

June 28, 1960

W. J. HIGGINS
RECTANGULAR STORAGE RACKS EMBODYING RACK UNITS
OF STANDARD SPACE ALLOCATION

2,942,735

Filed April 10, 1958

3 Sheets-Sheet 1

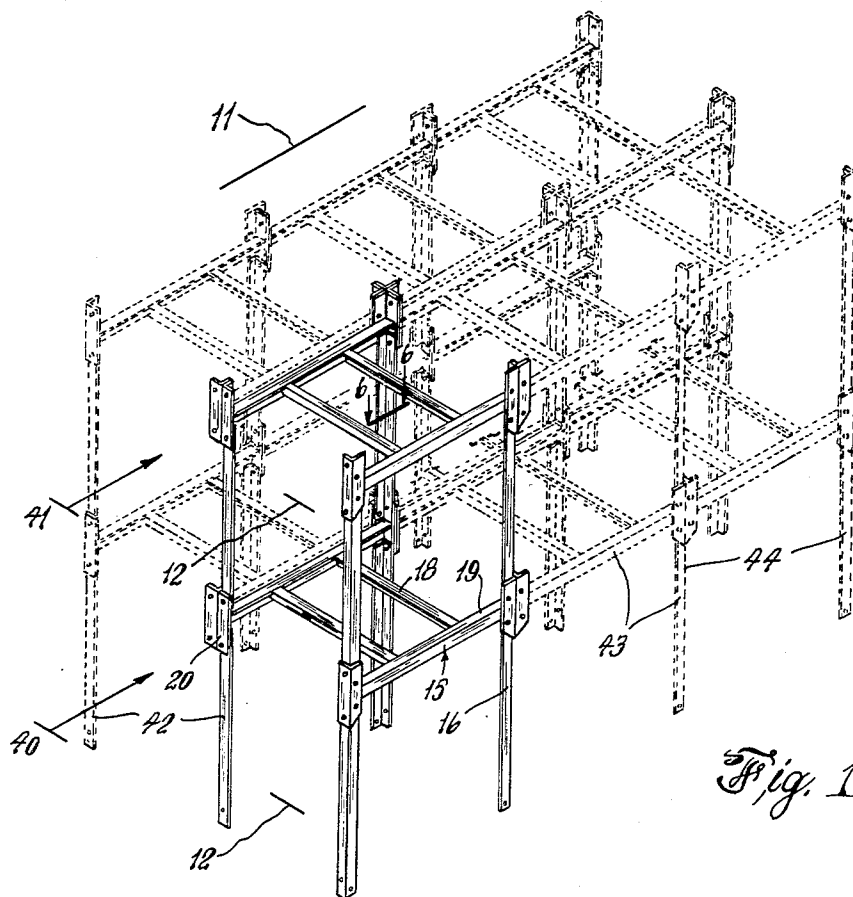


Fig. 1

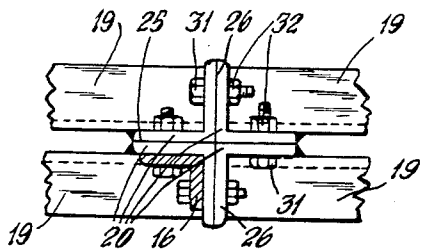


Fig. 6

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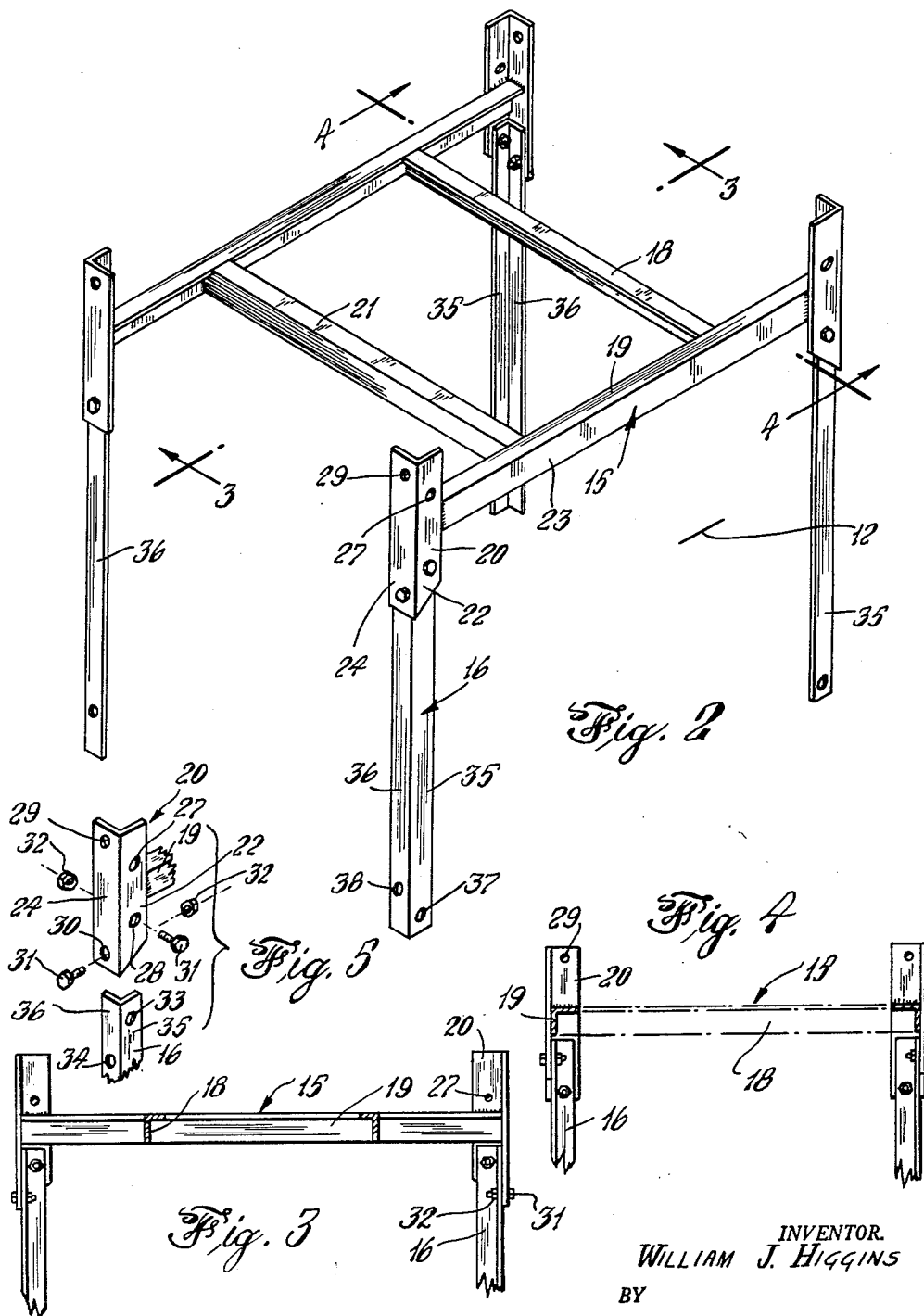
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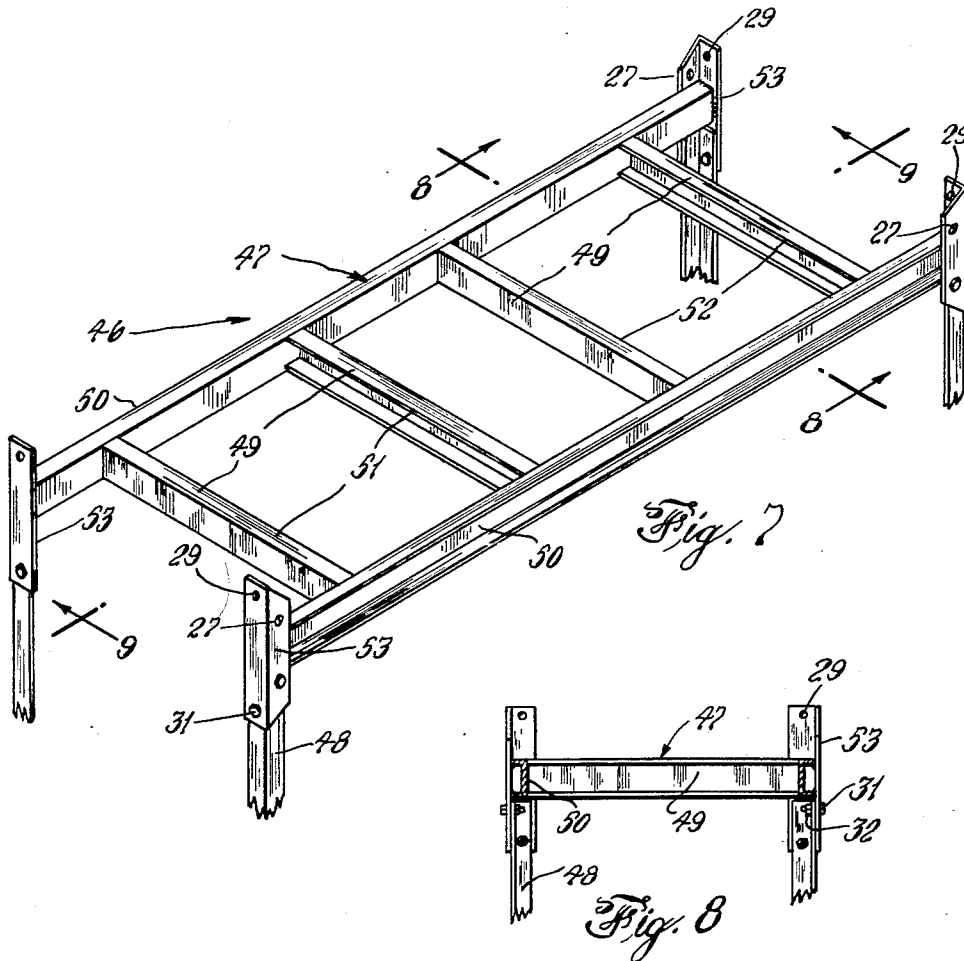
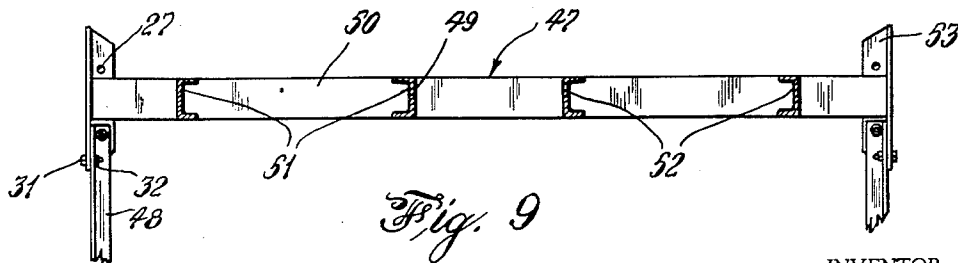
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**RECTANGULAR STORAGE RACKS EMBODYING
RACK UNITS OF STANDARD SPACE ALLOCA-
TION**

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6 Claims. (Cl. 211—148)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention pertains to the art of storing stock of various kinds in uniform increments of volume occupied thereby. The invention comprises extendible rack structure consisting of space-allocating rack units which are attachable one to another, the space allocated by any given unit constituting the same volume as volumetric increment of stock, or a higher multiple thereof. Novelty of the invention resides in the structure of a rack unit.

Rack structure of the invention may be extended horizontally to the extent of floor area allotted to storage, and also vertically to attain the optimum storage capacity of the allotted storage space. Accordingly, rack units are attachable to each other horizontally, as also in the vertical direction.

Each rack unit comprises a platform and its supporting elements or legs, and these constitute the essential components of any rack unit, as also the essential components of the rack structure throughout its horizontal and vertical extent. Platforms are interchangeably alike in the several rack units of a rack structure. Legs are interchangeably alike also, within a rack unit, and in the several rack units of the rack structure. Accordingly, a rack structure of any desired extent horizontally and vertically can be assembled from platforms and legs. In a given rack structure, each of all platforms can be the same, as also each of all legs.

A platform constitutes that component of a rack unit on which an increment of stock can rest, and defines the floor area that is occupied by a rack unit. Rack structure is extended as desired horizontally by attaching platforms, one to another. Legs are attached to platforms to extend downwardly therefrom, and are located wherever needed to support the rack structured and its load of stock. To extend the rack structure vertically, rack units are attached to each other, one above the other. Fastening devices are provided, by means of which platforms are attached to each other and legs are attached to platforms.

In the particular structure of the disclosed and preferred embodiment, fasteners are not secured to the essential components integrally, but instead constitute separate elements for attaching platforms to platforms and legs to platforms, the platforms and legs being provided with fastening devices companion to the fasteners. All fasteners are alike, and are interchangeable within a rack unit, as also throughout the several units of the rack structure. Thus, fasteners, all of which are alike, constitute the only requisite element of the rack structure in addition to like platforms and like legs.

A space increment of stock is rectangular, as also a rack unit, and a platform defines a rectangle. Structurally, a platform comprises rest rails arranged to define

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the plane of a surface of rest on which stock can bear. Rest rails consist of standard stock constituting each a length of elongate stress members, such as an angle iron, channel iron, etc., and are held in position by means of transverse rails, also consisting each of a length of elongate stress members. The transverse rails are secured to the rest rails to form a rectangular framework of rails. Juncture members are secured to the framework consisting of rest and transverse rails, to be positioned along the several edges of the platform rectangle, and they afford means for platforms to be secured to each other adjacently edge-to-edge in the several rectangular directions. Juncture members also consist each of a length of elongated stress members, and are secured to the rails which are secured to each other, preferably by welding to constitute a rigid integral structure.

The disclosed rack structure of the present invention is adapted particularly for storing stock on pallets or the like devices, in accordance with common practice in warehouses and transportation. A pallet consists of a flat panel constituting a rectangle, on which stock can rest. Support structure under the panel raises it above the floor, and provides space under the panel into which the fork or the like of a truck can be inserted to lift the pallet for transporting its stock to or from storage. The area of the panel of a pallet determines the horizontal area of an increment of storage space in a rack structure, the rack structure being somewhat larger to allow clearance for transporting a pallet to or from storage by means of a truck. The rectangular horizontal area of a rack unit can equal the horizontal area of an increment of storage space, or it can equal the area of several increments adjacently edge-to-edge. Thus, a rack unit can support either one pallet or several pallets adjacently, depending upon its size.

Platforms are constructed to extend rack structure indefinitely horizontally in both rectangular directions, each platform being attachable to any other platform interchangeably, in both rectangular directions, along either of opposite edges interchangeably. Rack structure can be assembled to constitute a single row of increment storage spaces, which can be backed against a wall or the like, providing frontage for each increment along an aisle through which a truck can travel to or from any increment in the two, selectively. Rack structure can be assembled also to constitute two rows of increment storage space back-to-back, each row fronting on an aisle, the several aisles extending parallel across the rack from each other.

Usually it is not desired to extend the rack structure in the depth-wise direction more than two rows of increment storage space, because it is preferred that each increment front on an aisle to be accessible by means of a truck. In the frontage-wise direction, increment storage spaces, in one or two rows, can be extended indefinitely within the limits of floor space allotted to storage. Rack structure comprising either one or two rows of units can be extended vertically by assembling rack units in tiers, limits of vertical extension of the rack structure being indefinite within the vertical dimension of space allotted to storage. The number of tiers of rack units is limited also by the height to which a truck is able to lift a pallet of stock. The length of a leg is determined to provide the desired vertical dimension of an increment storage space. In the disclosed structure, all legs are the same length, and are positionable interchangeably throughout the rack structure.

Several practical embodiments of the invention are disclosed in the accompanying drawings, in which

Fig. 1 is a perspective of rack structure embodying the invention,

Fig. 2 is a perspective of a rack unit of the rack structure of Fig. 1,

Fig. 3 is a cross-section, taken on line 3—3 of Fig. 2,

Fig. 4 is a cross-section, taken on line 4—4 of Fig. 2,

Fig. 5 is an exploded view of details of the rack unit in Fig. 2,

Fig. 6 is a cross-section, taken on line 6—6 of Fig. 1,

Fig. 7 is a perspective of another embodiment of a rack unit,

Fig. 8 is a cross-section, taken on line 8—8 of Fig. 7, and

Figure 9 is a cross-section, taken on line 9—9 of Fig. 7. Structure of rack 11, Fig. 1, consists of several rack units like the unit 12, Fig. 2. A basic or original rack unit 12 is assembled as seen in Fig. 2, and additional similar units are attached to unit 12 to extend rack 11 in both directions horizontally, as also vertically to constitute several tiers, as seen in Fig. 1.

As seen in Fig. 2, a rack unit consists essentially of platform 15, supported by upright members or legs 16, one of which is attached at each corner of the platform.

Each platform 15 comprises a support rest for storing material, constituting rest rail 18, each rest rail being secured at each of its opposite ends to a transverse rail 19 to form a rectangular framework of rails. A juncture member 20 is secured at each corner of the framework of rails 18 and 19, where it defines the corner of platform 15.

In the disclosed structure of Fig. 2, each rest rail 18 constitutes a length of angle iron, a surface 21 of one of its webs being positioned to constitute a surface of rest for stock in storage. Web faces 21 of the several rails 18 in platform 15 are located in a plane which defines the rest-surface of the platform. Rails 18 are held parallel, and near enough to each other to define continuity of the surface on which stock rests. The distance that rails 18 are spaced apart is determined by the structure of a pallet. Two rails 18 are sufficient, and are engaged by a pallet resting on the rails.

Transverse rails 19 hold rest rails 18 in their desired parallel relationship in platform 15, by being secured one at each of opposite ends of the several rest rails. Rails 18 being the same in length and positioned to extend coextensively, transverse rails 19 also thereby are held parallel to each other, and are extended coextensively to constitute a framework of rails 18 and 19, which forms a rectangle.

Each transverse rail 19, consisting also of a length of angle iron, extends along an edge of the framework rectangle of rails 18 and 19, the several transverse rails being along opposite edges of the platform rectangle. An end of each transverse rail is located at a corner of the framework rectangle.

According to existing practice, stock is delivered to, or removed from, any unit of rack structure 11, Fig. 1, selectively by means of a truck. Several units of rack structure 11 are arranged in a row fronting on an aisle, which is travelled by the truck to deliver or remove a pallet of stock respectively to or from the selected unit. Rack structure 11, consisting of several tiers, is arranged also to constitute vertical columns of units in the several tiers. Conventionally, the truck comprises a fork or the like on which a pallet may rest, and which may be lowered to deliver or remove a pallet at the level of the floor below platforms 15 of a column of units, or the fork may be raised to the level of the platform 15 of any unit in the column, onto which it deposits a pallet of stock or from which it removes the pallet.

At the selected unit, the truck turns in the aisle, and approaches the unit in the direction laterally of transverse rails 19 of its platform 15, moving lengthwise of rest rails 18 into position to lower a pallet where desired onto the rest rails, or to raise a pallet therefrom. Accordingly, transverse rails 19 of a platform 15 extend in the frontage-wise direction, one rail 19 being positioned

at the front of the unit adjacent to the aisle, opposite the rail 19 being positioned at the rear. Rest rails 18 extend in the depth-wise direction.

Juncture members 20 also consist of lengths of angle iron, and one is secured at each end of each transverse rail 19, the angle iron of the juncture member extending lengthwise of itself and laterally of the transverse rail in the direction normal to the plane of rest defined by faces 21 of the several rest rails 18. Rest rails 18 are secured to transverse rails 19 preferably by welding, juncture members 20 being secured to their transverse rails in like manner, to constitute a rigid integral structure in each platform 15.

Each juncture member 20 is secured along the inside surface of its web 22 against web face 23 of its transverse rail 19 at the end thereof, thus positioning the other web 24 of the juncture member projecting across the end of the transverse rail. Faces 25 and 26 of respective webs 22 and 24 of any juncture member 20, being at right angles to each other, are located in platform 15 to define a corner of the platform rectangle.

In any juncture member 20 at one end of a transverse rail 19, its web 22 is positioned to locate its web face 25 in the same plane with the web face 25 of juncture member at the opposite end of the transverse rail, thereby defining an edge of the rectangle of platform 15 in the frontage-wise direction. Of juncture members 20 secured to opposite transverse rails 19 of any platform 15, web faces 25 define opposite edges of the platform rectangle in the frontage-wise direction, and the distance between planes of web faces 25 of opposite transverse rails 19 measures the dimension of the platform rectangle in the depth-wise direction.

In the depth-wise direction, opposite edges of the platform rectangle that are adjacent to the edges in the frontage-wise direction of web faces 25 are defined by faces 26 of webs 24 of the several juncture members 20 of a platform 15. In juncture members 20 of any platform 15 at corresponding ends of opposite transverse rails 19, web faces 26 are located to lie in the same plane, the structure being symmetrically opposite at opposite ends of the several transverse rails. The planes of web faces 24 of juncture members 20 at opposite ends of the transverse rails 19 of a platform 15 define opposite edges of the platform rectangle in the depth-wise direction, and the distance between opposite planes of web faces 26 measures the dimension of the platform rectangle in the frontage-wise direction.

Any two platforms 15 positioned adjacently edge-to-edge along their engaging edges in the frontage-wise direction present web faces 25 of juncture members 20 of the two platforms in companion relationship abutting each other. Similarly, web faces 26 abut each other in companion relationship when any two platforms 15 are positioned adjacently edge-to-edge along engaging edges in the depth-wise direction.

The angle iron of any juncture member 20 is secured to its transverse rail 19 to extend lengthwise of itself in the direction laterally of the rail both above and below the plane of rest of its platform 15 that is defined in web faces 21 of rest rails 18. Fastening devices, in the disclosed structure constituting bolt holes 27, 28, 29 and 30 through the several webs 22 and 24 of each juncture members 20, are located to be uniformly companion to each other in the several platforms 15.

Web 22 of any juncture member 20 contains bolt holes 27 and 28 which are located equidistant respectively above and below the rest plane of platform 15. Similarly bolt holes 29 and 30 through web 24 are located in any juncture member 20 equidistant respectively above and below the platform rest plane. Bolt holes 27 and 28 in web faces 25, and bolt holes 29 and 30 in web faces 26, are each uniformly located uniform distances away from platform rest planes in different juncture members of any platform 15, and in different platforms.

Therefore, when any two platforms 15 are positioned adjacently edge-to-edge along engaging edges in their frontage-wise directions, companion web faces 25 of the two platforms abut each other face-to-face, and bolt holes 27 above the platform rest plane register with each other, as also bolt holes 28 below the rest plane. Similarly, when depth-wise edges of any two platforms 15 are positioned to engage each other along their companion web faces 26, bolt holes 29 above the rest plane register with each other, as also bolt holes 30 below. The described interchangeability is extended also between opposite edges of any platform 15 either in the frontage-wise or depth-wise direction, so that like bolt holes register with each other whenever either of opposite edges of any platform is positioned against either of opposite like edges of any other platform.

In web face 25 of any juncture member 20, both bolt holes 27 and 28, respectively above and below the platform rest plane, are positioned nearer to the rest plane than bolt holes 29 and 30 respectively above and below the rest plane in web face 26. This staggered relationship between bolt holes 27 and 29 of respective webs 22 and 24 above the rest plane, and between bolt holes 28 and 30 of the same respective webs 22 and 24 below the rest plane, provides added distance between adjacent bolt holes in the two webs affording increased resistance in greater torque arm against relative displacement in any attachment of several elements to each other. The result is added rigidity in structure 11. The added distance between relatively staggered bolt holes 27 and 29 and bolt holes 28 and 30, also affords more space for handling a tool to assemble rack structure 11. This relationship of bolt holes 27 and 28 of webs 22 both being nearer to the rest plane of a platform 15 than respective bolt holes 29 and 30 of webs 24 occurs at each corner of a platform rectangle in all juncture members 20 in all platforms 15.

Bolts 31 with companion nuts 32 are of a suitable standard size that is readily procurable, and fit all bolt holes 27, 28, 29 and 30, which are all of the same size, the bolts being all the same and interchangeable throughout structure 11. Bolts and nuts 31, 32 are the only elements, in addition to platforms 15 and legs 16 that are required to assemble a structure 11 of any extent. Essential components, consisting of platforms 15 all alike and legs 16 all alike, with fasteners all alike and consisting of standard bolts and nuts 31, 32, in respective quantities of each, are the only materials that need to be supplied to assemble rack structure 11 of any desired extent. Cost of material and assembly time are greatly reduced thereby.

Rock unit 12, Fig. 2, is an original unit, to which other units are attached to extend structure 11, Fig. 1, horizontally. Rack unit 12 consists of a platform 15 and four legs 16, with the required quantity of eight bolts and nuts 31, 32.

Each leg 16 constitutes a length of standard angle iron with holes 33 and 34 at one of its ends through its respective webs 35 and 36, and at its opposite end of the bolt holes 37 and 38 through its same respective webs 35 and 36. In web 35 at respective opposite ends of each leg 16, bolt holes 33 and 35 are each positioned near to its end of web 36. All legs 16 are the same, and may be placed interchangeably at the several corners of any unit throughout the extent of structure 11, Fig. 1.

At each of its ends alternatively, each leg 16 fits in companion engagement with the inside angle of the angle iron of any juncture member 20 of any platform 15, in either of both positions below and above the rest plane of the platform. Bolt holes 33 and 34 are positioned in respective webs 35 and 36 at one end of any leg 16 to register with respective bolt holes 28 and 30 below the rest plane of any platform 15 alternatively at each of two diagonally opposite corners of the platform rectangle, and also at each of the other two diagonally opposite corners, the same bolt holes 33 and 34 register with bolt

holes 27 and 29 above the rest plane of the platform. At corners where bolt holes 33 and 34 do not register with bolt holes 28 and 30 below the rest plane of the platform, bolt holes 37 and 38 at the opposite end of each leg projecting downwardly from the platform register with bolt holes 28 and 30 below the rest plane, and with the leg projecting upwardly bolt holes 33 and 34 at the other end of the leg register with bolt holes 27 and 29 above the rest plane. At all juncture members 20, bolt holes of web 35 of any leg register with bolt holes of web 22 of the juncture member, and bolt holes of webs 36 and 24 of leg and juncture member, respectively, register with each other, registry being the same at each of any diagonally opposite juncture members, but occurring at opposite ends of legs at the respective several sets of diagonally opposite juncture members in any platform 15.

To assemble platform 12, Fig. 2, two legs 16 are selected as to their appropriate ends for attachment each at one of diagonally opposite corners of the platform rectangle, the other two legs thereby being attachable at their opposite ends, one at each of the other two diagonally opposite corners. All the legs 16 are positioned to project downwardly from the platform 15. A bolt 31 through bolt hole 33 of a leg 16 in its web 35 registers with bolt hole 28 at each of diagonally opposite juncture members 20 of the platform 15, and another bolt 31 through hole 34 of web 36 of the leg registers at each of the same juncture members with bolt hole 30 of web 24. Inherently in this structure, at each of the other two diagonally opposite juncture members 20, a bolt through hole 37 in web 35 of a leg 16 registers also with hole 28 of web 22 of the juncture member, and another bolt 31 through hole 38 of web 36 of the leg registers with hole 30 also of the juncture member. A nut 32 on each of the bolts 31 is tightened to make rack unit 12 a rigid structure, as shown.

Lower tier 40, Fig. 1, consists of an original unit 12 of Fig. 2, to which other units are attached to extend rack structure 11 in position as desired to occupy a predetermined area of floor space allotted to storage. Attachment of added units to unit 12 and to each other may be continued indefinitely in opposite directions either frontage-wise, with companion web faces 26 of adjacent platforms 15 along depth-wise edges of platform rectangles abutting each other face-to-face, or also in opposite directions depth-wise, with companion web faces 25 of adjacent platforms along frontage-wise edges abutting each other face-to-face.

Unit 42 consists of two legs 16 and a platform 15 taken from supply with the required number of four bolts and nuts 31, 32. A leg 16 is attached to each of two adjacent juncture members 20 of the platform 15 along an edge of the platform rectangle in the frontage-wise direction. Either of opposite edges in the frontage-wise direction of any platform 15 may be selected for attaching the two legs 16, respectively, to its adjacently located juncture members 20, the opposite edge of the platform rectangle then remaining to be attached to the platform of unit 12. The two legs 16 are attached at their respective opposite ends to their respective adjacent juncture members 20 of attachment. A bolt 31 through hole 34 of one leg 16 registers with bolt hole 28 of web 22 of the juncture member 20 to which it is attached, and another bolt 31 through bolt hole 34 of the other web 36 of the leg registers with bolt hole 30 of web 24 of the juncture member. At the other adjacent juncture member 20 along the frontage-wise edge of the platform 15, bolt hole 37 of web 35 of the leg 16, containing a bolt 31 registers with bolt hole 28 of web 22 of the juncture member, and another bolt 31 through hole 38 of the leg registers with bolt hole 30 of the juncture member. A nut 32 is tightened onto each of the four bolts 31 to secure each leg 16 rigidly to its juncture member.

Platform 15 of unit 42 may be attached to the platform of unit 12 either after legs 16 are attached, while they

are being attached, or before. All platforms 15 are alike, and an operator saves time in taking a platform from supply for any added unit, because he is not required to select a platform that fits. Furthermore, whichever of opposite edges of a platform taken from supply happens to be most conveniently located in hand, either frontage-wise or depth-wise, will fit for attachment to the unit to which it is attached along either of its opposite like edges interchangeably. The operator is not compelled to rotate a platform 15 through a half turn to find an opposite like platform edge that fits, and this saves time.

To secure platform 15 of unit 42 to unit 12, nuts 32 are removed from bolts 31 of bolt holes 28 of webs 22 along an edge in the frontage-wise direction of the platform of unit 12, either of opposite edges being appropriate alternatively. Because of the interchangeability of platforms as described hereinbefore, bolt holes 28 of the added platform 15 of unit 42 will register with bolts 31 from which nuts 32 have been removed, and the nuts are re-applied to their bolts and tightened to secure the platforms of the two units 12 and 42 rigidly to each other.

Unit 42 attached to unit 12 extends lower tier 40 of structure 11, Fig. 1, in the depth-wise direction, and begins two rows of units attached to each other back to back, which may be extended in either of opposite or both directions frontage-wise, starting in each direction with two added platforms and three legs from supply and with the requisite number of six bolts and nuts 31, 32. One added platform 15 is attached to either unit 12 or 42, to extend tier 40 horizontally in either frontage-wise direction as desired, the other added platform being attached to the remaining unit 12 or 42. Two legs 16 are attached to one of the added platforms 15, and the third leg is attached to the other.

In the structure of Fig. 1, unit 43 is attached to unit 12, consisting of a platform 15 and two added legs 16. Nuts 32 are removed from two bolts 31 in bolt holes 30 of adjacent juncture members 20 of platform 15 of unit 12, and two bolt holes 30 along either of opposite depth-wise edges of the added platform will register to engage the exposed bolts. Nuts 32 now are re-applied to their bolts 31 and tightened to secure the two platforms 15 rigidly to each other. A leg 16 is attached to the remaining two juncture members 20 of the added platform. As in the case of the added legs of unit 42, one of the added legs of unit 43 is attached at its end embodying bolt holes 33 and 34 to its juncture member 20, and the other leg is attached at its end that embodies bolt holes 37 and 38.

The other added platform 15 that completes the rectangle of four units, is attached adjacently edge-to-edge onto unit 43, in the manner already described by which unit 42 was attached to unit 12, and the added platform is attached adjacently edge-to-edge onto unit 42 also, in the manner described by which unit 43 was attached to unit 12. Those juncture members 20 of the fourth added unit now are attached each to at least one juncture member of another unit, and a leg 16 is attached to the juncture member that remains unattached.

The angle iron of legs 16 is strong enough to support four corners of any four platforms 15 in structure 11, all loaded with stock, which are attached to each other as seen in Fig. 6. Accordingly, where any two or more juncture members 20 of different platforms 15 are attached to each other to extend the structure 11 horizontally, one leg only is attached, which may be projected away from any of the several juncture members that are attached to each other.

Extension of tier 40, Fig. 1, horizontally in the frontage-wise direction is limited according to the extent of floor area allotted to storage. In the depth-wise direction, preferred practice is to extend tier 40 the distance of two units only, to provide two rows of units back-to-back, each fronting on an aisle along which a truck may

travel to deliver stock to any unit in the row selectively, or to remove stock. A single row of units may be extended horizontally frontage-wise, in a manner that is obvious from the hereinbefore description, to front on an aisle and be backed against a partition or the like.

Stock may be stored on pallets, which may be rested on the floor below the platforms 15 and on the platforms of units that constitute tier 40, with one pallet below and one on top of the platform of each unit. Another tier 41 may be attached on top of tier 40 to extend structure 11 vertically, and if desired one or more other tiers may be attached on top of each other and on top of upper tier 41. The height to which structure 11 may be extended vertically is limited by storage space in the vertical direction, and also by the height to which a truck is able to lift a pallet of stock.

To begin upper tier 41, and any additional upper tier above tier 41, an original unit 12 is assembled first, which is attached on top of any unit of lower tier 40, the upper tier thereafter being extended horizontally in either or both of opposite directions frontage-wise, and also in the depth-wise direction, in a manner similar to the horizontal extension of lower tier 40 as described hereinbefore. Each additional unit of tier 41 is attached to a corresponding unit of lower tier 40, and units of the upper tier may be provided for all, units of the lower tier, or some only thereof if desired.

Each unit of upper tier 41 is attached to a unit of lower tier 40 by a bolt and nut 31, 32 through each bolt hole at the lower end of each of its legs, each bolt also being fitted through each bolt hole 27 and 29 above the platform rest plane in the unit of the lower tier at each juncture member 20 thereof. Because of the interchangeable structure of platforms 15 described hereinbefore, with all legs 16 being alike with the specific bolt hole locations 33 and 34, and 37 and 38, at respective opposite ends as described, the bolt holes 27 and 29 of each juncture member 20 in lower tier 40 register with bolt holes 33 and 34, or 37 and 38, at the lower end of the corresponding leg of the upper tier 41. Thus, all rack units of structure 11 in Fig. 1 are rigidly secured to each other by attachments between adjacent unit in both directions horizontally and in the vertical direction.

In the specific structure 11 of Fig. 1, unit 12 of upper tier 41 has been attached to unit 12 of the lower tier 40, and the several additional units of the upper tier are attached to each other and to unit 12 of the upper tier, in the manner described hereinbefore whereby lower tier 40 was assembled. It will be observed that, in the event of failure of any unit in the structure 11 of Fig. 1, for example if a leg 16 is struck by a truck traveling near the structure, the unit may be removed and replaced, or any of its components constituting a platform 15 and one or more legs 16, without the necessity of disassembling and rebuilding the whole structure 11 to make the repair.

It is observed that rack structure of the invention is not limited to a unit, such as 12, accommodating only one pallet of stock resting on its platform 15. The cost of material of supply for a rack structure, as well as the cost and time of assembling a rack structure, is greatly reduced when platforms are made to support two or more pallets adjacent to each other. Also, the material of stress members is not limited to angle iron as shown in the embodiment of Figs. 1 and 2, in the components of platforms 15 and legs 16.

Fig. 7 shows a modified structure of rack unit 46, consisting of platform 47, and legs 48, which is large enough to accommodate two pallets adjacent to each other on its platform, and two other adjacent pallets below the platform.

Platform 47 comprises the rest rails 49, in this embodiment constituting channel iron, and comprises transverse rails 50 constituting channel iron also. Four rest rails 49 are provided in pairs 51 and 52, each positioned in

platform 47 to constitute a rest surface on which a stand-
ard pallet of stock may be placed to locate the two
pallets adjacently in rack structure embodying rack unit
46. Rest rails 49 are located coextensively parallel,
each being secured rigidly at its respective opposite ends
to a transverse rail 50 in any suitable manner such as
by welding, transverse rails 50 also being located co-
extensively parallel to constitute a rectangular framework
of rails. A junctural member 53 is secured rigidly at
each of opposite ends of each rest rail 49, also by weld-
ing, to define the four corners of the platform rectangle
in a manner similar to juncture members 20 in the em-
bodiment of Fig. 2.

Except as hereinbefore described, rest rails 49 and
transverse rails 50 are like the rest and transverse, 18
and 19 respectively, in the embodiment of Fig. 2, ex-
ception being as to the greater length of transverse rails
50 and the inherently stronger stress members of channel
iron being preferred, as compared with angle iron.
Juncture members 53 of Fig. 7 are like juncture mem-
bers 20 of Fig. 2, except that a heavier gage of angle
iron is employed to support the heavier load. Legs 48
in the embodiment of Fig. 7 are like legs 16 of the em-
bodiment of Fig. 2, again except that a heavier gage of
angle iron is employed to support the heavier load.

Each juncture member 53 is provided with bolt holes
27 and 29 in the respective webs of its angle iron above
the rest plane of platform 47, and bolt holes 28 and 30
in the same respective webs below the rest plane of the
platform. Each leg 48 comprises bolt holes 33 and 34 in
its respective webs at one of its ends, and bolt holes
37 and 38 at its other end in the same respective webs.
Bolt holes 27, 28, 29 and 30 are arranged in juncture
members 53 the same as described hereinbefore with
reference to the embodiment of Fig. 2, and bolt holes
33, 34, 37 and 38 of legs 54 also are arranged the same
as in legs 16. Accordingly, a rack structure similar to
11 in Fig. 1 may be assembled, using platforms 47, legs
48, and bolts and nuts 31 and 32, in the manner described
hereinbefore by which the structure 11 is assembled.

A rack structure of platforms 47 and legs 48 may be
assembled to accommodate the same quantity of stock
in storage within less space than is required for rack
structure 11. Space that is allocated in a unit of the
embodiment of Fig. 7 for two pallets positioned adja-
cently, eliminating a leg between the areas of the two
pallets, requires less clearance for operating a truck
safely to deliver stock to, or remove stock from a rack
structure. The length of transverse rails 50 may be
shorter, accordingly, and this structure of platforms 47
is satisfactory if all rack units of the whole rack struc-
ture consists of the embodiment of Fig. 7. However,
the distance between opposite depth-wise edges of the
rectangle of platform 47 may be made the same as twice
the dimension of platform 15 in the frontage-wise direc-
tion, the length of transverse rails 50 being determined
accordingly. The latter structure enables any two adja-
cent units in the frontage-wise direction, in any tier 40,
41 of rack structure 11, to be removed and replaced by
a single unit comprising a platform 47 and legs 48, with-
out disturbing the remainder of the structure 11.

The cost of a platform 47 is much less than the cost
of two platforms 12. Therefore, the cost of rack struc-
ture according to the embodiment of Fig. 7 is less than
rack structure 11, and affords a saving in cost and time
to build a rack structure, as compared with rack struc-
ture 11 of the same capacity.

Several embodiments of the invention are disclosed.
Scope of the invention is defined in the accompanying
claims.

I claim:

1. In rack structure, a platform element comprising a

first transverse rail, a second transverse rail parallel to
and spaced from said first rail, a first rest rail having
its ends secured to said transverse rails and a second
rest rail having its ends secured to said transverse rails,
said second rest rail being parallel to and spaced from
said first rest rail, whereby said transverse and rest rails
define a double-barred H configuration, a plurality of
juncture elements each comprising an angle iron bracket
member having the inner face of one flange secured to
the outer side of a transverse rail and having the inner
face of the other flange secured to the end of said trans-
verse rail, each bracket member extending symmetrically
above and below the plane defined by said platform ele-
ment, and means to secure leg posts and like bracket
members of like platform elements to said bracket
members.

2. In the combination of claim 1, said securing means
for leg posts and like bracket members comprising first
holes in one flange of said bracket member at a first
distance from the proximate face of said platform ele-
ment and second holes in the other flange of said bracket
member at a second distance from the proximate face
of said platform element, each hole being adapted to
receive a bolt.

3. In the combination of claim 2, the platform ele-
ment further comprising a plurality of leg posts of angle
iron, each leg post having a hole in each end of each
flange adapted to mate with corresponding holes in the
flanges of said bracket members and a plurality of bolts
so securing each leg post to one of said bracket members.

4. In rack structure, the combination of claim 3 further
comprising a like platform element having selected
bracket members secured to bracket members of said
platform element and having like leg posts secured de-
pendingly to bracket members other than the bracket
members of said platform element and other than said
selected bracket members.

5. In rack structure, the combination of claim 3 fur-
ther comprising a plurality of like platform elements
having selected bracket members secured to bracket mem-
bers of said platform element, other selected bracket
members of one or more of said like platform elements
being secured to each other to provide coupled trans-
verse and lateral rows of platform elements, and having
like leg posts secured dependingly to each single bracket
member and a single like leg post secured dependingly to
one of two or more adjacent bracket members.

6. In rack structure, the combination of claim 5 fur-
ther comprising a like leg post secured upstanding from
selected single bracket members and single like leg posts
secured upstanding from selected ones of two or more
adjacent bracket members, and like platform elements
secured similarly to each other and to the ends of said
upstanding leg posts distal said bracket members, to pro-
vide a second level of platform elements.

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