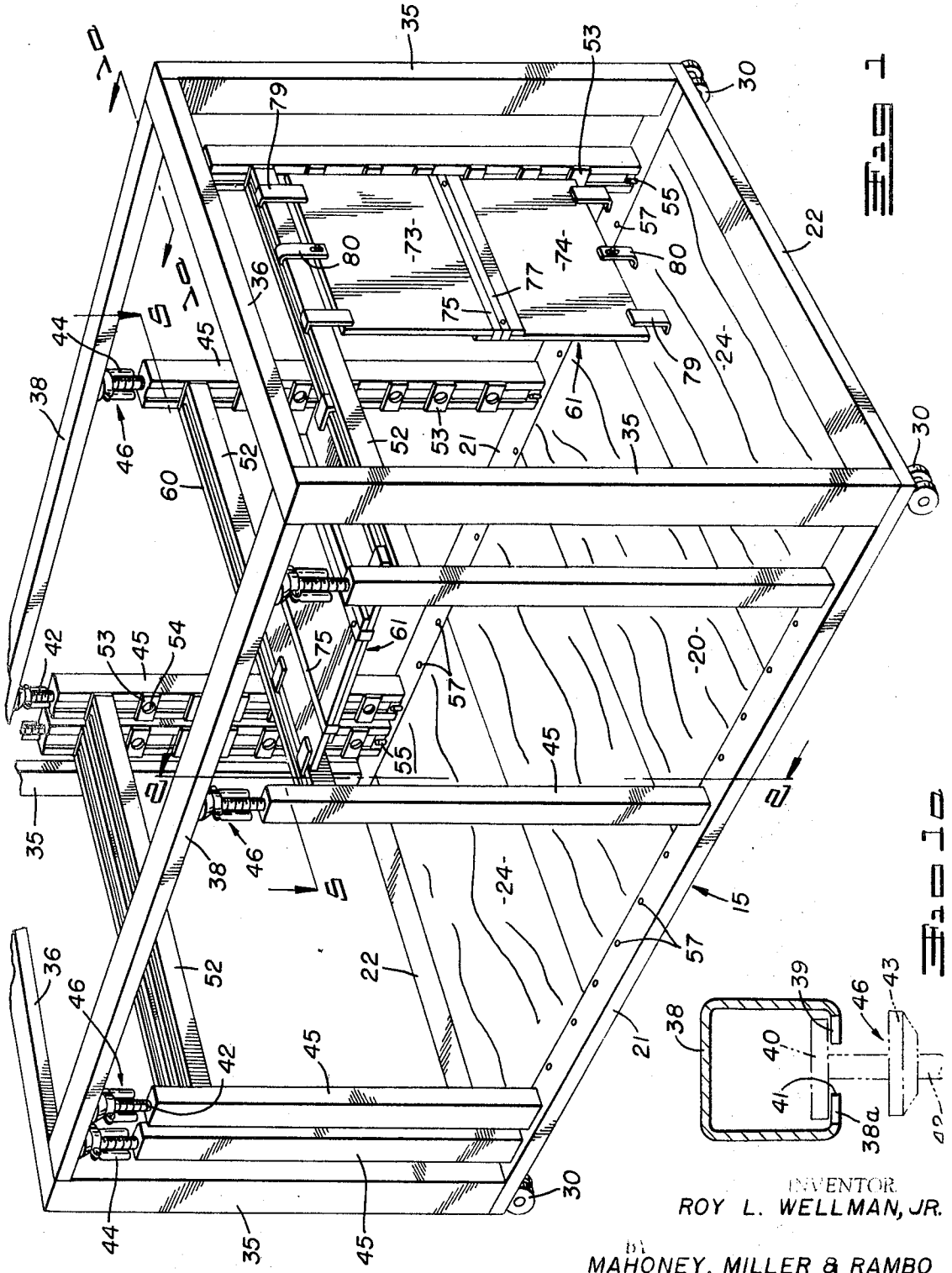
July 7, 1970 R. L. WELLMAN, JR 3,519,140

ARTICLE SUPPORTING RACK

Filed Aug. 17, 1967 4 Sheets-Sheet 1



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ARTICLE SUPPORTING RACK

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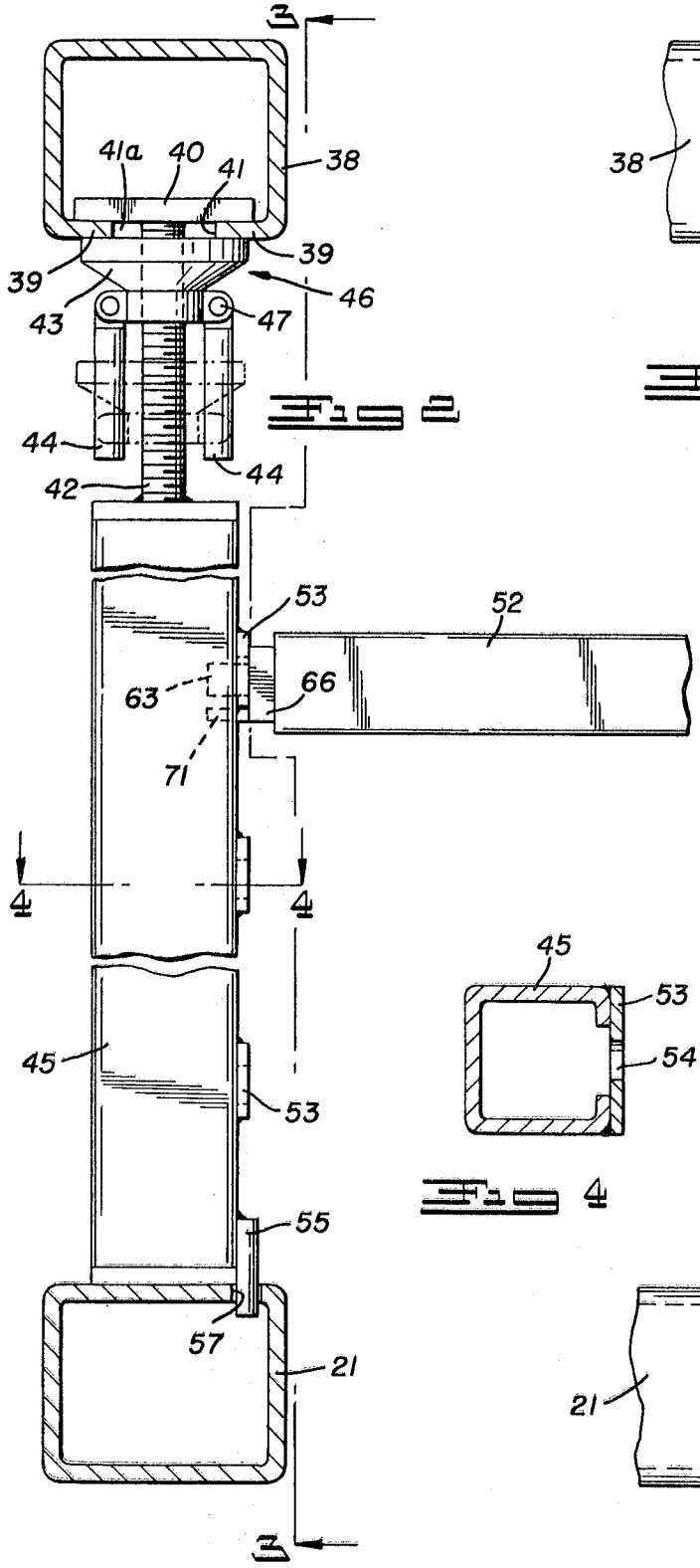


Fig 2

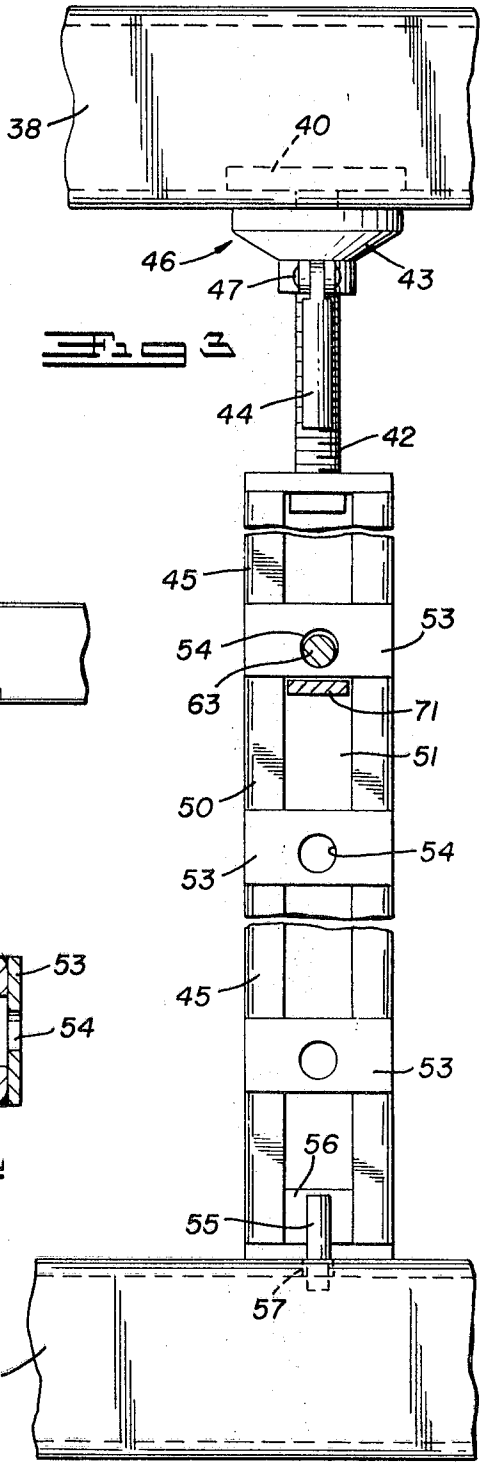


Fig 3

Fig 4

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ARTICLE SUPPORTING RACK

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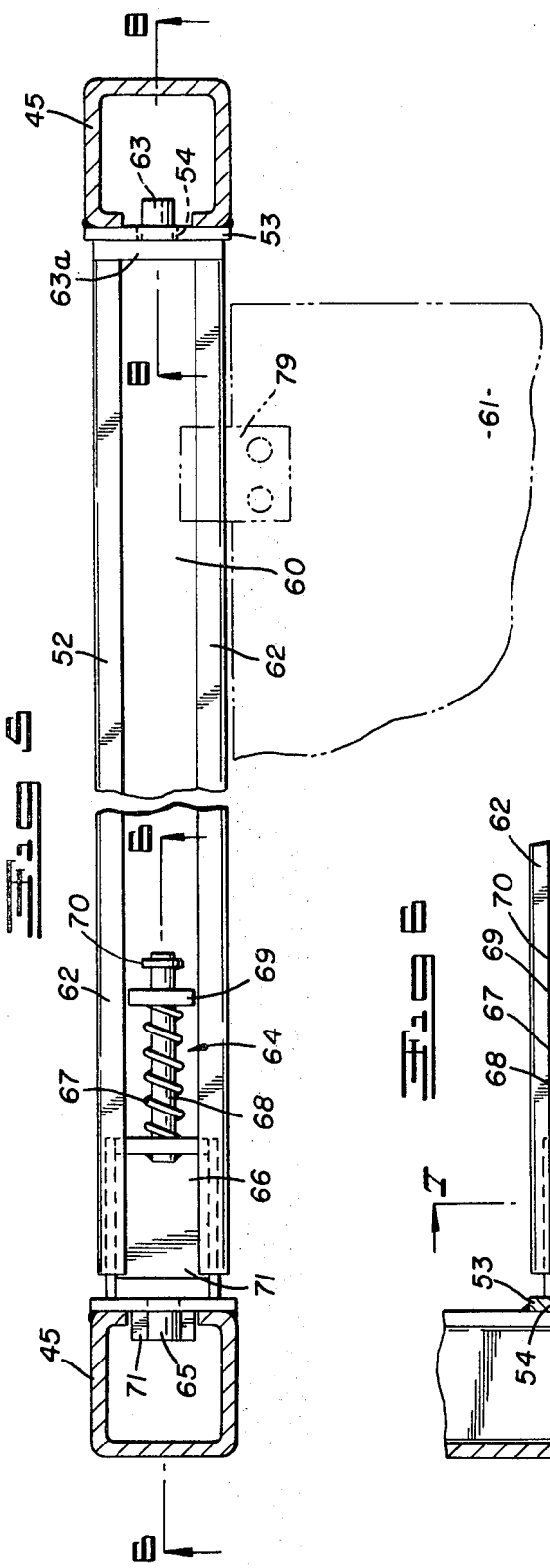


FIG. 5

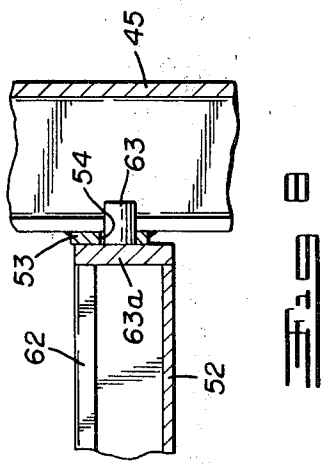


FIG. 8

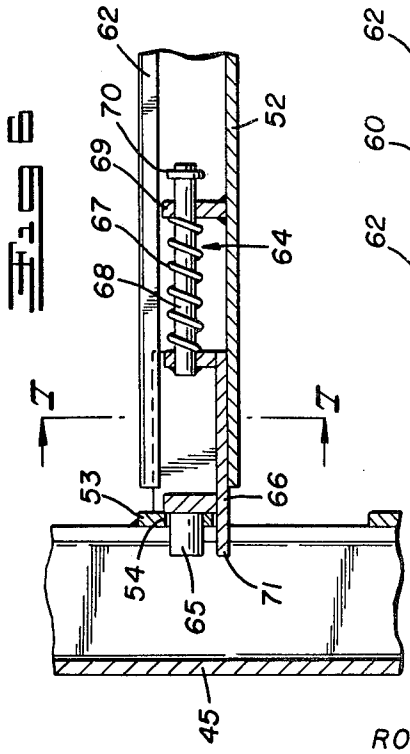


FIG. 6

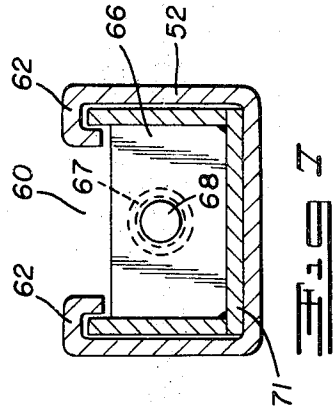


FIG. 7

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ARTICLE SUPPORTING RACK

Filed Aug. 17, 1967 4 Sheets-Sheet 4

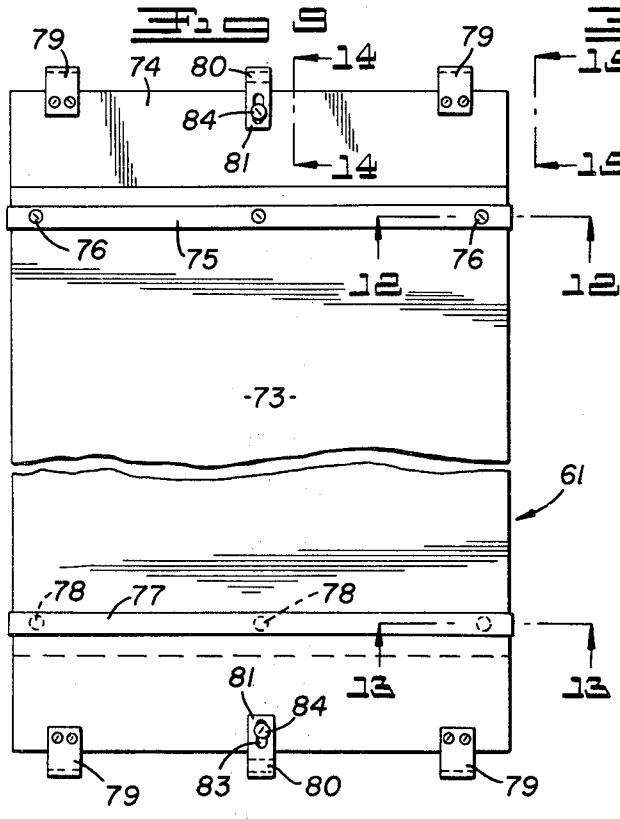


Fig 9

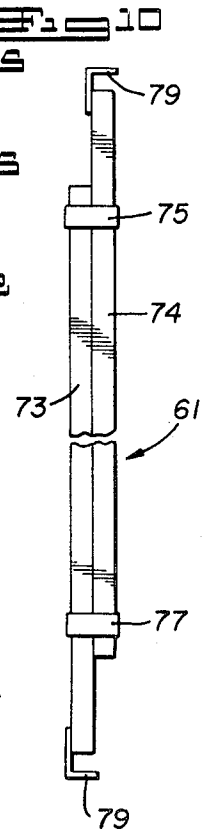


Fig 10

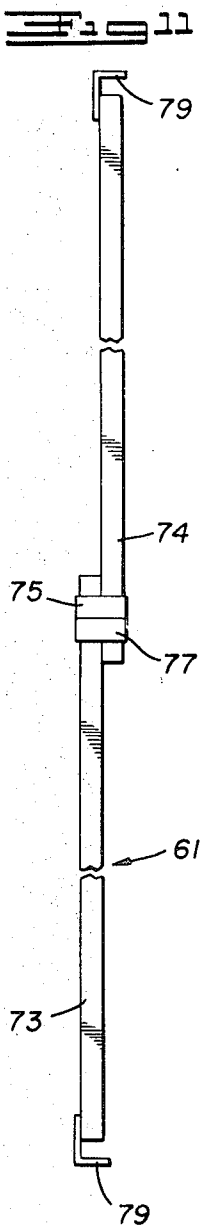


Fig 11

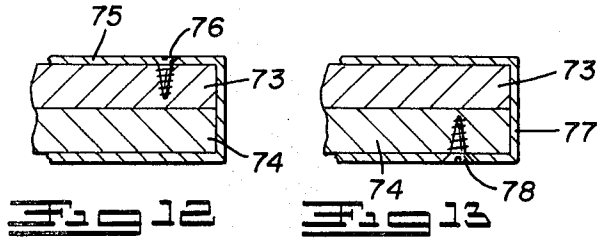


Fig 12

Fig 13

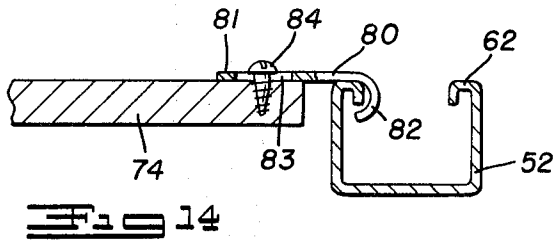


Fig 14

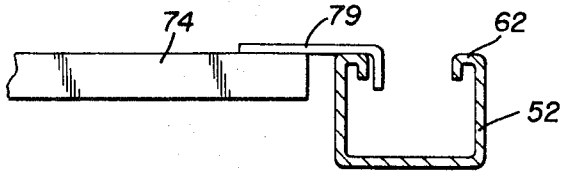


Fig 15

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3,519,140

ARTICLE SUPPORTING RACK

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Int. Cl. A47f 5/13
U.S. Cl. 211—148 3 Claims

ABSTRACT OF THE DISCLOSURE

A cargo transporting device. In general, it comprises a portable rack which is provided with various adjustable supports to vary the cargo-receiving spaces in accordance with the cargo to be loaded therein. This permits loading of odd-shape articles into the rack with a maximum of efficiency of use of the available space. The cargo can be preloaded into the rack and then at the proper time the loaded rack can be moved into a transporting or delivery vehicle such as a truck.

GENERAL DESCRIPTION OF STRUCTURE

As in said patent, the portable rack comprises a base with a pair of parallel, laterally spaced, longitudinally extending guide and support rails supported thereon at an elevated position. From each of these parallel rails a set of vertically extending struts is suspended for selective adjustment therealong. The lower end of each of the struts is provided with a depending retaining pin adapted to be selectively positioned in any of a series of sockets disposed in the base of the rack in a longitudinal row so located laterally relative to the guide rail from which that set of struts is suspended as to hold the struts laterally upright. However, according to the present invention, each of the struts is suspended from one of the rails by means of an improved arrangement which includes a self-contained clamping unit that can be adjusted readily from a releasing condition to permit movement of the strut along the rail to a locking or retaining condition where the strut will be set and clamped to the rail at the desired upright longitudinal position in alignment with the lower end fixed by the retaining pin and its cooperating socket. As in the patent structure, the transversely extending support bars are provided for cooperating with opposed struts of a transverse pair and can be set at selected elevations thereon, the bars of longitudinally spaced pairs of struts located at a common level being adapted to support shelves or cargo articles directly. However, according to the present invention, the ends of the bars are removably connected to the struts by novel joints which prevent rotation or twisting of the bars about their axes as well as locking them to prevent accidental disconnection by vertical movement due to jarring or vibration. As in the patent structure, telescoping shelves are supported at their opposed ends by longitudinally spaced pairs of bars supported by the struts at a common level. However, according to this invention, the shelves are of improved construction for supporting various articles and are provided with improved means at their opposed ends for engaging the bars and connecting thereto. This improved connecting means is easily operable to lock the shelves to the bars or to disconnect them therefrom and when locked will preclude the shelves from vertical displacement from the bars by vibration or jarring.

BRIEF DESCRIPTION OF DRAWINGS

The improved structure of the present invention is illustrated in the accompanying drawings in which:

FIG. 1 is a perspective view of the rack.

FIG. 1*a* is an enlarged detail in section taken through one of the support and guide rails along line **1***a*—**1***a* of FIG. 1.

FIG. 2 is an enlarged vertical transverse sectional view taken along line **2**—**2** of FIG. 1 showing the vertical strut and its means for suspending it from the rail.

FIG. 3 is a vertical sectional view taken along line **3**—**3** of FIG. 2 showing the inner face of the strut.

FIG. 4 is a horizontal sectional view taken along line **4**—**4** of FIG. 2.

FIG. 5 is an enlarged horizontal sectional view taken along line **5**—**5** of FIG. 1 showing a horizontal support bar connnected between two opposed struts.

FIG. 6 is a vertical sectional view taken along line **6**—**6** of FIG. 5.

FIG. 7 is a sectional view taken along line **7**—**7** of FIG. 6.

FIG. 8 is a vertical sectional view taken along line **8**—**8** of FIG. 5.

FIG. 9 is a plan view of one of the article supporting telescoping shelves.

FIG. 10 is an edge view of the shelf.

FIG. 11 is a view similar to FIG. 10 but showing the shelf extended.

FIG. 12 is an enlarged detail in section taken along line **12**—**12** of FIG. 9.

FIG. 13 is a similar view taken along line **13**—**13** of FIG. 9.

FIG. 14 is an enlarged detail in section taken through the shelf along line **14**—**14** of FIG. 9 and showing an associated horizontal support bar in section.

FIG. 15 is an enlarged edge view of an end portion of the shelf showing an associated horizontal support bar in section.

DETAILED DESCRIPTION OF DRAWINGS

Having reference to the drawings, an article transporting apparatus or transporter of a general structure like that disclosed in said patent but embodying the improvements of the present invention is illustrated in detail in the several figures. Referring specifically to FIG. 1, the article supporter and transporter **15** is shown in the form of a portable rack and is seen to comprise a base platform designated generally by the numeral **20** and a novel adjustable shelving or article supporting structure. This structure is carried on the base platform and is selectively positionable thereon, both vertically and horizontally, to facilitate the loading of the articles and to provide horizontally disposed supports or platforms for multi-level stacking of the articles. As in the patent, it comprises mainly guide rails **38** from which are suspended vertical struts **45**, which support transverse article support bars **52** that may carry horizontal telescopic shelves **61**. As will be more fully explained hereinafter, the article supporting structure may be adjusted and positioned to accommodate articles which extend the full height of the transporter as well as smaller articles which may be stacked in layers for economical space utilization. Also, it may be adjusted to accommodate articles of various lengths. Thus, the article receiving spaces provided by the adjustable supporting structure may be varied in accordance with the articles they are to receive for maximum efficiency in use of the available space of the rack. The article transporters or racks **15** may be constructed in any size which is suitable for a particular application. As in the patent structure, the article transporter or rack **15** is designed to fit within a van-type body of a delivery truck. Other dimensional configurations may be utilized for specific applications. For example, a multiple of transporters or portable racks may be designed to fit within a particular van body or truck or in a trailer

body as in the case of trailer-type highway vehicles. In that instance, three or four such transporters or racks could conveniently be positioned within a trailer body. If desired, the portable rack may also be used in a warehouse or similar building itself for moving cargo around the building. Also, the improvements of this invention are applicable to a stationary storage rack.

The base platform **20** of the transporter or rack **15** comprises a rigid frame preferably of welded steel construction formed from a pair of longitudinally extending side rails **21** and interconnecting end rails **22**. The side and end rails **21** and **22** are preferably box-type, tubular girders to provide the necessary structural rigidity. Intermediate cross members (not shown) may also be provided to increase the rigidity of the structure and provide support for the central floor covering which forms a lowermost article-supporting surface for the articles to be carried by the transporter or portable rack. This floor covering may be formed from a number of plywood panels **24** which are preferably positioned with the surface thereof aligned with the upper surface of the end and side rails **21** and **22** forming a smooth continuation thereof. Movement of the transporter or rack **15** is facilitated by means of several wheel caster assemblies **30** which are secured to the rigid frame of the base platform. Four such caster assemblies **30** are utilized in the present embodiment.

Rigidly secured to each end of the base platform **20** is an upstanding frame assembly which preferably includes the vertically disposed corner support members **35** and the cross brace **36** secured and interconnecting the upper ends of the support members. Preferably, this end frame assembly is also of welded construction utilizing box-type, tubular structural members with the end of the support members **35** being welded to the side rails **21** of the base platform.

Supported by the upstanding end frame assemblies at a selected level are the guide or track means from which certain parts of the article-supporting or shelf structures are supported. Each track means comprises the support and guide rail **38** which extends longitudinally of the base platform. The ends of each of the guide rails **38** are rigidly secured to the vertical support members **35** of the end frame assemblies and are disposed vertically above the side rails **21** of the base platform in a common longitudinally extending vertical plane. Each guide rail **38**, which is of a generally box-like channel form, as can be best seen by reference to FIGS. 2 and 3, is formed with two horizontally disposed inwardly directed flanges **39** at the bottom side thereof. The flanges **39** form guide or track rails along which bearing and clamp shoe or plate **40** may slide. The flanges **39** terminate in opposed, longitudinally extending edges **41** which are relatively spaced apart and form a slot **41***a* therebetween. Opposed portions of the guide or track rail flanges **39** are removed at one end of each guide rail **38** (FIG. 1*a*) to provide an opening **38***a* through which the shoe **40** may readily pass vertically.

The shoes **40** are on the upper ends of the respective vertical struts **45** which provide vertical supports for the shelving or article supporting structure. At least two of these struts are carried by each of the guide rails **38** but preferably they are provided as a set in greater number. Each of the vertical struts **45** is suspended from the respective guide rail **38**, according to the present invention, by a clamp assembly **46** which includes the shoe **40**. The shoe **40** is rigidly mounted, as by welding, on the upper end of a threaded pin **42**, the lower end of this pin being fixed, as by welding, to the upper end of the strut **45**. Carried by the threaded pin **42** below the shoe **40** is a clamping nut **43** which has a flat disc-like upper surface adapted to engage the flat lower surfaces of the guide rail flanges **39** when the flat upper surfaces are clamped between the nut and the shoe **40**. The shoe **40** is preferably angular such as square or rectangular so that it will not rotate in the guide rail when the nut

43 is rotated. The nut preferably is rotated by means of opposed handles **44** which are pivoted to the nut at diametrically opposed pivots **47** so that normally the handles will hang in dependent position within the circumference of the nut in an out-of-the-way position as shown in FIG. 2. When the nut **43** is drawn upwardly against the flanges **39** by rotation in a proper direction, it will draw the shoe **40** downwardly against the flanges **39** to produce an effective clamping action to hold the upper end of the strut **45** at a selected location along the guide rail. When the nut is retracted, the clamping action is released and the strut **45** can then be moved to any position along the guide rail with the shoe **40** sliding along the upper surfaces of the flanges **39** but still suspending the strut from the rail. However, the strut can be removed from the rail by positioning the shoe **40** over the opening **38***a* so that it can be moved downwardly therethrough. Replacement of the strut in the rail can be accomplished with ease by passing the shoe **40** upwardly through the opening **43** and sliding the shoe **40** along the flanges **39** to position the strut **45** longitudinally along the rail **38** as desired.

Each of the vertical struts **45** is of an improved structure according to this invention. It is in the form of a box-like channel, as shown best in FIGS. 2, 3 and 4, which, at its inner side or face, is provided with inwardly directed flanges **50** having their edges spaced apart to provide a slot **51** extending the full height of the strut. Disposed across this slot **51** at selected elevations are the transverse lugs or cleats **53** which are welded or otherwise fixed to the flanges **50**. Each of these cleats **53** is provided with a pin-receiving socket or opening **54** in registry with the slot. The lower end of the strut **45** has a retaining pin **63** rigidly mounted thereon in depending relationship thereto. The pin is fixed to the strut, for example, by means of welding to a transverse cleat **56** which is welded within the flanges **50** and, as indicated in FIG. 2, this is at the inner side of the strut. Each of these retaining pins **55** can be inserted in an opening or socket **57** in the rail **21** of the base platform **20** at the time the clamping unit **46** on the strut is released. It will be noted from FIG. 1 that the openings **57** are arranged as a row of longitudinally spaced openings or upwardly opening sockets in each of the rails **21**. When the clamping unit **46** is released by retraction of the nut **43** downwardly, it is possible to move the entire strut **45** vertically relative to the guide **38** to permit lifting of the pin **55** out of one of the sockets or openings **57** and reinsertion in the same or any other selected opening. However, when the clamp is in clamping condition, the pin **55** cannot be displaced upwardly out of its socket **57**. Thus, each of the struts **45** may be moved to various positions longitudinally along and between the opposed upper guide rail **38** and lower support rail **21**. The movement may be accomplished when the clamp unit **46** is released but when the clamp is set, the retaining pin **55** and associated socket **57** will hold the lower end of the strut in a fixed longitudinal position on the rail **21** whereas its upper end will be clamped in a corresponding longitudinal position along the guide rail **38**. Initial positioning of each strut in an upright relationship to the base **20** at a selected longitudinal position thereon is facilitated by this structure as well as resetting of the strut a different selected longitudinal upright positions.

The support bars **52** are adapted to be disposed at selected levels transversely horizontally between a pair of opposed vertical struts **45** which have been adjusted longitudinally of the respective guide rails **38** so that they are opposite each other and in alignment. According to this present invention, the bars and their releasable end connections to the respective struts **45** are of improved construction and this improved construction is shown best in FIGS. 1 and 5–8. Each bar is of substantially box-like channel form with an upwardly opening slot **60** (FIG. 5) formed therein between the inwardly and downwardly

turned upper lips **62** and extending the full length thereof. One end of the bar is closed by a lug **63***a* welded in place and having a retaining pin **63** fixed thereon and extending outwardly therefrom. This pin is adapted to be positioned in any of the openings **54** on an adjacent vertical strut **45**. The other end is provided with a releasable lock or retaining pin assembly **64** for cooperating with the openings **54** in the adjacent post **45**. This assembly comprises a pin **65** projecting outwardly from a slide **66** which is slidably fitted into the adjacent end of the channel bar **52**. This slide **66** is biased outwardly by means of a compression spring **67** which surrounds a pin **68** fixed to the inner portion of the slide and extending inwardly slidably through a guide lug **69** fixed on the lower web of the bar **52**. The spring is disposed between the lug **69** and the inner end of the slide and normally urges the slide outwardly beyond the adjacent end of the bar **52** but outward movement is limited by a stop key **70** passed transversely through an opening at the inner end of the pin **68** for engagement with the lug **69**. The slide **66** has a flat tongue **71** projecting outwardly therefrom at its lower side which is adapted to extend beneath the straight lower edge of a cleat **53** when the pin **65** carried by that slide is inserted into the opening **54** in that cleat. Thus, at this time this end of the bar **52** will not only be connected to the vertical strut **38** but the bar will be prevented from twisting or rotating about its longitudinal axis. This will keep the slot **60** facing upwardly. Each bar **52** can be selectively positioned at different levels in a horizontal position by choosing the proper opposed sockets **54** at the desired level. The bar can be easily removed by first withdrawing the spring biased pin or plunger **65** from the socket **54** in the cooperating strut **38**, dropping the end of the bar and then withdrawing the fixed pin **63** from the socket **54** in the opposed strut. Remounting of the bar **52** on the opposed struts **45** can be accomplished by first inserting the fixed pin **63** and then the movable pin **65**. Thus, selective positioning of bars **52** on the opposed struts **45** can be readily accomplished and when each bar is mounted, it not only will not be jarred out of place but will not twist about its axis. If desired, the stop means **71** for preventing twisting may be fixed to the opposite end of the bar **52** along with the pin **63** in proper position to engage the associated cleat **53**.

The pairs of transversely opposed vertical struts **45** are adjusted longitudinally as desired and two pairs of longitudinally spaced struts may support one or more of the shelf structures **61** in horizontal position. To support a shelf, the transverse support bars **52** will be mounted on the struts at the desired elevation with the bars on the respective pairs of struts being at the same level so that the telescopic shelf **61** can be extended therebetween longitudinally and horizontally and supported thereby. According to this present invention, this shelf is of improved construction and improved means is provided for mounting it on and connecting it to the support bars **52**. This improved structure is illustrated best in FIGS. 9–15.

The shelf structure **61** is composed of two flat sections or laminations **73** and **74** which may be metal plates but preferably are formed of plywood. The section **73** will be the upper section and will carry a transversely surrounding guide loop **75** for the other section, this loop being a metal band secured at the inner end of the section **73** by means of screws **76** in flat contact with the upper surface of the section and forming a guide below the section. Similarly, the section **74** has secured on its inner end a transversely surrounding guide loop **77** fastened to the lower surface thereof by the screws **78** so as to provide a guide above the section for the other section **73**. The sections are disposed in laminated relationship and are slidable relatively in their respective guide loops so that the telescopic shelf can be lengthened or shortened in accordance with the spacing of the pair of longitudinally spaced support bars which are to support the shelf. The retracted condition of the shelf sections is shown in FIG. 10 and the fully extended condition is shown in FIG. 11 and it will be noted that in the latter condition the loops **75** and **77** control and serve as stops to prevent separation of the sections.

The outer end of each shelf section **73** and **74** carries supporting and connecting bracket clips for engagement with the respective support bars **52**. The arrangement on the outer ends of both sections are identical and, therefore, a description of one will suffice and it will be noted that it comprises two fixed outer clips **79** and one adjustable middle clip **80**. The clips are downturned angles fastened to the upper surface of the end of the shelf section to project beyond that end. The clip **80** has a flat inner leaf end **81** secured to the upper surface of the shelf section and a downwardly curled outer end **82** spaced outwardly from the end of the shelf section. The leaf end is provided with a slot **83** through which a clamp screw **84** passes into the material of the section. Thus, the clip **80** can be adjusted in-and-out relative to the shelf section end and may be clamped in adjusted position by tightening the screw **84**.

When the shelf **61** is supported on the bars **52**, the fixed angle clips **79** on the opposite ends of the shelf rest on the inner lip **62** of the bar, it being understood that the shelf has been extended or retracted to the necessary extent. Then to lock the shelf down on the bars, the locking brackets **80** are adjusted inwardly to cause the curl **82** of each to interfit with the associated lip **62** and prevent lifting of the ends of the shelf. Other adjustable locking or interfitting means between the shelf and associated support bar may be provided for locking the shelf in position to prevent accidental vertical movement, such means being releasable when desired to permit lifting and removal of the shelf.

As indicated in FIG. 1, when the shelves are not in use they may hang in dependent position from some of the transverse bars **52** so that they will be available for use. Also, the struts **45** not in use normally will be hanging from the guide rails **38** and will be readily available for adjustment into a position of use along the rack. In this way both the struts and the shelves are always conveniently located for selection and use.

It will be apparent from the above that this present invention provides a rack, preferably portable, which has improved means for adjusting it to vary the article-receiving spaces to obtain maximum use of the available space. The struts or vertical supports are suspended by the clamping assemblies which facilitate movement of the struts to various upright positions longitudinally of the rack. Each strut is provided with inwardly opening sockets for receiving cooperating ends of transverse support bars which may or may not support shelving. These bars are provided with retaining means at their ends which interfit with the sockets of the struts to support the bars at variable levels. The interfitting connections are fixed at one end and retractable at the other end to permit insertion into opposed openings in a pair of struts between which the bars are disposed. The connection at either end may have, in addition, interfitting means between the end of the bar and the adjacent strut to prevent rotation of the bar about its axis. The retaining means also functions to prevent vertical displacement of the bars under vibration conditions. The telescopic shelves may be supported by the transverse bars and are provided with connections which interlock with the bars to prevent accidental displacement of the shelves from the bars under vibration. These connections include adjustable locking means which can be moved readily between locking and releasing positions. These connections on the shelves, the connections on the ends of the transverse support rods, as well as the strut locating means on the two ends of the struts, all are free of parts which are removable and which might be lost or misplaced if they were removable. Also, all of the connections can be actuated without the use of tools, even

the locking screws on the shelf-clips which can be turned with a coin.

Various other advantages will be apparent.

Having thus described this invention, what is claimed is:

1. An article-supporting rack comprising an upright supporting structure having supported thereon:

a pair of lower horizontal longitudinally extending rails which are in laterally spaced parallel relationship;

a pair of upper horizontal longitudinally extending rails which are laterally spaced parallel relationship to each other and are disposed in the same vertical planes as the respective lower rails and are at a preselected level spaced above said lower rails in parallel relationship to said lower rails;

at least one pair of vertical struts cooperating with said upper and lower rails with each of the respective struts of the pair being disposed between an upper and lower rail;

and a transverse support bar extending transversely between the two struts of a pair and having its ends connected to the respective struts;

each of said upper rails being a support and guide rail having inwardly directed horizontal support flanges disposed in a common plane with a longitudinally extending guide slot formed therebetween and at least one longitudinally extending upwardly projecting side wall formed on a flange and spaced a distance laterally outward from and parallel to said slot, said flanges being cut-away at a selected position longitudinally of the rail to form an opening; each of said struts having an upward threaded extension non-rotatably fixed thereon and adapted to project upwardly through said slot for longitudinal movement of the strut along the slot and carrying non-rotatably fixed thereon a clamp and support shoe which is adapted to be positioned above and to extend outwardly over said support flanges, and to pass vertically through said opening so as to permit removal of the strut from or engagement of the strut with the upper rail by passage of said fixed clamp and support shoe through said opening relative to said flanges, said clamp and support shoe provided with an angular outer edge adapted to engage said upwardly projecting side wall of said upper rail to prevent relative rotation of said strut about the vertically disposed longitudinal axis thereof, and a clamp nut member threaded on said extension adapted to be disposed below said flanges and adjustable vertically by rotation on said threaded extension to clamp the flanges between it and said fixed clamp and support shoe, said lower rails being support rails and said lower rails and the lower ends of said struts having interfitting portions which are engageable and releasable upon vertical movement of said strut when said clamp nut member is adjusted to a lower position on said threaded extension; and means removably connecting said transverse support bar to the respective struts and preventing twisting of said bar about its longitudinal axis.

2. A rack according to claim 1 wherein said means removably connecting said transverse support bar to said struts comprises inwardly opening sockets formed on the respective struts, a fixed retaining pin axially projecting from one end of said bar and removably inserted into a respective socket on one strut, and a plunger axially projecting from the opposite end of said bar and removably inserted into a respective socket on the other strut, said plunger provided with additional means interfitting with the strut to prevent relative rotation of said support bar about its longitudinal axis and being axially retractable relative to said support bar for withdrawal from the respective socket to permit withdrawal of the fixed retaining pin from its respective socket and removal of said support bar.

3. A rack according to claim 2 in which said struts are each provided with a plurality of vertically spaced sockets.

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