Dec. 24, 1957 G. D. STOUGH 2,817,305

ANCHORING MEANS FOR ARTICLE HOLDERS WITHIN A TRANSPORT VEHICLE

Filed Nov. 9, 1955 2 Sheets-Sheet 1

FIG. 1

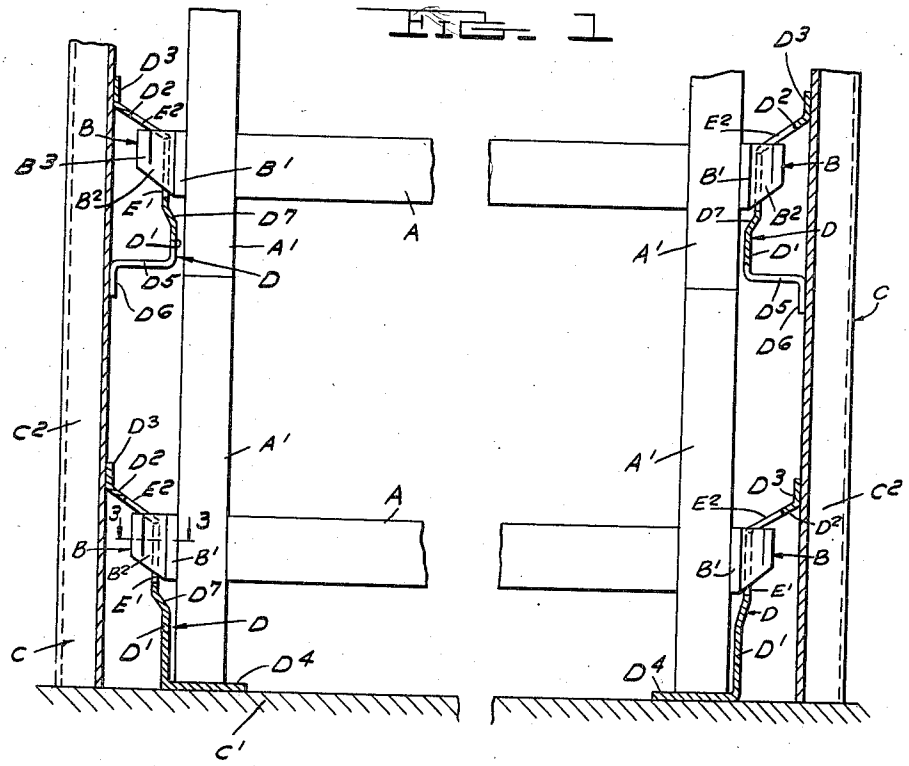
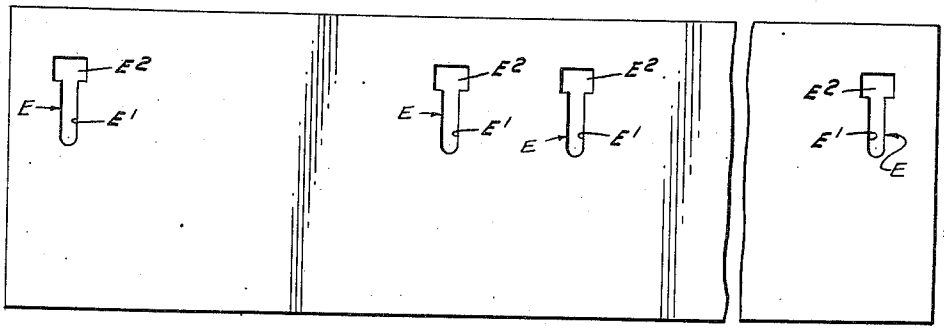



FIG. 2




INVENTOR.
GERALD D. STOUGH
BY
Whittemore, Hulbert & Belknap
ATTORNEYS

Dec. 24, 1957 G. D. STOUGH 2,817,305

ANCHORING MEANS FOR ARTICLE HOLDERS WITHIN A TRANSPORT VEHICLE

Filed Nov. 9, 1955

2 Sheets-Sheet 2

FIG. 3

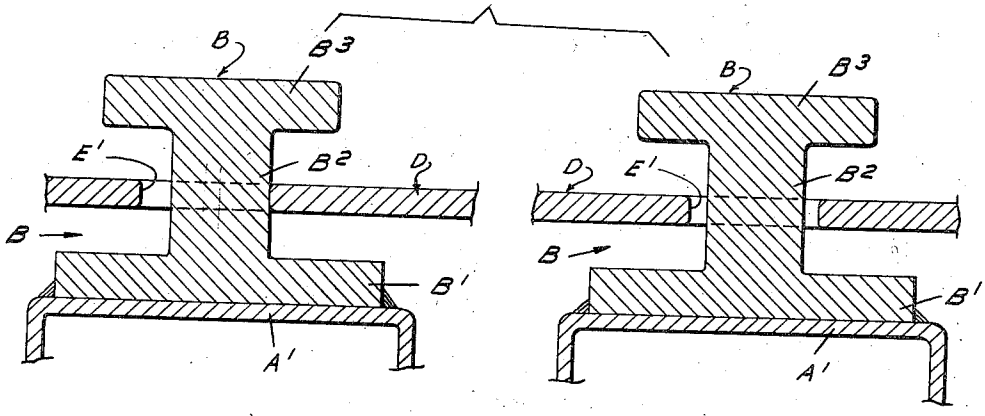
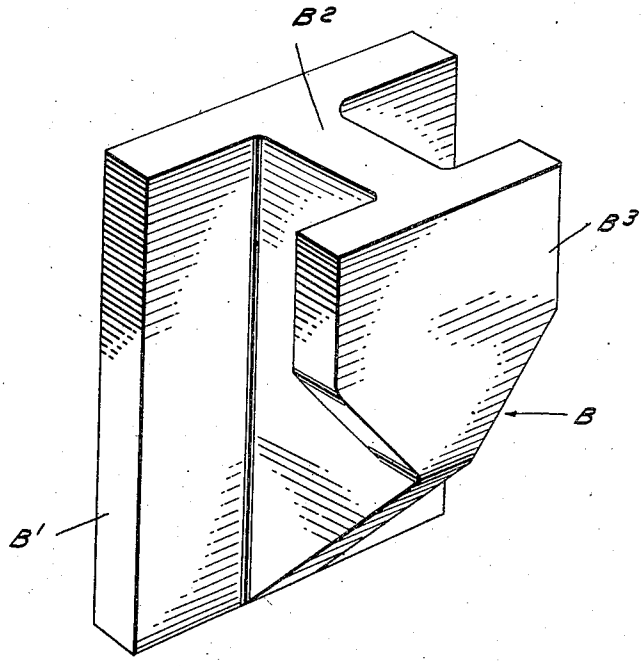



FIG. 4




INVENTOR.
GERALD D. STOUGH
BY
Whittemore, Hulbert & Belknap
ATTORNEYS

United States Patent Office

2,817,305

Patented Dec. 24, 1957



2,817,305

# ANCHORING MEANS FOR ARTICLE HOLDERS WITHIN A TRANSPORT VEHICLE

Gerald D. Stough, Detroit, Mich., assignor to Whitehead & Kales Company, River Rouge, Mich., a corporation of Michigan

Application November 9, 1955, Serial No. 545,873

10 Claims. (Cl. 105—369)

The invention relates to means for storing and anchoring articles of merchandise within transport vehicles and of that type forming the subject matter of my former applications for patent, Serial Nos. 467,264, filed November 8, 1954, now Patent No. 2,808,788, dated October 8, 1957 and 479,464, filed January 3, 1955, now Patent No. 2,808,789, dated October 8, 1957.

Briefly described, the individual articles are carried by holders or racks which are so proportioned as to utilize all available storage space within the vehicle and without waste. The weight of these holders and their content is carried by the vehicle floor but inertial stresses tending to shift the position of these holders are absorbed by a superstructure which in case of a railway freight car is attached to the side walls of the car. This is the most characteristic feature of the system, viz. carrying all gravitational load directly into the floor and absorbing all inertial stresses by the superstructure.

The superstructure, as shown in my former applications for patent above referred to, includes rails secured to the sides of the car to extend longitudinally thereof at different heights. Each rail has spaced vertical slots therein open at the top, and the racks or holders are provided with headed coupling elements which may be engaged with said slots when lowered to rest the weight upon the floor. Thus, each holder will be retained in the position in which it is originally placed and will also be held from transmitting any transverse stress to adjacent holders. However, holders over the same floor area may be arranged in a stack to occupy all the upper space within the car, gravitational load being carried from the upper members of the stack downward through the lower members thereof into the floor.

The instant invention is directed to the means for coupling the racks or holders with the rails of the superstructure and has for its object the avoidance of any tendency in said holders to tilt or move upward from the floor when subjected to shocks. This is accomplished by locating the couplings with respect to the center of mass of the holder and its content so as to impart shear stresses from certain of said couplings into the rails of the superstructure and thereby cause the resulting friction between the engaged surfaces to restrain such tilting movement. The invention, therefore, consists in the construction of this coupling means, as hereinafter set forth.

In the accompanying drawings:

Fig. 1 is a cross section through a portion of a railway car showing article holders or racks arranged in stacked relation, and anchoring means therefor.

Fig. 2 is a fragmentary elevation of a blank for forming one of the anchoring rails.

Fig. 3 is an enlarged fragmentary horizontal section on line 3—3, Fig. 1.

Fig. 4 is a perspective view of one of the lugs or coupler elements detached.

The article holder may be any suitable construction but preferably is a rectangular rack A having a length substantially equal to the distance between the side walls $C^2$ of a transport vehicle C. In use the rack A is adapted to extend transversely across the transport vehicle between said side walls $C^2$ thereof. At each of the four corners of the rack A are posts $A^1$ which may be formed of square tubes resting either directly on the floor, or in case of a stack, the posts of the upper racks will rest on and will be interlocked with those lower down, as in my application aforesaid bearing Serial No. 467,264. Each of the posts is provided with a horizontally projecting substantially T-shaped anchorage member or lug B, and each lug B is preferably a short section of I beam having its base portion $B^1$ welded to a post. As shown, the stem $B^2$ of the lugs B are substantially uniform or equal in width. Each stem $B^2$ extends outward from the base $B^1$ and a T-shaped head portion $B^3$ is at the outer end of each stem.

Preferably the transport vehicle C is a railway freight car having a load-sustaining floor $C^1$ between the opposite side walls $C^2$ thereof. D are horizontal rails or anchorage members secured to the side walls $C^2$ to extend longitudinally thereof at different levels. These rails are preferably formed of pressed sheet metal and each has a vertically extending or upright web portion $D^1$ spaced outward from the side wall $C^2$ to which it is connected and has at its upper end an obliquely extending or lateral portion $D^2$ terminating in a flange $D^3$ in contact with and secured to said side wall $C^2$. For each lower rail D there is a flange $D^4$ for attachment to the floor $C^1$ and for each upper rail there is a horizontal portion $D^5$ terminating in a flange $D^6$ for attachment to said side wall $C^2$.

While the sheet blank for forming the rail is still in the flat it has punched out therefrom a series of longitudinally spaced apertures E, each including a comparatively narrow slot portion $E^1$ and a portion $E^2$ of greater width at its upper end. These portions are so located that when the blank is formed into the rail the slots $E^1$ will extend vertically in the portion $D^1$ of the rail and will open upwardly into the upwardly opening wider portion $E^2$ in the portion $D^2$ thereof. The portion $D^1$ below the slots $E^1$ is slightly offset, as indicated at $D^7$. The aperture portion $E^2$ is adapted to receive the head $B^3$ of the coupler member or lug B while the stem portion $B^2$ will enter the slot $E^1$.

Thus, to lock a holder A in substantially fixed position within the car it is only necessary to use a lift-truck or the like to elevate the rack sufficiently to pass the heads $B^3$ of the lugs B over the portion $D^2$ of the rails D and by then lowering the rack A the heads $B^3$ will pass downwardly through the apertures $E^2$ and the stem portions $B^2$ of the lugs B will be located in the slots $E^1$. As illustrated in Fig. 2 the slots $E^1$ are substantially uniform or equal in width, and the portions $E^2$ are also substantially uniform or equal in width.

With the constructions forming the subject matter of my earlier applications for patent the spacing between centers of the transversely spaced coupler members or lugs B was the same as the spacing between the centers of the longitudinally spaced slots $E^1$, the intention being that the stems $B^2$ of both couplers or lugs B would be simultaneously in contact with the edges of the slots $E^1$. However, this would seldom be exactly true due to inaccuracies in fabrication.

Moreover, when a moving freight car is stopped suddenly, for example during a "humping" operation or during a coupling operation with a stationary freight car, there is a tendency of one end of the suddenly stopped freight car to tilt or move upwardly and thereby cause the loaded racks A to do likewise. In that event there would be a tendency for one side of each rack A in the stopped car to tilt upwardly. Therefore, I have developed

the present structure in which one of the two lugs B at each end of each rack will contact prior to the other the rail D to which it is coupled and will carry the major part of the inertial load. Consequently, each lug B on the racks in contact with the rails D will transmit shear stresses to such rails, with the result that friction between the engaged surfaces will restrain the racks A against tilting movement. Such contact of the lugs B with the rails D will also restrain any horizontal displacement of the racks A more than the slight lost motion.

To accomplish such result the longitudinally spaced slots $E^1$ in the rails D are each made of greater width than the respective stem portions $B^2$ of the transversely spaced lugs D so as to permit limited horizontal lost motion therebetween in the direction of travel of the vehicle.

Moreover, the spacing between the centers of the longitudinally spaced slots $E^1$ for the stems $B^2$ of the transversely spaced lugs B is different than the spacing of the centers of the stems $B^2$ but within the limit of lost motion of said stems in said slots. As a consequence, one lug only at each end of each rack A will be in action at one time depending upon the direction in which the car is moving. By making the distance between the centers of the stems $B^2$ different than the distance between the centers of the slots $E^1$ but within the limit of lost motion of the stems in said slots, the lugs B in action will transmit shear stresses from one lug at each end of each rack A to the rails B.

In the event the distance between the centers of the stems $B^2$ is less than the distance between the centers of the slots $E^1$ and the center of mass of the load carried by the rack should be higher than the point of engagement of the lugs B with the rails D, then any shock or stress caused by a sudden forward movement of the car tending to move the rack rearwardly in the car will be transmitted to the rails D by the lugs B in rear of the center of mass.

In the event the distance between the centers of the stems $B^2$ is less than the distance between the centers of the slots $E^1$ and the center of mass of the load carried by the rack should be higher than the point of engagement of the lugs B with the rails D, then any shock or stress caused by a sudden stop in the forward movement of the car tending to move the rack forwardly in the car will be transmitted to the rails D by the lugs B in advance of the center of mass.

In the event the distance between the centers of the stems $B^2$ is greater than the distance between the centers of the slots $E^1$ and the center of mass of the load carried by the rack should be lower than the point of engagement of the lugs B with the rails D, then any shock or stress caused by a sudden forward movement of the car tending to move the rack rearwardly in the car will be transmitted to the rails D by the lugs B in advance of the center of mass.

In the event the distance between the centers of the stems $B^2$ is greater than the distance between the centers of the slots $E^1$ and the center of mass of the load carried by the rack should be lower than the point of engagement of the lugs B with the rails D, then any shock or stress caused by a sudden stop in the forward movement of the car tending to move the rack forwardly in the car will be transmitted to the rails D by the lugs B in rear of the center of mass.

In any case the friction between the engaged surfaces of the lugs B in action and rails D will restrain each rack A against tilting movement, and the contact of the lugs B with the rails D will also restrain any displacement of the racks A more than the slight lost motion. Thus stress will be transmitted through certain of the lugs B to certain vertical edges of said elongated slots E depending upon the direction lengthwise of the transport vehicle in which said rack should shift on the floor $C^1$ as the result of a sudden stop of said vehicle while in motion in either a forward or a rearward direction.

As a specific illustration, the stem portions $B^2$ of the lugs B may be three-quarters of an inch wide, while the longitudinally spaced slots $E^1$ in the rails D may be an inch in width. If the distance between centers of said stems $B^2$ is one-eighth of an inch less than the distance between centers of the slots $E^1$, then when the stem $B^2$ of one of the two lugs B at one end of the rack A is in contact with a side edge of one slot $E^1$ in the adjacent rail D, then the stem $B^2$ of the other of said two lugs B at one end of the rack A will be located centrally within and spaced from both side edges of the next adjacent slot $E^1$ in the said adjacent rail.

It will be understood that the other holders in a stack will be restrained from displacement in a similar manner by the upper rails while all of the gravitational load will be carried through the stack directly into the floor.



What I claim as my invention is:

1. In combination, a transport vehicle having a storage chamber provided with a load-sustaining floor and provided above said floor with spaced upright side walls, a portable article carrying rack within said storage chamber and having at opposite ends thereof load-sustaining means supported upon said floor, the length of said rack being substantially equal to the distance between said spaced upright side walls, and means restraining said rack against upward tilting movement while permitting the static load thereof to be carried entirely by said floor independently of said upright side walls, including horizontally extending rails connected to said upright side walls and bridging opposite ends of said rack, said rails having upright portions spaced inwardly from said upright side walls and provided with longitudinally spaced vertically extending upwardly opening slots, and spaced lugs on opposite ends of said rack having stems removably engaging selected slots in said upright portions with a limited lost motion therebetween and having other portions in the space between said upright portions and said upright side walls and detachably interlocked with said upright portions, said engaged slots being substantially uniform or equal in width, said stems being substantially uniform or equal in width, the width of each stem being less than the width of each engaged slot, the distance between the centers of said stems being different than the distance between the centers of said engaged slots but within said limit of lost motion, and the extent of said lost motion being substantially equal to the difference between said stem center spacing and said slot center spacing and approximately one-half of the difference between the width of each slot and the width of each stem.

2. In combination, a transport vehicle having a storage chamber provided with a load-sustaining floor and provided above said floor with spaced upright side walls, a portable article carrying rack within said storage chamber and having at opposite ends thereof load-sustaining means supported upon said floor, the length of said rack being substantially equal to the distance between said spaced upright side walls, and means restraining said rack against upward tilting movement while permitting the static load thereof to be carried entirely by said floor independently of said upright side walls, including anchorage members mounted on said upright side walls opposite the ends of said rack, said anchorage members having upright portions provided with spaced vertically extending upwardly opening slots, and spaced lugs on opposite ends of said rack having stems removably engaging selected slots in said upright portions with a limited lost motion therebetween and having other portions in rear of said selected slots and detachably interlocked with said upright portions, said engaged slots being substantially uniform or equal in width, said stems being substantially uniform or equal in width, the width of each stem being less than the width of each engaged slot, the distance between the centers of said stems being different than the distance between the centers of said engaged slots but within said limit of lost motion, and

the extent of said lost motion being substantially equal to the difference between said stem center spacing and said slot center spacing and approximately one-half of the difference between the width of each slot and the width of each stem.

3. In combination, a storage chamber having a load-sustaining floor and provided above said floor with spaced upright side walls, a portable article carrying rack within said chamber and having at opposite ends thereof load-sustaining means supported upon said floor, the length of said rack being substantially equal to the distance between said spaced upright side walls, and means restraining said rack against upward tilting movement while permitting the static load thereof to be carried by said floor independently of said upright side walls, including anchorage means on said upright side walls opposite the ends of said rack, and anchorage means on said rack at opposite ends thereof detachably interlocked with the anchorage means on said upright side walls, the anchorage means on said upright side walls having spaced upwardly opening slots, the anchorage means on said rack having spaced stems removably engaging selected slots aforesaid with a limited lost motion therebetween, said engaged slots being substantially uniform or equal in width, said stems being substantially uniform or equal in width, the width of each stem being less than the width of each engaged slot, the distance between the centers of said stems being different than the distance between the centers of said engaged slots but within said limit of lost motion, and the extent of said lost motion being substantially equal to the difference between said stem center spacing and said slot center spacing and approximately one-half of the difference between the width of each slot and the width of each stem.

4. In combination, a storage chamber having a load-sustaining floor and having above said floor an upright wall provided with an anchorage member, said anchorage member having an upright portion spaced inwardly from said upright wall and provided with spaced vertically extending upwardly opening slots, a portable article carrying rack within said storage chamber opposite said anchorage member and having at its opposite ends load-sustaining means supported upon said floor, and means restraining said rack against upward tilting movement while permitting the static load thereof to be carried by said floor independently of said upright wall, including anchorage means on said rack having spaced stems removably engaging selected slots aforesaid with a limited lost motion therebetween and having means in rear of said slots detachably interlocked with said upright portion, said engaged slots being substantially uniform or equal in width, said stems being substantially uniform or equal in width, the width of each stem being less than the width of each engaged slot, the distance between the centers of said stems being different than the distance between the centers of said engaged slots but within said limit of lost motion, and the extent of said lost motion being substantially equal to the difference between said stem center spacing and said slot center spacing and approximately one-half of the difference between the width of each slot and the width of each stem.

5. In combination, a storage chamber having a load-sustaining floor and having an upright wall above said floor, a portable article carrying rack beside said wall and having at opposite ends thereof load-sustaining means supported upon said floor, and means restraining said rack against horizontal movement while permitting the static load thereof to be carried by said floor independently of said upright wall, including two anchorage means located between said rack and said upright wall and respectively mounted upon said upright wall and upon said rack, one of said means having an upright portion provided with spaced vertically extending upwardly opening slots, the other of said means having spaced stems removably engaging said slots with a limited lost motion therebetween



and having other portions in rear of said slots and detachably interlocked with said upright portion, said engaged slots being substantially uniform or equal in width, said stems being substantially uniform or equal in width, the width of each stem being less than the width of each engaged slot, the distance between the centers of said stems being different than the distance between the centers of said engaged slots but within said limit of lost motion, and the extent of said lost motion being substantially equal to the difference between said stem center spacing and said slot center spacing and approximately one-half of the difference between the width of each slot and the width of each stem.

6. In combination, a storage chamber provided with a load-sustaining floor and provided above said floor with spaced upright side walls, upper and lower portable article carrying racks within said chamber and having load-sustaining elements at opposite ends thereof, the load-sustaining elements of said lower rack being supported upon said floor, the load-sustaining elements of said upper rack being supported upon the load-sustaining elements of said lower rack, whereby said upper and lower racks are arranged in a vertical stack, the length of each rack being substantially equal to the distance between said spaced upright side walls, and means restraining said upper and lower racks against upward tilting movement while permitting the static load thereof to be carried by said floor independently of said upright side walls, including anchorage means on said upright side walls opposite the ends of said upper and lower racks, and anchorage means on said upper and lower racks at opposite ends thereof and having means detachably interlocked with the anchorage means on said upright side walls, the anchorage means on said upright side walls having spaced upwardly opening slots, the anchorage means on said racks having spaced stems removably engaging selected slots aforesaid with a limited lost motion therebetween, said engaged slots being substantially uniform or equal in width, said stems being substantially uniform or equal in width, the width of each stem being less than the width of each engaged slot, the distance between the centers of said stems being different than the distance between the centers of said engaged slots but within said limit of lost motion, and the extent of said lost motion being substantially equal to the difference between said stem center spacing and said slot center spacing and approximately one-half of the difference between the width of each slot and the width of each stem.

7. In combination, a storage chamber provided with a load-sustaining floor and provided above said floor with an upright wall, upper and lower portable article carrying racks within said chamber and having load-sustaining elements at opposite ends thereof, the load-sustaining elements of said lower rack being supported upon said floor, the load-sustaining elements of said upper rack being supported upon and interlocked with the load-sustaining elements of said lower rack, whereby said upper and lower racks are arranged in a vertical stack, and means restraining said upper and lower racks against upward tilting movement while permitting the static load thereof to be carried by said floor independently of said upright wall, including anchorage means on said upright wall and bridging at least one of said racks, and anchorage means on said bridged rack having means detachably interlocked with the anchorage means on said upright wall, the anchorage means on said upright wall having spaced upwardly opening slots, the anchorage means on said bridged rack having spaced stems removably engaging selected slots aforesaid with a limited lost motion therebetween, said engaged slots being substantially uniform or equal in width, said stems being substantially uniform or equal in width, the width of each stem being less than the width of each engaged slot, the distance between the centers of said stems being different than the distance between the centers of said engaged slots but within said limit of lost motion, and the extent of said lost motion

being substantially equal to the difference between said stem center spacing and said slot center spacing and approximately one-half of the difference between the width of each slot and the width of each stem.

8. In combination, a transport vehicle having a storage chamber provided with a load-sustaining floor and provided above said floor with spaced upright side walls, a portable article carrying rack within said storage chamber and having at opposite ends thereof load-sustaining elements supported upon said floor, the length of said rack being substantially equal to the distance between said spaced upright side walls, and means restraining said rack against upward tilting movement while permitting the static load of said rack to be carried entirely by said floor independently of said upright walls, including transversely spaced substantially T-shaped lugs mounted on opposite ends of said rack and substantially horizontal rails secured to said spaced upright side walls and bridging opposite ends of said rack, said lugs having substantially horizontal stems of substantially uniform or equal width, said rails having upright portions spaced inwardly from said upright side walls, said upright portions having longitudinally spaced vertically extending upwardly opening elongated slots receiving the stems of said T-shaped lugs with a limited lost motion therebetween, said slots being substantially uniform or equal in width, the width of each stem being less than the width of each slot, the distance between the centers of said stems being different than the distance between the centers of said slots but within said limit of lost motion, and the extent of said lost motion being substantially equal to the difference between said stem center spacing and said slot center spacing and approximately one-half of the difference between the width of each slot and the width of each stem, whereby stress will be transmitted through certain of said stems to certain vertical edges of said slots depending upon the direction lengthwise of the vehicle in which said rack should shift on said floor as the result of a sudden stop of said vehicle while in motion in either a forward or a rearward direction, and horizontal displacement of said rack more than said limited lost motion will be prevented.

9. In combination, a transport vehicle having a storage chamber provided with a load-sustaining floor and provided above said floor with spaced upright side walls, a portable article carrying rack within said storage chamber and having at opposite ends thereof load-sustaining elements supported upon said floor, the length of said rack being substantially equal to the distance between said spaced upright side walls, horizontally extending rails connected to said spaced upright side walls and bridging opposite ends of said rack, said rails having upright portions spaced inwardly from said upright side walls and provided with longitudinally spaced vertically extending upwardly opening elongated slots, and lugs secured to and projecting endwise from opposite ends of said rack having substantially horizontal stems removably engaging selected slots in said upright portions with a limited lost motion therebetween, and having headed portions in the space between said upright portions and said upright side walls and detachably interlocked with said upright portions, said engaged slots being substantially uniform or equal in width, said horizontal stems being substantially uniform or equal in width, the width of each horizontal stem being less than the width of each engaged slot, the distance between the centers of said stems being different than the distance between the centers of said engaged slots but within said limit of lost motion, and the extent of said lost motion being substantially equal to the difference between said stem center spacing and said slot center spacing and approximately one-half of the difference between the width of each slot and the width of each stem.

10. In combination, a transport vehicle having a storage chamber provided with a load-sustaining floor and provided above said floor with upright side walls, a portable article carrying rack within said storage chamber and having at opposite ends thereof load-sustaining elements supported upon said floor, the length of said rack being substantially equal to the distance between said spaced upright walls, and means restraining said rack against upward tilting movement while permitting the static load of said rack to be carried entirely by said floor independently of said upright walls, including two sets of anchorage members located between opposite ends of said rack and said upright side walls and fixed respectively to said upright walls and to said rack, one set of anchorage members being provided with spaced elongated vertically extending slots, and the other set of anchorage members having spaced substantially horizontal stems removably engaging selected slots aforesaid with a limited lost motion therebetween, said stems being substantially uniform or equal in width, said elongated slots being substantially uniform or equal in width, the width of each stem being less than the width of each slot, the distance between the centers of said stems being different than the distance between the centers of said slots but within said limit of lost motion, and the extent of said lost motion being substantially equal to the difference between said stem center spacing and said slot center spacing and approximately one-half of the difference between the width of each slot and the width of each stem, whereby stress will be transmitted through certain of said stems to certain vertical edges of said slots depending upon the direction lengthwise of the vehicle in which said rack should shift on said floor as the result of a sudden stop of said vehicle while in motion in either a forward or a rearward direction, and horizontal displacement of said rack more than said limited lost motion will be prevented.

No references cited.