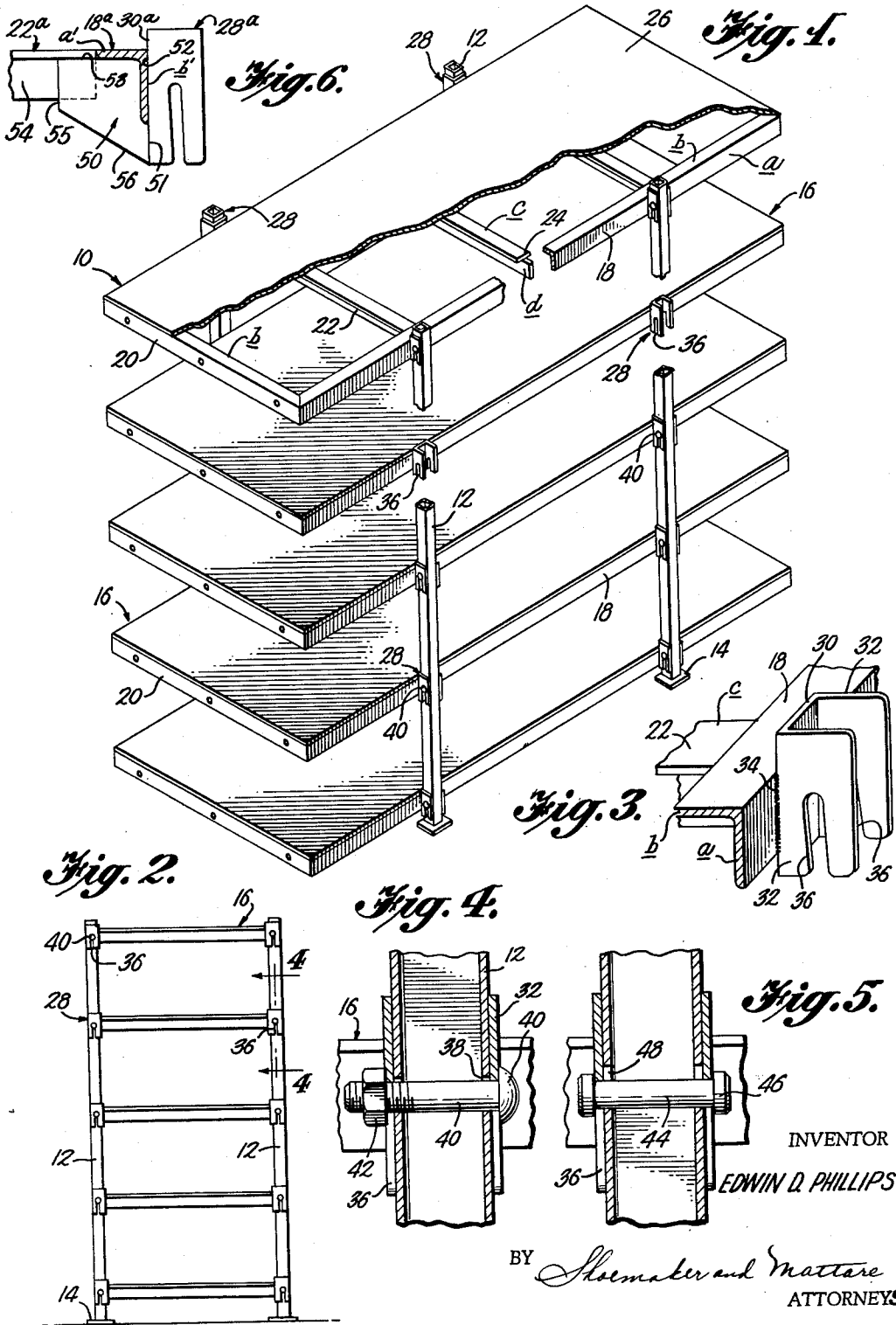


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INTERLOCKING JOINT  
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1

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## INTERLOCKING JOINT

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3 Claims. (Cl. 108—111)

This invention relates generally to the class of supports and is directed particularly to new and novel improvements in interlocking joints for the same.

In many business and industrial activities use is made of racks and stands upon which to stack articles of merchandise or various articles of equipment, tools and the like. It is also desirable that such racks and stands be of a design which will permit the easy placement of articles thereon and their removal therefrom without interference from corner posts and the like.

Racks and stands for use in the various activities referred to also frequently have to be moved and accordingly it is desirable that they be of a construction which will permit them to be easily disassembled and reassembled and where such racks and stands are of a substantial size it is of great advantage to have them constructed in such a manner that they can be knocked down and the parts assembled in a compact unit for easy transportation.

In the light of the foregoing it is a particular object of the present invention to provide a new and novel stand or rack construction embodying a number of supporting standards or posts and shelves for attachment thereto, wherein a novel type of interlocking coupling or joint is provided which facilitates the attachment of the shelves to the posts or standards without necessitating the use of wrenches or other tools.

It is another object of the present invention to provide in a structure of the above described character an interlocking joint or coupling for securing the edge portion of a shelf to a supporting standard in such a manner that the joint will automatically tighten itself as the coupling is effected between the shelf and the standard so that there will be no looseness or play between the coupled parts.

The invention more particularly contemplates the provision in a rack or stand structure of a plurality of standards or posts and a series of shelf frames with a clevis type coupling member carried by the frames for receiving the supporting posts or standards and engaging coupling pins carried by the posts or standards in such a way that a tight joint or connection may be automatically obtained when a clevis and pin are engaged with one another.

The invention will be best understood from a consideration of the following detail description taken in connection with the accompanying drawings, wherein:

FIG. 1 is a view in perspective of a rack or stand constructed in accordance with the preferred embodiment of the present invention and showing a portion of one shelf board and of a frame side member broken away to illustrate details of construction.

FIG. 2 is a view in end elevation of the set up rack.

FIG. 3 is a detail perspective view showing on an enlarged scale one of the post or standard engaging units.

FIG. 4 is a sectional view on an enlarged scale taken substantially on the line 4—4 of FIG. 2, showing the coupling pin or bolt carried by the standard and engaged by the coupling member or clevis.

FIG. 5 is a sectional view on an enlarged scale corresponding to FIG. 4 and illustrating another type of coupling pin carried by the standard.

FIG. 6 is a detail view illustrating a modified construction of the coupling unit wherein a reinforcing gusset plate is secured to the unit, the side rail and the web of a cross bar.

2

Referring now more particularly to the drawings, the numeral 10 generally designates a rack or stand constructed in accordance with the present invention and which is shown in FIG. 1 as embodying four posts or standards supporting a number of shelves. However, it is to be understood that this illustration is not intended to be limiting in any respect with regard to the number of standards which may be employed, or with regard to the number of shelves which may be supported thereby, since obviously a larger rack or stand might require the use of six or more posts or standards, three on each side of the rack, and the standards may be of any height to take any desired number of shelves.

In carrying out the invention there are provided the required number of posts or standards, each of which is designated 12 and which are here shown as being in the form of square or rectangular tubing. Each of the posts may be secured at its bottom end to a suitable foot in the form of a plate 14, as shown, or it may be provided with any other base forming means.

The posts or standards when assembled in the desired arrangement support between them a number of shelves, each of which is generally designated 16.

Each of the shelves comprises a frame of suitable dimensions, here shown as being rectangular and such frames comprise the longitudinal side rails 18 and the transverse or cross connecting end rails 20. The frame side and end rails are preferably fashioned of angle iron material and are assembled or joined together so that one flange of the angle is disposed vertically as indicated at *a* and the other flange is disposed horizontally, as indicated at *b* when the shelf is put into use or is attached by the hereinafter described interlocking joint or coupling to the posts.

In order that the frames of the shelves may be suitably braced or made rigid, particularly where the shelves may be of substantial length, a number of cross bars 22 are provided which preferably are of T cross section and a portion of each end of the head *c* of the T is cut away as at 24 so as to leave a projecting portion of the leg *d* of the T for engagement beneath the horizontal flange *b* of the side rail and this arrangement brings the ends of the head *c* into the same plane as the horizontal flange *b* of the adjacent frame rail. Thus the flanges *b* of the angle bar rails and the heads *c* of the cross bars will have their top surfaces in a common plane and will firmly support the shelf board 26 which is designed to be placed on the frame to complete the shelf construction.

This shelf may be of any suitable material such as plywood or it may be formed of sheet metal for use in those places where heavy material such as tools or metal units are to be stacked on the rack.

Each of the shelves has secured to the vertical flange portion *a* of each of two opposite rails thereof, two or more coupling units, each of which is generally designated 28 and which units are in the form of a clevis or substantially U-shaped cross section or of channel form and is joined to its supporting rail to have the channel opening directed outwardly therefrom to receive a post or standard 12.

The U-shaped or channeled clevises each embodies a back plate 30 and a pair of spaced parallel side flanges 32. The back plate 30 is welded as indicated at 34, against the vertical flange *a* of the supporting angle rail.

Each of the flanges 32 has formed therein a pin receiving slot 36 which opens through the bottom edge of the flange and these slots which are aligned with one another in the two adjacent flanges, are disposed at a slight downwardly and outwardly extending angle for the purpose hereinafter set forth. Preferably the angle of the slot 36 in each flange 32 is approximately 2° from the

3

vertical but it is to be understood, of course, that this angle may be varied slightly and accordingly this stated angle is only exemplary and is not to be considered as limiting in any way.

The posts or standards 12 are provided in their opposite sides with the transversely aligned holes or apertures 38 at spaced locations along the length of the post as required for proper vertical spacing of the shelves. These transversely aligned apertures of the posts are, in one embodiment of the invention, designed to receive supporting bolts or pins 40. Where such pins are in the form of bolts, as shown, the head 41 of the bolt on one side of the post and a nut 42 applied to the bolt at the opposite side of the post, cooperate with the adjacent faces of the post to hold in position a coupling member or clevis 28 when the post is inserted into the clevis and the latter is moved downwardly on the post so as to receive the ends of the pin or bolt in the angle slots 36.

Thus it will be seen from the foregoing that in assembling the rack or stand, the proper number of posts or standards are set up and the shelf frames may be disposed between them so as to couple the shelves by the interlocking coupling with the posts and where necessary, after establishing the coupling the nuts 42 may be drawn up on the bolts to firmly hold the flanges 32 in close contact with the engaged post.

Also, it will be seen that by forming the slots 36 at a slight angle or inclination from the vertical so that the top ends of the slots are closer to the frame rails than the bottom ends, the post will be drawn in tightly against the back 30 of the clevis so as to establish a firm tight coupling.

An alternative arrangement is illustrated in FIG. 5 where, in place of a nut and bolt unit to provide the supporting pins for the shelves, a one-piece pin 44 may be employed, having an integral flange or collar 46 on each end. Where this type of pin is employed the hole or aperture in each side of the post will be of slightly larger size so as to permit the flange 46 of the pin to pass through, such hole or aperture being designated 48. Also, it will be apparent that the length of the pin 44 and the size of the flange 46 on the ends thereof will be such that when the pin is in position there will be just enough space between each flange 46 and the adjacent side of the post to snugly receive a flange 32 of an applied coupling clevis.

As illustrated in FIG. 1, it is preferable that the members or clevises be attached to the opposite rails of the shelf frames inwardly of the ends of the shelves. By this arrangement it will be seen that access may be readily had to the shelves from the ends and at the sides near the ends, without interference from corner posts such as are commonly used in rack or stand constructions. Thus large objects or long objects can be easily placed on a shelf at the end of the stand without difficulty, avoiding the necessity of extending such object lengthwise between supporting posts or standards as would be required if such standards were at the corners of such shelves instead of being set back from the ends thereof.

In FIG. 6 there is illustrated a modification of the construction of the coupling unit. This modified unit is generally designated 28a.

The modification of the unit structure 28a resides primarily in the manner in which the same is rigidly coupled with the adjacent side rail and the adjacent end of a cross bar.

In this modified construction the side rail to which the unit 28a is secured, is designated 18a and the horizontal top flange and the vertical side flange are respectively designated a' and b'.

The numeral 22a designates a cross bar.

The numeral 50 generally designates a reinforcing gusset plate.

The gusset plate has an outer vertical edge which is designated 51 and which is recessed as at 52 from the top

4

of the gusset through a substantial portion of the edge 51 and as shown the edge portion 51 of the gusset is disposed against the back 30a of the unit 28a and the recess 52 receives the vertical flange portion b' of the rail 18a, to the outer face of which flange portion the back 38 of the unit 28a is also secured by welding or the like, the lower edge portion 51 of the gusset also being welded to this back plate of the unit.

The cross bar 22a is cut square across as shown and the top edge 53 of the gusset plate is positioned against and is welded to the under side of the horizontal flange a' of the side rail and to the under side of the head of the T-shaped bar and the web or vertical portion 54 of the bar is disposed against one side of the gusset plate and is welded thereto.

The inner edge 55 of the gusset plate is considerably shorter than the outer side edge in which the recess 52 is formed and the inner and outer edges are connected by the oblique bottom edge 56 as shown.

It will be seen that in the modified construction the end of the head portion of the cross bar 22a butts against the longitudinal edge of the top flange a' of the side rail and by welding the web portion 54 of the cross bar to the side of the gusset plate, together with the welding of the top and outer side edges of the gusset plate to the side rail and to the unit 28a a simple but very strong coupling is provided between the several parts.

From the foregoing it will be seen that there is provided by the present invention a new and novel rack or stand structure having novel means for coupling the shelves to the supporting posts whereby the stands may be easily disassembled or assembled to facilitate moving and transportation, and wherein the coupling means between the shelves and the standards is such that a firm, positive or tight connection will be automatically established when the parts are assembled.

As this invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrative and not restrictive, since the scope of the invention is defined in the appended claims, and all changes that fall within the metes and bounds of the claims, or that form their functional as well as conjointly cooperative equivalents, are therefore intended to be embraced by those claims.

I claim:

1. A sectional knock-down rack comprising at least two pairs of supporting standards and at least two shelf units, the shelf units having longitudinal sides and transverse ends and being horizontally disposed between the pairs of standards when the rack is set up for use, said shelf units each embodying a rectangular frame consisting of longitudinal side and transverse end rails of angle bar material and a shelf board, said angle bar material having one flange thereof disposed vertically and having the other flange disposed horizontally with the shelf board lying upon the horizontal flanges and having at least the longitudinal edges thereof flush with the outer sides of the vertical flanges of the frame side rails, said standards each being of approximately square cross sectional form, and means for coupling the longitudinal sides of the shelf units with the pairs of standards between which they are positioned, said means comprising short clevis members each being of a channel cross sectional form and embodying a flat back plate and spaced right angle flanges and each being disposed vertically with the back plate thereof lying against and rigidly fixed to a vertical flange of a longitudinal side rail of said frame and with the channel thereof directed outwardly, cross bars interconnecting the side rails between oppositely positioned clevises, means on said cross bars at the ends thereof engaging against the inner sides of the vertical flanges of the side rails to rigid-

5

ify the structure, each of said clevis members snugly receiving a standard in the channel thereof, the said flanges of each clevis having parallel slots therein extending from and opening through the lowermost edges of the flanges, and headed pins extending transversely through each of the standards beyond the sides of the standards and each adapted to be removably engaged in the slots of the pair of clevis flanges with the heads of the pins disposed upon the outer sides of the flanges, when the channel has a standard snugly seated therein.

2. A sectional knock-down rack as defined by claim 1 wherein the said means on the cross bars at the ends thereof consists of gusset members connected to the cross bars and to the said vertical flanges.

3. A sectional knock-down rack as defined by claim 1 wherein the said parallel slots in the clevis flanges are disposed at an inclination from the open lower ends thereof toward the adjacent side rail flange to which the clevis is fixed, whereby a post is drawn securely into the clevis upon engagement of the pins in the slots.

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