

Aug. 18, 1964

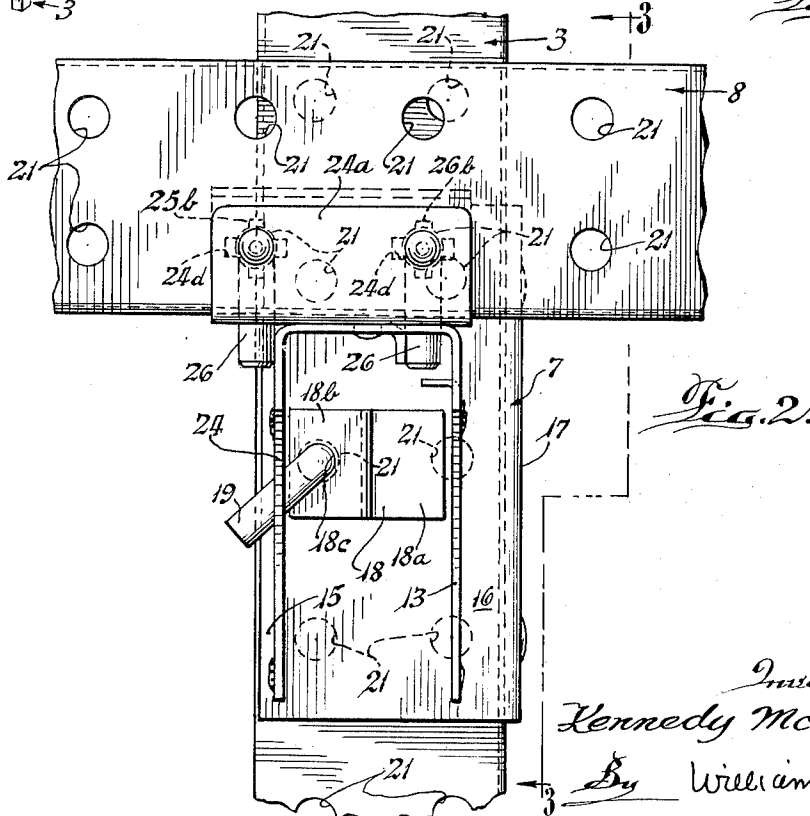
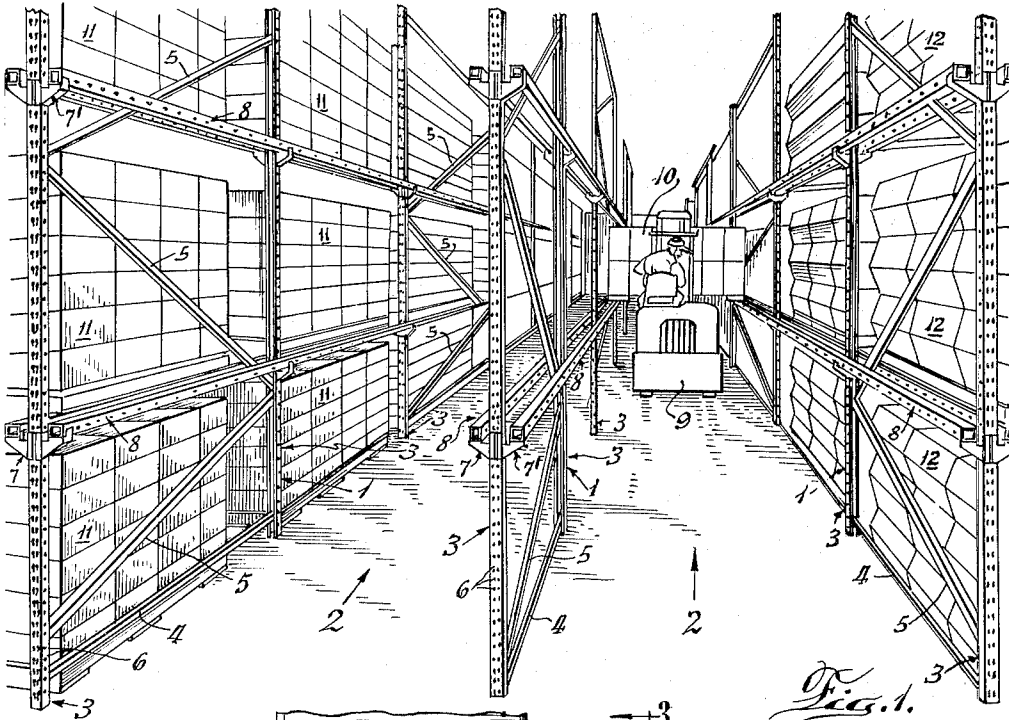
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3,144,944

DRIVE-IN PALLET RACK

Filed March 19, 1962

3 Sheets-Sheet 1



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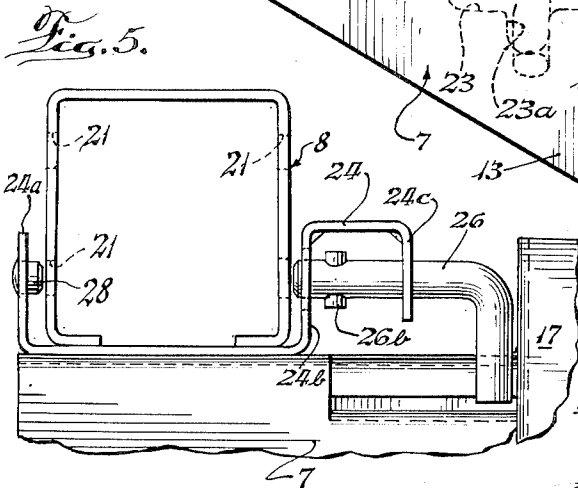
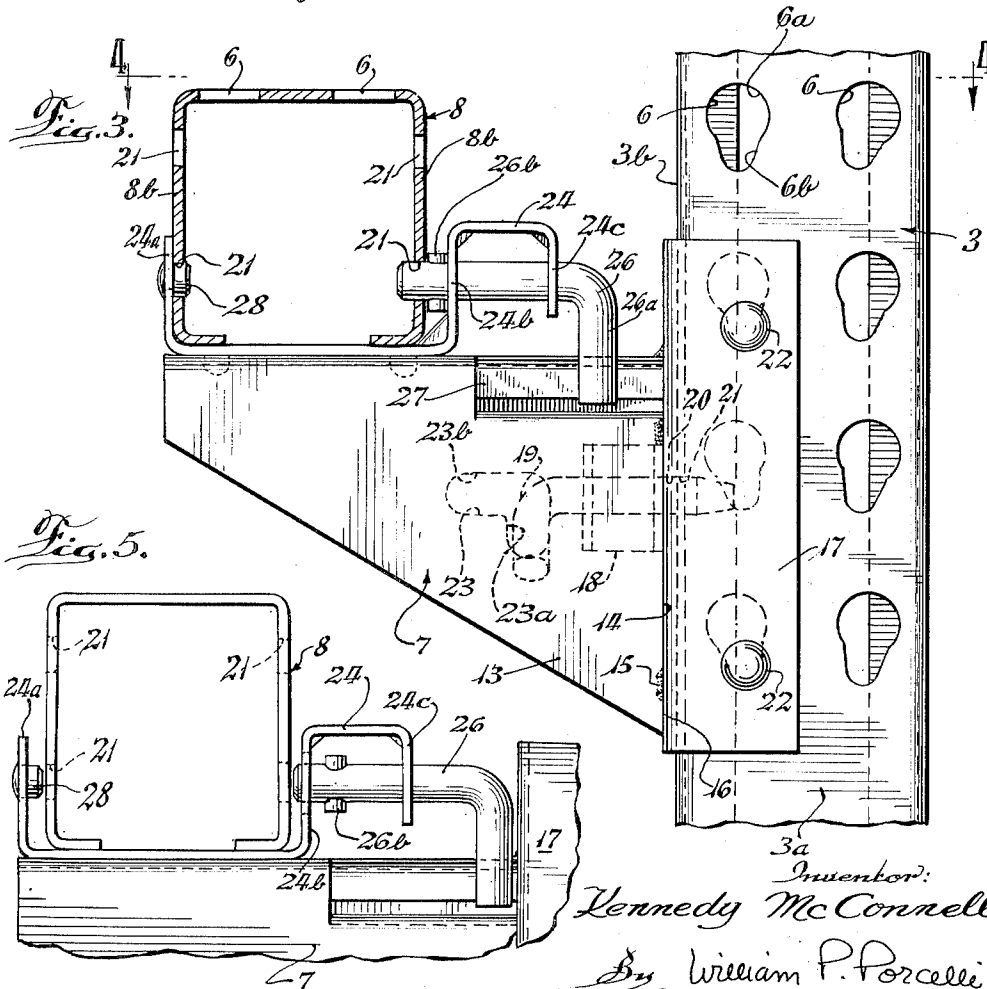
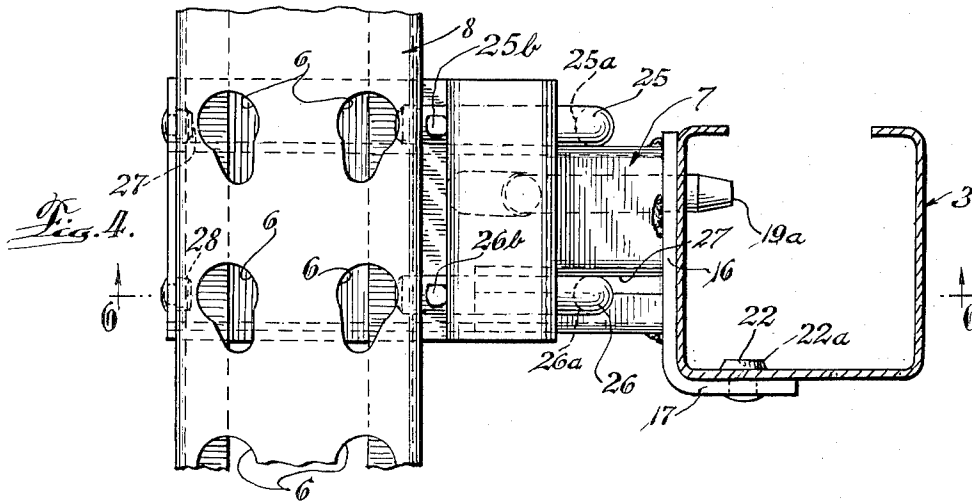
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DRIVE-IN PALLET RACK

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3 Sheets-Sheet 2



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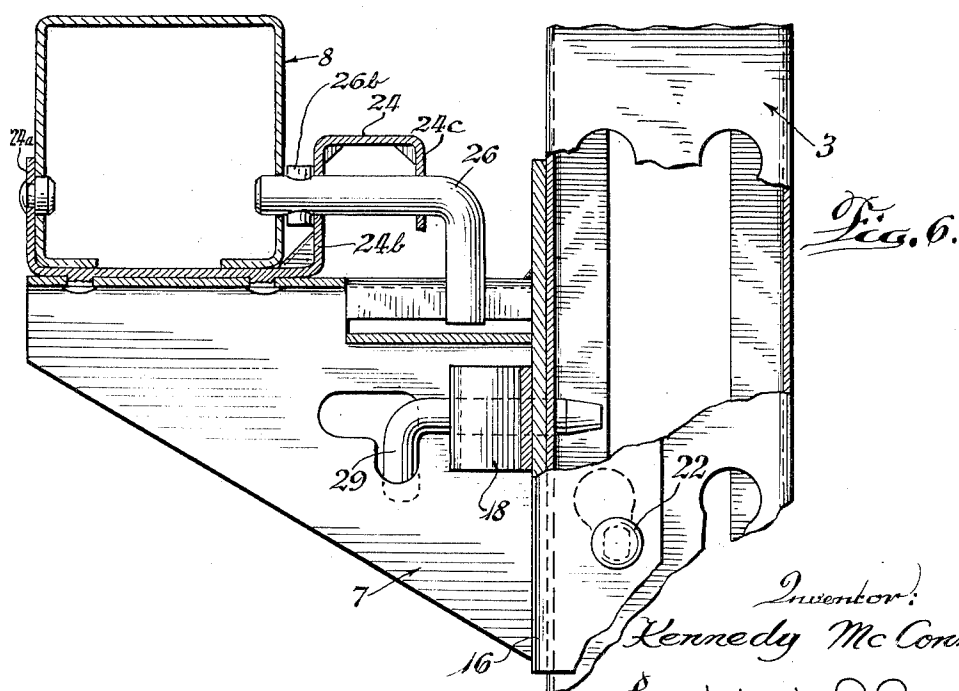
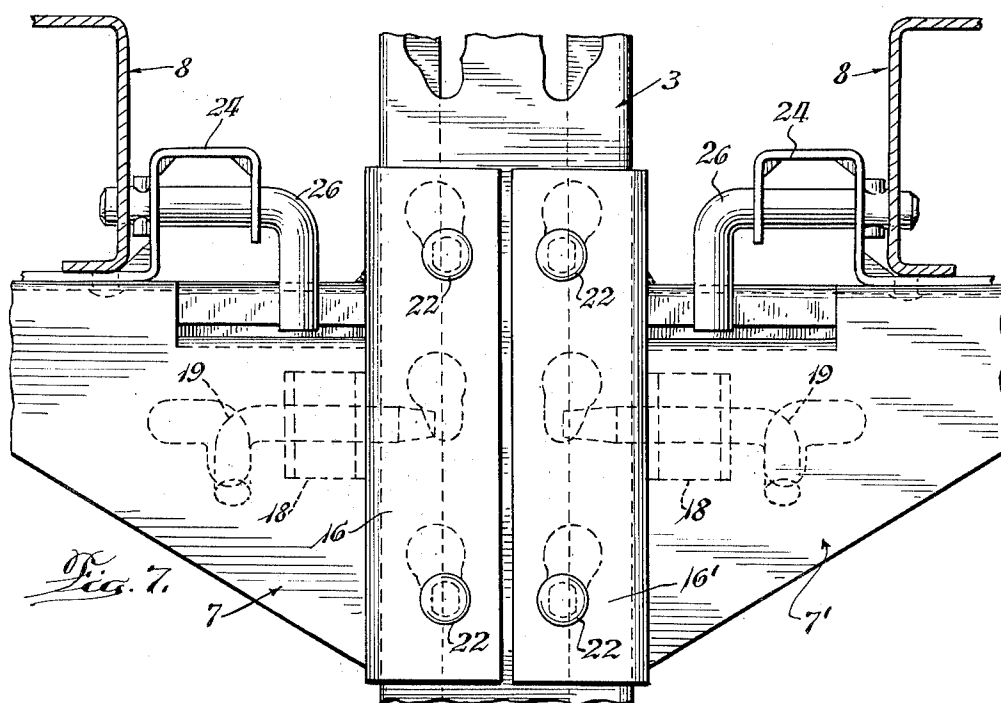
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3,144,944

DRIVE-IN PALLET RACK

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3 Sheets-Sheet 3



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3,144,944

DRIVE-IN PALLET RACK

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6 Claims. (Cl. 211-148)

This invention relates to the art of support structures commonly referred to as pallet racks and particularly to an improved type of drive-in pallet rack.

Presently, pallets or skids are in wide use as supports for loads of all varieties of materials. The skids or pallets are designed to support the loads and also permit the forks of a lift truck to be inserted through or below them in order to allow the palletized loads to be conveniently transported from place to place as required. Because of the increased usage of palletized loads, there arose a definite need for a pallet rack or support structure which can support the maximum number of palletized loads over a minimum floor space at a minimum cost.

Present pallet rack structures for this purpose are generally in the form of vertical upright members joined together by horizontal side to side and front to back members forming an open type skeletal structure. The vertical members are made along enough to support the horizontal members at vertically spaced intervals to provide a multi-tiered structure for supporting the palletized loads at different stacked levels. The vertical members are spaced horizontally from each other by calculated amounts to establish bays of given length to accommodate a given number of palletized loads in a row without waste of space on the pallet rack structure. An improvement over this basic type of pallet rack structure mentioned is the drive-in pallet rack which ordinarily consists of a self-supporting structure having one or more aisles for permitting entrance of a truck equipped with a fork for lifting a load. These aisles are divided from each other by vertical wall portions extending in a direction from front to back of the structure. They are provided with side shelves or supports, such as rails, extending horizontally from front to back along the sides of the vertical wall portions. The shelves or rails are spaced at different levels and are mounted opposite each other between the vertical wall portions at different vertical levels. These vertical wall members can be made very long so that their entire length can be equal to several times the length or width of a palletized load. With this arrangement, a palletized load can be elevated by means of a fork lift truck and driven into an aisle of the drive-in rack and positioned on the rails beginning at the rear of the rack, and another palletized load can be positioned forward of it. Additional palletized loads can be positioned all along the oppositely extending rails. The aisles provide a convenient way of allowing the fork lift trucks to be driven into the pallet rack for access to the loads.

For certain installations of such a drive-in pallet rack it has appeared desirable to provide more convenience for assembly of the side rails to the vertical wall members and, at the same time, provide ready removal of the rails if the pallet rack is to be disassembled and later reassembled, and it is the principal object of this invention to provide a pallet rack having this convenience. In order to accomplish this objective, the rails are detachably secured in place on rail supports by means of quickly releasable latches. These rail supports are in turn detachably secured to the vertical wall portions so that the rails and the rail supports can be quickly detached from each other and from the vertical wall portions when necessary.

It is another object of the invention to provide such a pallet rack structure which is not subject to accidental disassembly.

It is still another object of the invention to require a

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minimum number of free parts in order to assemble all parts together. Other objects and advantages of the invention can be better understood by referring to the accompanying drawings, in which

FIG. 1 shows a perspective view of a drive-in pallet rack as it appears during use;

FIG. 2 shows a portion of a vertical upright with a portion of a horizontal rail and its rail support secured to the vertical upright;

FIG. 3 shows a sectional view of the structure of FIG. 2 as viewed along the line 3-3 of FIG. 2;

FIG. 4 shows a sectional view as viewed along the line 4-4 of FIG. 3 looking downward on the structure;

FIG. 5 shows a view of the upper left hand portion of the structure shown in FIG. 3, except with the rail detached;

FIG. 6 shows a partial sectional and cutaway view along the line 6-6 of FIG. 4; and

FIG. 7 shows a view similar to FIG. 3, but with two rail supports and rails shown in position.

According to the general construction of the drive-in pallet rack, as shown in FIG. 1, it consists of a plurality of spaced apart parallel vertical wall members 1 separated from each other by aisle spaces 2. These vertical wall members consist of vertical uprights 3 spaced from front to back along the wall members by means of horizontal beams 4 and diagonal braces 5 which join them together rigidly. The vertical uprights 3 are provided with a plurality of keyhole openings 6 which are used to engage lugs or studs projecting from rail supports 7 and 7' mounted to project laterally from the uprights 3. These rail supports 7 and 7' support tubular rails 8 which extend from front to back along the lengths of the vertical wall members 1. They are detachably secured to these rail supports in a manner hereinafter described.

As viewed in FIG. 1, it is apparent that a fork lift truck 9 can be driven through the aisles 2 in order to transport a load 10 through the aisle and position it at the far end of the aisle between two opposite rails 8 mounted on oppositely positioned vertical wall members 1. After positioning of the load 10, another load can be driven in and positioned ahead of it. But, the rails at levels above must also be filled before loads are positioned toward the front of the aisles 2. Naturally, the first load to be positioned would be on the floor below the first level of rails if all of the usable space is to be occupied. The loads 11 and 12 shown in two aisles beyond the aisles 2 indicate how the aisles can be filled to use all the space in them.

As viewed in FIGS. 2, 3, 4 and 5, a more detailed view is shown of the connections between a rail 8, an upright 3 and a rail support 7. The rail support 7 is provided with an inverted channel shaped body 13 welded along its forward edge 14 to one wall 15 of an L-shaped flange 16 which has another wall 17 extending perpendicular to the wall 15 in a direction away from the body portion 13. The wall 15 of the flange 16 is provided with a Z-shaped bracket 18 having a portion 18a welded to the wall 15 and a portion 18b spaced away from the wall 15. This portion 18b is provided with an opening 18c in which is mounted an L-shaped latch 19. The wall 15 of the flange 16 is also provided with a hole 20 through which the latch 19 passes. The upright 3 is provided with a plurality of equally spaced holes 21 along two parallel rows and the latch is adapted to pass into one of these holes 21 when the L-shaped flange 16 is positioned against the upright 3 with one of the holes 21 aligned with the latch 19. The wall 17 of the flange 16 has flanged studs or projecting members 22 projecting from them and they are adapted to engage the keyhole openings 6 provided in parallel rows along the front wall 3a of each upright 3. The flanged end 22a of each stud 22 is slightly smaller

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than the larger portion 6a of the holes 6, but is of a larger diameter than the width of the smaller portion 6b of each of the holes 6. In order to provide a proper connection, each stud 22 is passed through the hole 6 by allowing it to pass into the enlarged portion 6a and then dropped down into the narrower portion 6b. The flanged end 22a of each stud then prevents passage of the stud back through the hole 6. Each wall 17 of the L-shaped flange is provided with two of these studs so that they can be connected to two spaced apart holes 6 and provide a rigid connection of the rail support 7 to the upright 3. These studs 22 thereby provide a connection along the front wall 3a of the upright. The latch 19 provides a connection along a side wall 3b of the upright 3. By means of the latch 19 and the studs 22 along two walls at right angles to each other of the upright 3 substantial rigidity is provided.

The latch 19 projects out through an L-shaped slot 23 in one wall 24 of the body portion 13. The slot 23 is provided with a vertical portion 23a and a horizontal portion 23b. When the latch is engaged in a position as shown in FIGS. 3 and 6, it is rotated so that its free end projecting through the slot 23 rests in the slot portion 23a. When unlatching is required, the latch 19 is rotated upwardly and slid longitudinally along the slot portion 23b to thereby disengage the extreme inner end 19a of the latch 19 from the hole 21 through which it is connected.

The body portion 13 is also provided with an S-shaped support 24 which is provided with three vertical walls 24a, 24b and 24c. The two walls 24b and 24c are provided with aligned holes through which are slidably mounted two L-shaped latches 25 and 26. The free ends of these latches are bent to provide handles 25a and 26a. The other ends of these latches are provided with locking pins or projections 25b and 26b which extend transversely through holes in the latches 25 and 26. The other vertical wall 24a of the support 24 is provided with two short studs or projecting members 27 and 28. As shown in FIG. 5, a rail 8 is adapted to be positioned between the vertical walls 24a and 24b of the support 24. For convenience, the rail 8 can be of the identical structure as the uprights 3 which means that they are provided with the holes 6 and the holes 21. With the rail 8 positioned between the walls 24a and 24b, the studs 27 and 28 and the latches 25 and 26 are aligned to pass into the holes 21 which extend in parallel rows along opposite side walls 8b of the rail until engagement of the studs 27 and 28 and the latches 25 and 26 are as shown in FIGS. 2, 3, 4 and 6.

As viewed in FIG. 2, the holes 24d in the vertical wall 24b are of a key slot design to accommodate the pins 25b and 26b in the latches 25 and 26. In order to pass the pins 25b and 26b through the holes 24d, the handles 25a and 26a on the latches are rotated ninety degrees from their positions as shown in FIG. 2 to align the pins 25b and 26b with the holes 24d. The pins 25b and 26b are then passed through the holes 24d and the latches are allowed to then rotate back to their vertical position, as shown in FIG. 2. In this position, the pins 25b and 26b are prevented from reverse movement through the holes 24d. With the rail 8 properly positioned, the latches 25 and 26 engage the holes 21 while the studs 28 also engage holes 21 to thereby retain the rail 8 in a fixed position.

In the region 27 of the body 13, the metal is slit and bent inwardly to provide clearance for the arm 26a of the latch 26.

When it is desired to remove the rail 8, the latches 25 and 26 are rotated ninety degrees and then retracted to clear their connector ends from the holes 21 of the rails 8. This allows the rail 8 to be shifted slightly to disengage the studs 28 from other holes 21 so that the rail 8 can then be removed.

In FIGS. 2 to 6 is shown how a single rail support 7 is mounted to an upright 3. In FIG. 7 is shown in detail

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how two rail supports are mounted on opposite sides of an upright 3. It is apparent that the rail support 7' shown at the right hand of the upright 3 is of opposite hand to the rail support 7 to the left of the upright 3. Other than this, the two rail supports 7 and 7' are identical and they support the rails in an identical manner by means of latches 25 and 26 and studs 27 and 28 engaging holes 21 in rails 8.

From what has been shown and described, it should be apparent that a structure has been shown between uprights, rail supports and rails whereby they can be easily connected together in a rigid and secure manner and easily disconnected from each other when required in order to change the structural arrangement and layout of the pallet rack. Although the connections include latch type connections, there are no separate loose parts required for latching. The latches are built into the rail support members and cannot be lost.

When extending the rails 8 for substantial lengths, it is necessary to use more than one rail length. When using a plurality of them, one after another, as a single rail, since there are two latches 25 and 26 on each rail support 7 or 7', the ends of rail lengths can be placed on the rail support 7 or 7' with their ends abutting each other. Then, one latch 25 or 26 is used for connecting to the one length at its end while the other latch is connected to the other length at its end. In this way, one latch 25 engages one rail end while the latch 26 engages the other rail end. If splicing in this manner is not intended, one of the latches 25 or 26 on each rail support can be eliminated.

Although only a single embodiment of the invention has been shown and described, it should be clearly understood that the invention can be made in other ways without departing from the true scope of the invention as defined by the appended claims.

I claim:

1. A rack structure of a type having upright skeletal walls spaced parallel to each other to form aisles therebetween, said walls having uprights which have connected thereto rail supports which in turn have connected thereto load support rails extending parallel to said walls, each connection between a rail support and a rail comprising, said rail support having two spaced vertical wall portions extending from its upper surface between which a rail is positioned, said rail being provided with a plurality of holes spaced from each other in rows at the same vertical level longitudinally along the rail, one of said wall portions having a projecting member directed toward the other said wall portion to align with one of said holes on one side of the rail positioned between the two wall portions, the other said wall portion supporting a retractable latch which is aligned with one of said holes on the opposite side of said rail, said latch being extendable to engage the hole it is aligned with while the projecting member is engaged with the hole it is aligned with to thereby form the connection between the rail support and the rail.

2. A rack structure defined by claim 1 characterized by, said latch having a projection adapted to engage the said wall portion in which the latch is supported to thereby retain the latch in its extended position.

3. A rack structure defined by claim 1 characterized by said latch being slidably mounted for retraction and extension through a hole in said wall portion which supports the latch, said hole being irregularly shaped to match an irregular cross-sectional shaped portion of the latch so that the latch must be specially oriented with respect to the hole to allow passage of the irregular portion through the hole, reorientation of the latch after passage through the hole preventing its return through the hole.

4. A rack structure defined by claim 1 characterized by, said latch being slidably mounted for retraction and extension through a hole in said wall portion which

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supports the latch, said hole being of keyhole shape to match a key shaped portion of the latch so that the latch must be specially oriented with respect to the hole to allow passage of the key shaped portion through the hole, reorientation of the latch after passage through the hole preventing its return through the hole.

5. A rack structure of a type having upright skeletal walls spaced parallel to each other to form aisles therebetween, said walls having uprights which have connected thereto rail supports which in turn have connected thereto load support rails extending parallel to said walls, each connection between a rail support and a rail comprising, said rail support having two spaced vertical wall portions extending from its upper surface between which a rail is positioned, said rail being provided with a plurality of holes spaced from each other in rows at the same vertical level longitudinally along the rail, one of said wall portions having a projecting member directed toward the other said wall portions to align with one of said holes on one side of the rail positioned between the two wall portions, the other said wall portion supporting a retractable latch which is aligned with one of said holes on the opposite side of said rail, said latch being extendable to engage the hole it is aligned with while the projecting member is engaged with the hole it is aligned with to thereby form the connection between the rail support and the rail, a connection between a rail support and an upright comprising, each rail support abutting two non-coplanar adjacent walls of the right, the upright being provided with first openings along a first of said adjacent walls for engaging a second projecting member on the rail support to provide support of the rail support along the first adjacent wall, each upright being provided with second openings along the second adjacent wall for engaging a second latch on the rail support to provide support of the rail support along the second adjacent wall, said second latch being movable on said rail support for engagement with and release from the second openings.

6. A rack structure of a type having upright skeletal walls spaced parallel to each other to form aisles therebetween, said walls having uprights which have connected thereto rail supports which in turn have connected thereto load support rails extending parallel to said walls, each connection between a rail support and a rail com-

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prising, said rail support having two spaced vertical wall portions extending from its upper surface between which a rail is positioned, said rail being provided with a plurality of holes spaced from each other in rows at the same vertical level longitudinally along the rail, one of said wall portions having a projecting member directed toward the other said wall portion to align with one of said holes on one side of the rail positioned between the two wall portions, the other said wall portion supporting a retractable latch which is aligned with one of said holes on the opposite side of said rail, said latch being extendable to engage the hole it is aligned with while the projecting member is engaged with the hole it is aligned with to thereby form the connection between the rail support and the rail, said latch being slidably mounted for retraction and extension through a hole in said wall portion which supports the latch, said hole being of keyhole shape to match a key shaped portion of the latch so that the latch must be specially oriented with respect to the hole to allow passage of the key shaped portion through the hole, reorientation of the latch after passage through the hole preventing its return through the hole, a connection between a rail support and an upright comprising, each rail support abutting two non-coplanar adjacent walls of the upright, the upright being provided with first openings along a first of said adjacent walls for engaging a second projecting member on the rail support to provide support of the rail support along the first adjacent wall, each upright being provided with second openings along the second adjacent wall for engaging a second latch on the rail support to provide support of the rail support along the second adjacent wall, said second latch being movable on said rail support for engagement with and release from the second openings.

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