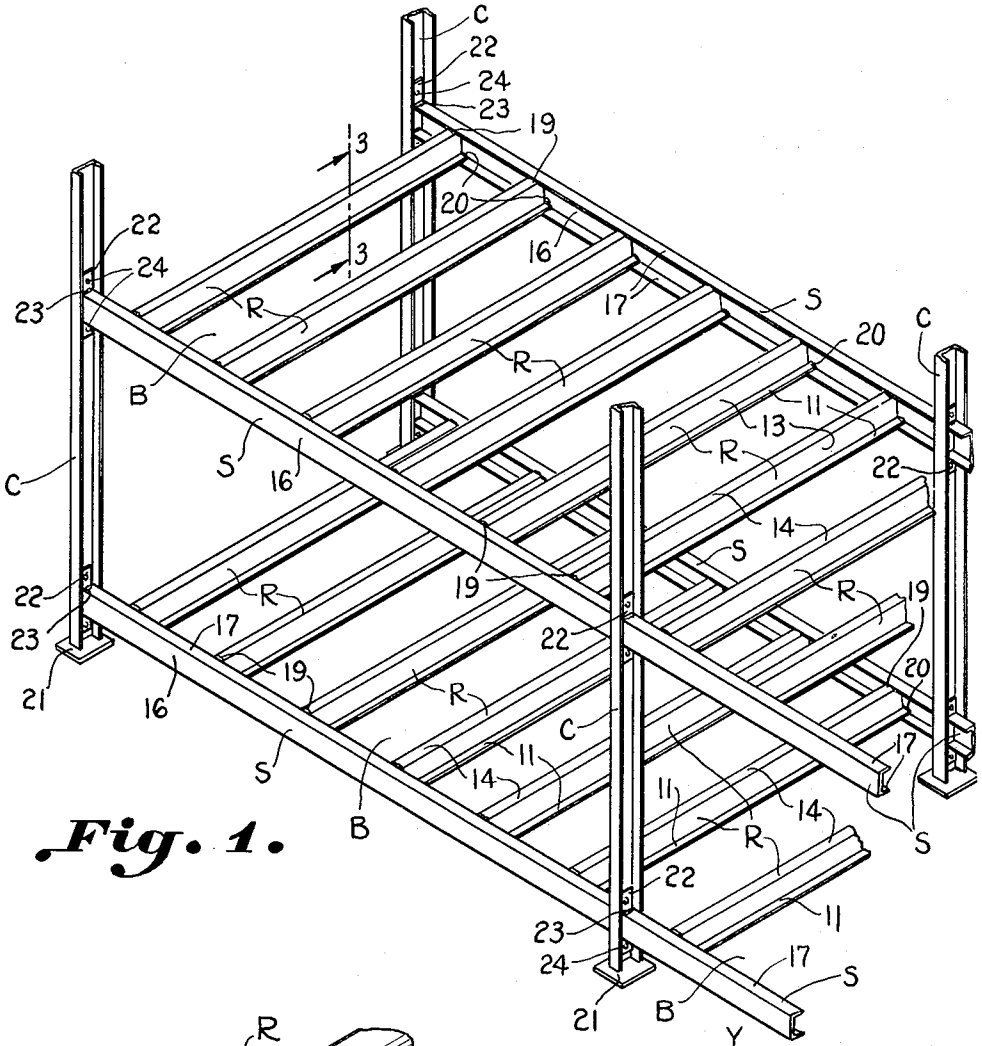


Fig. 1.

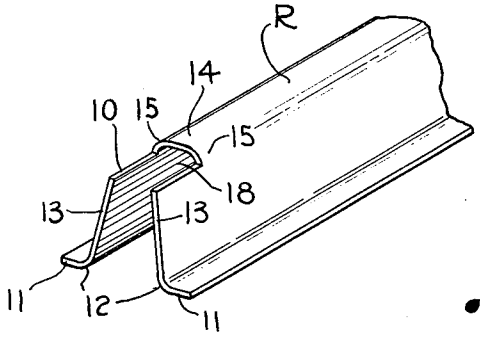


Fig. 2.

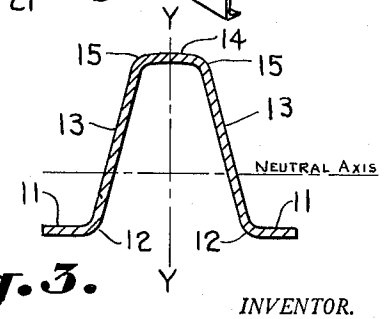


Fig. 3.

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MATERIALS HANDLING AND STORAGE RACKS

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This invention relates to storage racks and more particularly to an improved storage rack which especially facilitates the handling and storage of relatively large cartons constructed of cardboard and the like.

Many methods and devices have formerly been employed for the handling and storage of bulky materials; however, all these methods and devices have failed to provide solutions to many storage and materials handling problems. In many instances, bulky packages are simply stacked one on top of the other on the floor of the mill or warehouse in very large piles and, in other instances, such bulky material is stacked upon platens which are in turn stacked upon one another on the floor of the warehouse. Other warehouses and mills are provided with racks having relatively heavy frame members to support sheet metal shelves while others require the placing of the articles to be stored upon platens which are stored on awkward structural members. These storage problems are particularly pronounced in connection with the storage of textile goods because of their bulk. Such goods are usually stored in large cartons constructed of cardboard upon sheet metal shelves having a smooth surface to avoid damage to the cartons. Such storage means have many disadvantages, among them the inaccessibility of the packages to inspection and sprinkler water.

Accordingly, it is an object of this invention to provide an improved storage rack which will facilitate the storage and handling of bulky packages.

Another object of this invention is the provision of storage racks which will provide a smooth surface, but of open construction, for supporting bulky packages so that no platens will be necessary to support the packages on the racks.

Another object of the invention is to provide a storage rack having longitudinal stringers and a plurality of transverse runners which present a smooth, open shelf surface so that lift trucks may carry bulky packages and deposit the packages on the smooth surfaces presented by the stringers and runners.

Still another object of this invention is to provide a storage rack including a plurality of transverse runners constructed of relatively light gauge metal which present a rounded surface for protection of the cartons to be placed thereon.

Another object of this invention is to provide a storage rack including a plurality of runners which are constructed of relatively light gauge metal which present smooth, rounded surfaces for contact by the cartons and which are relatively deep so as to provide a large section modulus to make possible maximum utilization of steel employing a symmetrical section for vertical loading and horizontal flanges to provide some resistance to lateral loads.

Another object of this invention is to provide storage racks having an attractive, neat appearance and which will be of open construction to allow the passage of sprinkled water in case of fire in the mill as well as ready access to the packages stored thereon.

Some of the methods provided to carry out the invention will be hereinafter described.

The invention will be more readily understood from a reading of the following description and by reference to the accompanying drawings forming a part thereof wherein some illustrative examples of the invention are shown, and wherein:

Figure 1 is a perspective view showing a rack constructed in accordance with the present invention,

Figure 2 is an enlarged perspective view looking from the right hand front portion of the end of a runner constructed in accordance with the teaching of the present invention, and

Figure 3 is an enlarged transverse sectional view of a runner constructed in accordance with the teaching of the present invention.

Referring more particularly to the drawing, Figure 1 shows a plurality of vertical spaced channel frame members C for supporting a plurality of horizontal, elongated, spaced stringers S therebetween. A plurality of horizontal transverse runners R are held in spaced relation between opposed stringers and serve to support the relatively large cartons and packages by presenting smooth rounded upper surfaces therefor as will be discussed in greater detail below. In Figure 1, one complete bay B is shown together with a portion of a second bay B on the right hand side connected together by the plates 22 and a connected third bay B above. As many bays B as are desirable may be used in connection with the practice of this invention. The runners R are constructed of relatively light gauge sheet metal and have a pair of substantially vertical relatively high sides 13 converging slightly toward the top, an outwardly projecting flange 11 carried by the lower edge of each side, and a relatively flat top 14 having downwardly curving portions 15 joining the sides so that a smooth rounded surface is presented to support the packages to be placed thereon. Since the runners are symmetrical, they are designed for maximum use of steel since the vertical loads thereon will impose no torsional stress to the runners.

Preferably in the construction of the runners R, blanks of relatively thin sheet metal are cut by stamping operations in which notches 10 are cut in the ends of the blanks. The blanks having the centrally disposed rectangular notches 10 on each of their ends are each placed in a hydraulic press brake and die formed in one pressing operation.

The runners R have a pair of horizontal flanges 11 which extend outwardly in opposed relation to each other and are joined by curved portions 12 of the sheet metal blanks which form the runners R to upwardly extending slightly converging sides 13 which are relatively deep so as to increase the section modulus of the runner. The upper portion of the runners R have substantially flat top portions 14 which are joined by gently curving portions 15 to the sides 13. It will be noted particularly by reference to Figure 3 that the runners R are symmetrical about a vertical axis Y—Y and the neutral axis so that the shear center of the beam is coincident with the centroid of the beam so that the beam will not be subjected to torsional stresses thus making possible the use of a section constructed preferably of relatively thin sheet metal.

It will be noted that the stringers S are disposed with the webs 16 thereof vertical so that the flanges 17 face inwardly. The upper flanges 17 are accommodated by the cut-out portions 18 which are formed by the notches 10 so that the top of the flange 17 is substantially flush with the top 14 of the runner R. The runners are preferably welded in position by welding along the upper edges of the top portions 14 of the runners R and along the edges of the flanges 11 as shown at 19 and 20 respectively in the drawing. This provides a smooth surface for the reception of the cartons and the like by the stringers and the runners.

The articles to be stored are normally delivered to the rack by lift trucks and may be placed directly upon the runners without the use of platens which were heretofore necessary. The placing of the stringers so that the flanges 17 face inwardly prevents these flanges from being bent by contact with the lift trucks and makes a smooth surface for the reception of the articles. A showing of the cartons or relatively large packages, which the racks of the present invention are designed to accommodate, are omitted for purposes of clarity of illustration, but it is understood that these articles may be placed upon the stringers directly; and if the articles to be supported are too small to be supported by at least two stringers, a platen may be used.

Referring again to Figure 1, the vertical channel members C are supported by suitable base plates 21 and are secured thereto by any suitable means such as welding. Sway bracing is provided in the form of rectangular plates 22 to which the ends of the stringers are welded as at 23. The plates 22 are suitably secured to the web of the vertical channel members C by any suitable means such as bolts 24. The use of the plates 22 makes it unnecessary to use the usual angle bracing which has heretofore been used, thus conserving space and making possible the reception of more articles within a single bay of racks constructed in accordance with the embodiment of the present invention shown.

These racks present an attractive appearance and reduce damage to the cartons placed thereon due to the smooth rounded surfaces presented for reception of the cartons. Damage to products placed directly upon the runners is also prevented in a like manner. Since the cross section of the runners of the racks are symmetrical, a saving in metal is provided in making the racks lighter and reducing the costs thereof. The handling costs of the articles to be stored is reduced because of the direct accessibility of each carton because of the open construction of the racks. This open construction also makes possible the passage of sprinkler water which reduces insurance rates. By completely utilizing the space provided for the racks, it is possible to take full advantage of such storage space thus reducing the storage facilities. By making each carton directly accessible, the time lag in filling orders is reduced thus improving customer service and simplifies inventory control. The appearance and neatness of the entire storage operation has thus been greatly improved and together with these and other advantages results in an improved materials handling and storage operation.

The foregoing disclosure and description of the invention is illustrative and explanatory thereof and changes and variations will occur to those skilled in the art which may be made within the scope of the appended claims without departing from the spirit of the invention.

What is claimed is:

1. A materials handling and storage rack for the handling and storage of relatively large cartons constructed of cardboard and the like including, a pair of spaced horizontal stringers having horizontally disposed inwardly projecting flanges, a plurality of spaced runners disposed transversely of and fixed to said stringers so as to be supported by both of said inwardly projecting flanges, said runners being constructed of a relatively light gauge sheet metal having, a pair of upwardly projecting relatively deep aligned sides converging slightly toward the top thereof, an outwardly projecting substantially horizontal flange carried by the lower edge of each side, a relatively flat top and downwardly curving portions joining said top with said sides, and frame members supporting said stringers, whereby smooth rounded surfaces are presented to support the cartons.

2. A materials handling and storage rack for the handling and storage of relatively large cartons constructed of cardboard and the like including, a pair of spaced horizontal stringers having horizontally disposed inwardly projecting flanges, a plurality of spaced runners disposed transversely of and fixed to said stringers so as to be supported by both of said inwardly projecting flanges, said runners being constructed of a relatively light gauge sheet metal die formed blank having a pair of upwardly projecting relatively deep aligned sides converging slightly toward the top thereof, an outwardly projecting substantially horizontal flange carried by the lower edge of each side, a relatively flat top and downwardly curving portions joining said top with said sides, said runners having cut out portions at each end thereof to accommodate the upper flanges of the stringers to present a smooth surface for the reception of the cartons, and frame members supporting said stringers, whereby smooth rounded surfaces are presented to support the cartons.

3. A materials handling and storage rack for the handling and storage of relatively large cartons constructed of cardboard and the like including, a plurality of bays having, a pair of spaced horizontal stringers having horizontally disposed inwardly projecting flanges, a plurality of spaced runners disposed transversely of and fixed to said stringers so as to be supported by both of said inwardly projecting flanges, said runners being constructed of a relatively light gauge sheet metal having, a pair of upwardly projecting relatively deep aligned sides converging slightly toward the top thereof, an outwardly projecting substantially horizontal flange carried by the lower edge of each side, a relatively flat top and downwardly curving portions joining said top with said sides, said runners having cut out portions at each end thereof to accommodate the upper flanges of the stringers to present a smooth surface for the reception of the cartons, frame members supporting said stringers, and rectangular plates fixed to the ends of the stringers and fixed to said frame to serve as sway bracing and to connect the bays, whereby smooth rounded surfaces are presented to support the cartons.

4. In a materials handling and storage rack for the handling and storage of relatively large cartons constructed of cardboard and the like having a pair of spaced horizontal stringers and a frame supporting said stringers, a plurality of spaced runners disposed transversely of and fixed to said stringers so as to be supported by both of said inwardly projecting flanges, said runners being constructed of a relatively light gauge sheet metal having, a pair of upwardly projecting relatively deep aligned sides converging slightly toward the top thereof, an outwardly projecting substantially horizontal flange carried by the lower edge of each side, a relatively flat top and downwardly curving portions joining said top with said sides, and frame members supporting said stringers, whereby smooth rounded surfaces are presented to support the cartons.

5. In a materials handling and storage rack for the handling and storage of relatively large cartons constructed of cardboard and the like having a pair of spaced horizontal stringers and a frame supporting said stringers, a plurality of spaced runners disposed transversely of and fixed to said stringers so as to be supported by both of said inwardly projecting flanges, said runners being constructed of a relatively light gauge sheet metal die formed blank having, a pair of upwardly

projecting relatively deep aligned sides converging slightly toward the top thereof, an outwardly projecting substantially horizontal flange carried by the lower edge of each side, a relatively flat top and downwardly curving portions joining said top with said sides, said runners having cut out portions at each end thereof to accommodate the upper flanges of the stringers to present a smooth surface for the reception of the cartons, and frame members supporting said stringers, whereby smooth rounded surfaces are presented to support the cartons.

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