July 15, 1952 A. C. WEBSTER ET AL 2,603,167

DUNNAGE APPARATUS

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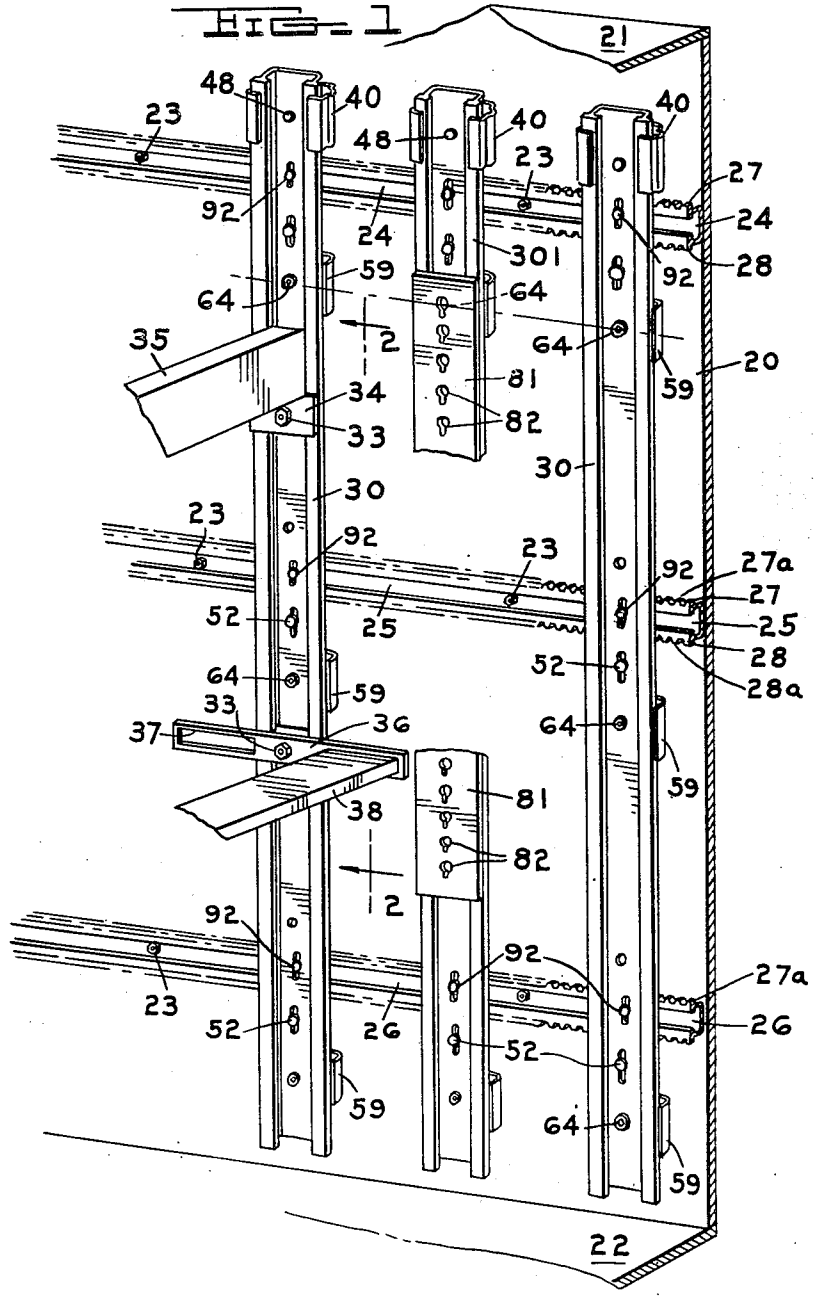
FIG. 1



INVENTOR.
ARVIN C. WEBSTER
GEORGE W. WEBSTER
BY Parker Porter & Parker
ATTORNEYS

July 15, 1952 A. C. WEBSTER ET AL 2,603,167

DUNNAGE APPARATUS

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FIG. 2

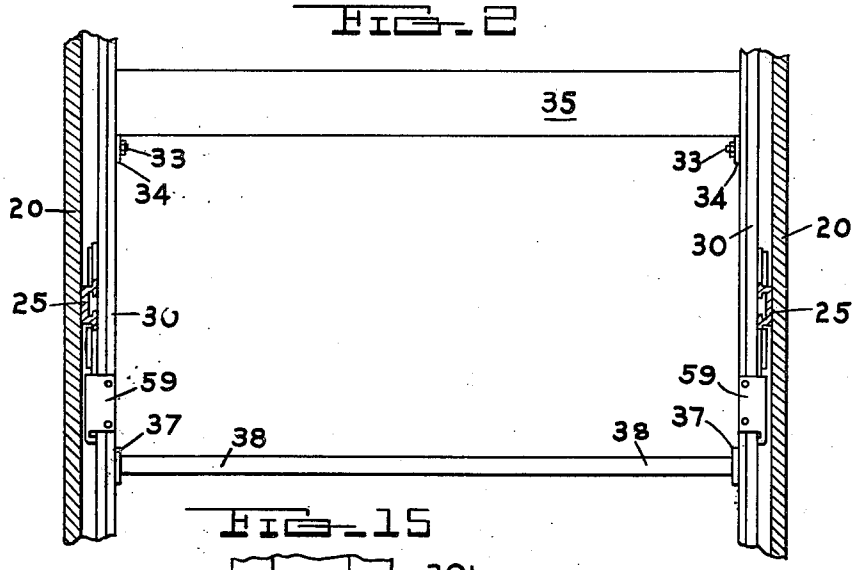


FIG. 15

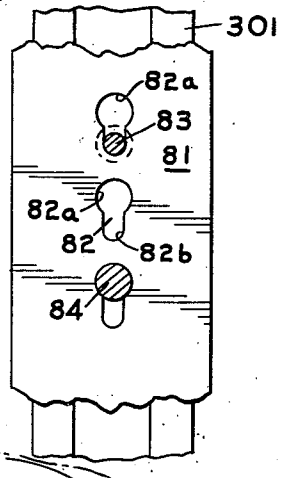


FIG. 14

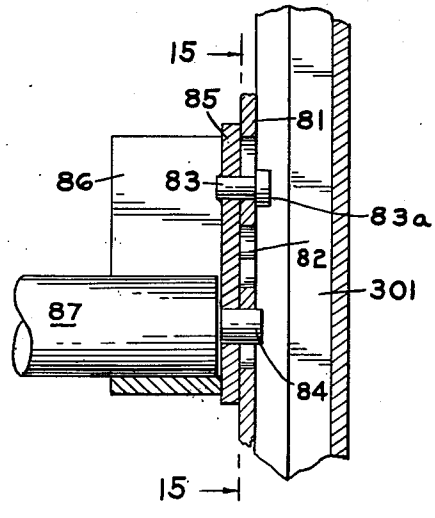
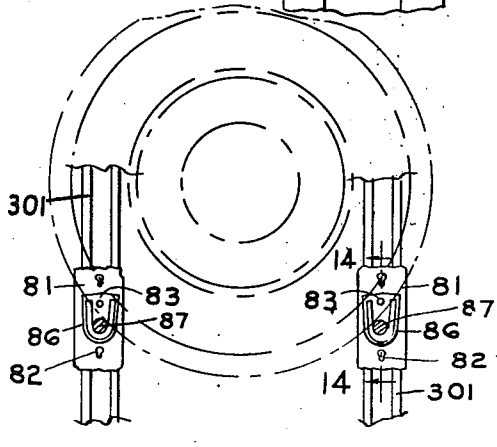


FIG. 13



INVENTOR.
ARVIN C. WEBSTER
GEORGE W. WEBSTER
BY Harley Forster & Harley
ATTORNEYS

July 15, 1952 A. C. WEBSTER ET AL 2,603,167

DUNNAGE APPARATUS

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FIG-3

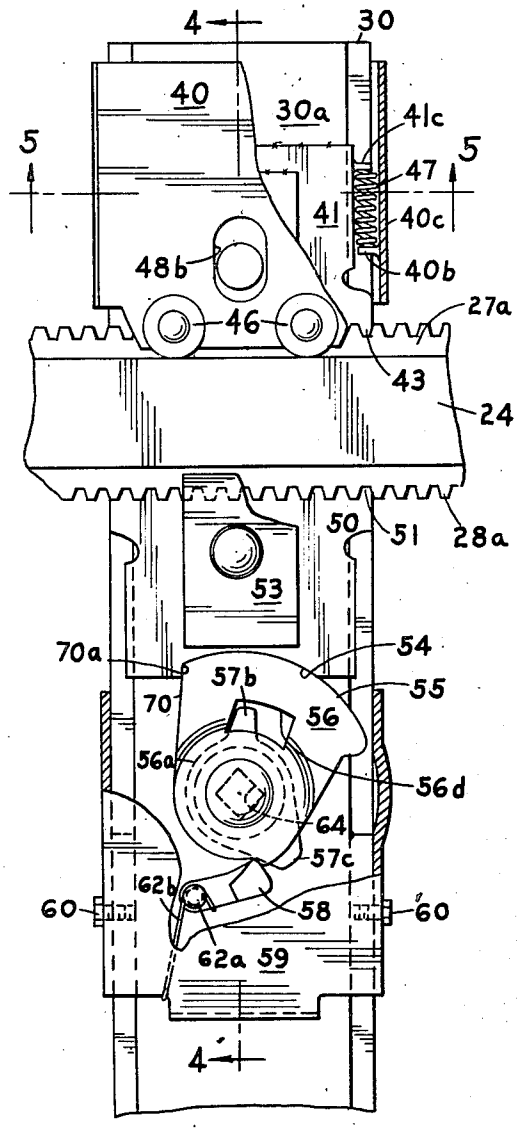
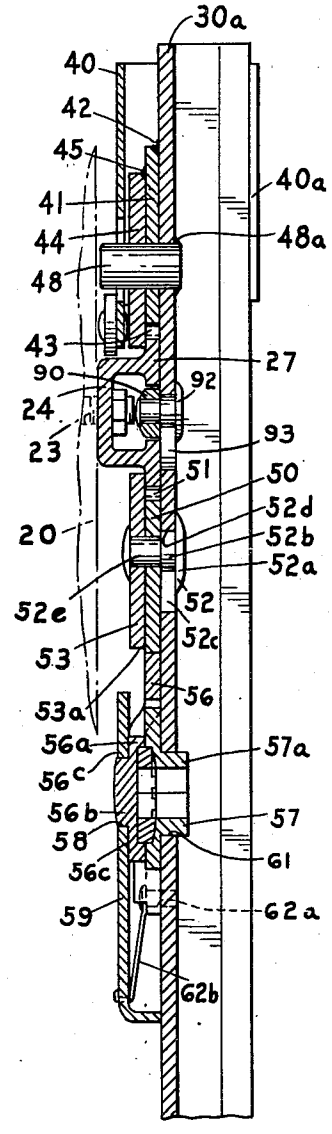


FIG-4



INVENTOR.
ARVIN C. WEBSTER
GEORGE W. WEBSTER
BY
Darby Darby & Darby
ATTORNEYS

July 15, 1952 A. C. WEBSTER ET AL 2,603,167

DUNNAGE APPARATUS

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FIG-5

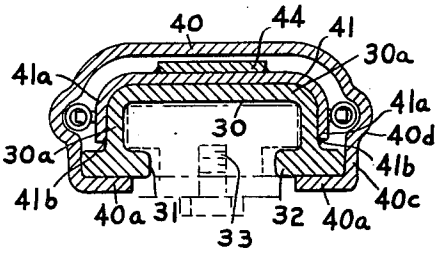


FIG-6

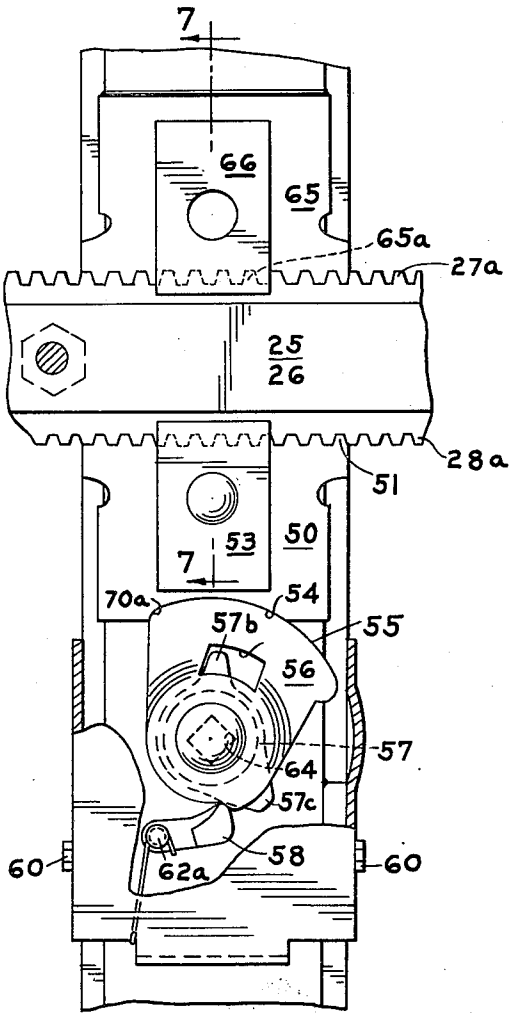
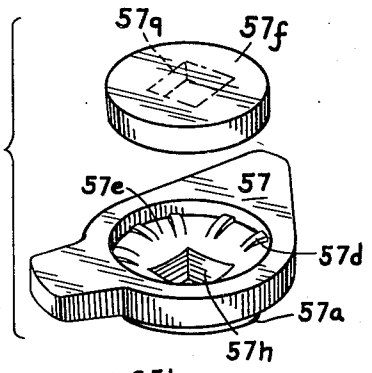


FIG-16



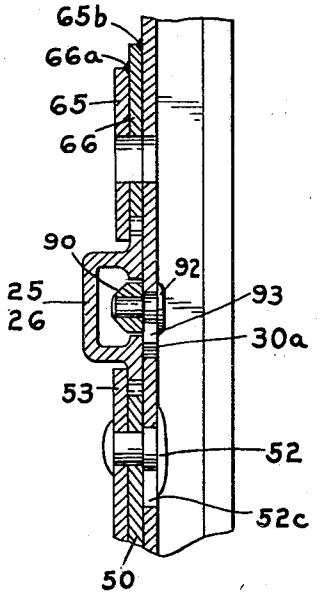


FIG-7

INVENTOR.
ARVIN C. WEBSTER
GEORGE W. WEBSTER
BY Harley Forster & Harley
ATTORNEYS

July 15, 1952 A. C. WEBSTER ET AL 2,603,167

DUNNAGE APPARATUS

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FIG. 10

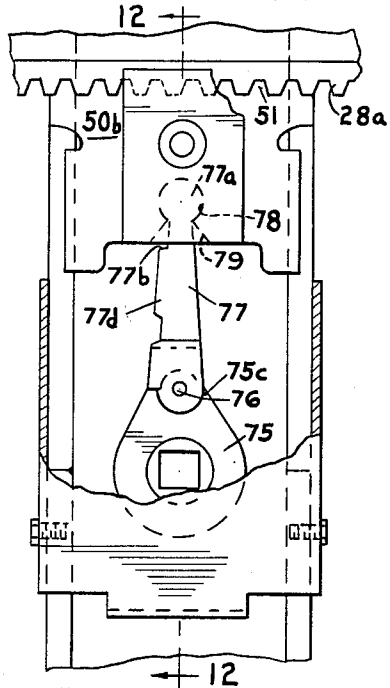


FIG. 11

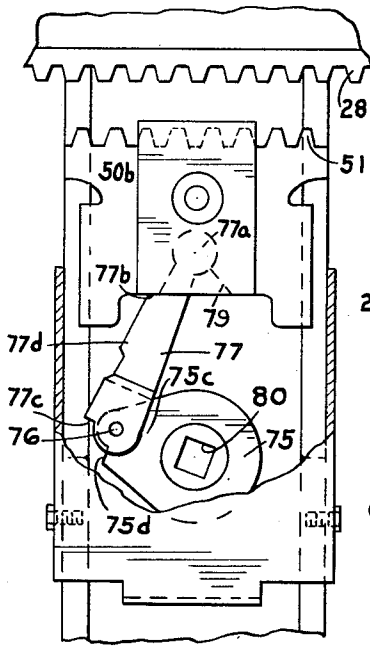


FIG. 12

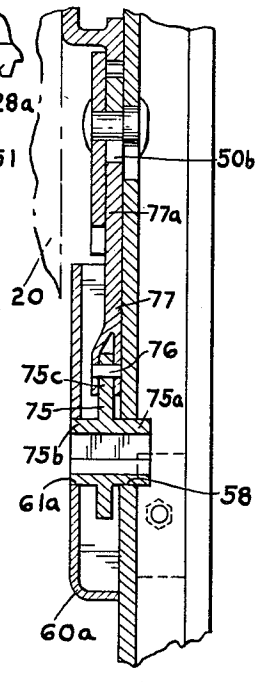


FIG. 8

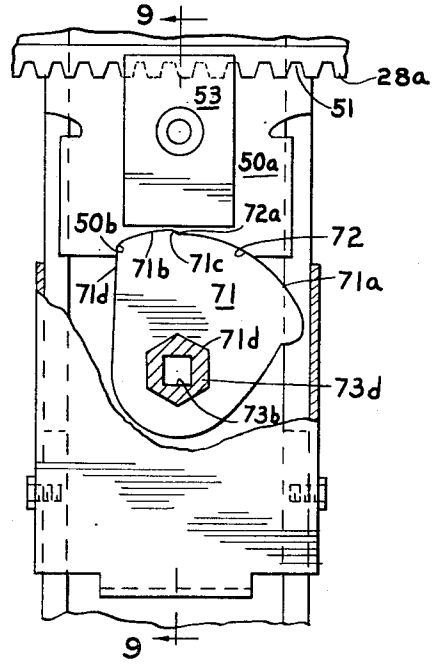
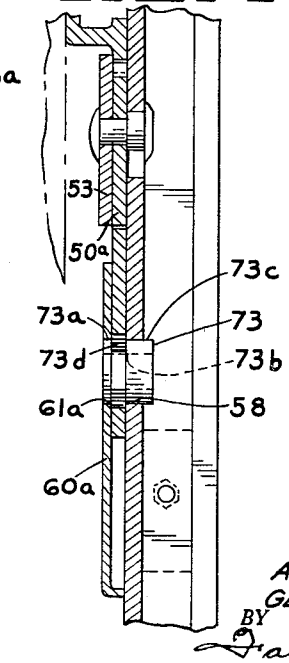


FIG. 9



INVENTOR.
ARVIN C. WEBSTER
GEORGE W. WEBSTER
BY Harley Gordon & Harley
ATTORNEYS

Patented July 15, 1952

2,603,167

UNITED STATES PATENT OFFICE

2,603,167

DUNNAGE APPARATUS

Arvin C. Webster and George W. Webster,
Detroit, Mich.

Application February 12, 1949, Serial No. 76,133

18 Claims. (Cl. 105—369)

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This invention relates to a dunnage securing mechanism that is permanently secured to the side walls of a boxcar of a like for holding in position dunnage pieces such as are customarily employed when railway boxcars are loaded with several layers or tiers of freight.

The present invention relates to the type of dunnage apparatus disclosed in the Reifer et al., Patent No. 2,165,652 granted July 11, 1939, and has for its principal object to improve upon the construction shown in said patent.

The principal characteristic of the Reifer patent is that of providing flanged channel-shaped longitudinally extending members which for convenience will be termed "belt members" which are secured to the side walls of the car and the flanges of which are provided with a continuous uninterrupted series of gear teeth with which are adapted to be engaged clamping or locking plates carried by vertical stanchions and which are provided with gear teeth adapted to be engaged with the gear teeth formed on the flanges of the belt members to hold the stanchions in adjusted position longitudinally of the car. As shown in the Reifer patent, however, only one flanged gear tooth belt member is provided at the lower part of each side wall of the boxcar and the stanchions are supported by a Z-shaped structural member secured closely adjacent to the top part of the side wall, each stanchion having a clamping bolt carrying rollers upon which the stanchions are supported by the top structural member for movement longitudinally of the car to any desired adjusted position and are locked in such position by tightening the clamping bolt upon an upwardly projecting flange of the Z-shaped structural member. A further feature of the Reifer patent is that of providing common operating means for the toothed locking plates whereby they are simultaneously drawn into engagement with the teeth formed on the lateral projecting flanges of the U-shaped belt member.

One of the principal purposes for which the Reifer type of construction is designed is for the carrying and shipment of sheet metal automobile parts, such as fenders or the like which, as they are very readily deformable, must be securely braced against movement in transit.

The present invention has for its principal object to provide a dunnage apparatus of the type disclosed in the Reifer patent in which at least three flanged toothed belt members are secured to each side wall of the railway car in much closer vertically spaced relationship than shown in said

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patent, thereby to reduce the unsupported span of the stanchions and thus obviate any appreciable bending or giving of the stanchions under the heavy impacts and blows to which the car is subjected in the ordinary handling thereof.

A further object is to improve upon the form of locking means for the locking plates so that when the plates are moved into locked position with the toothed flanges of the belt members, the plates will be held with greater rigidity in locked position in such a way as to reduce the possibility of their becoming accidentally disengaged or loosened when the car is in transit or being shifted around in the freight yards.

Another object of the invention is to improve upon the construction shown in the Reifer patent by eliminating any obstructions in the channeled part of the stanchions so as to have the entire length of each stanchion available for receiving the ends of wooden dunnage pieces.

A further object of the invention is to provide locking means that will be positively and rigidly locked in position so securely as to reduce accidental movement of the locking members after they have been secured in locked position.

Another object is to improve upon the construction shown in the Reifer patent by providing a much stronger and sturdier structure yet withal inexpensive and one in which the use of pivot pin connections subject to direct shearing stresses for operating the locking members, as in Reifer, is entirely eliminated.

The above and other objects of the invention will appear more fully from the following more detailed description and by reference to the accompanying drawings forming a part hereof and wherein:

Fig. 1 is a perspective view of one side of a railway car showing a portion of the longitudinally extending belt members and a plurality of adjacent vertically extending stanchions in position thereon, together with dunnage pieces and means for securing the latter in position;

Fig. 2 is a side elevation on a slightly reduced scale of the structure shown in Fig. 1 as seen from the line 2—2 thereof;

Fig. 3 is an enlarged side elevation of the top portion of a stanchion showing the manner of supporting each stanchion upon a top belt member, together with a form of operating means for moving the toothed locking plates into locked position with the toothed horizontal belt member;

Fig. 4 is a vertical section on the line 4—4 of Fig. 3;

Fig. 5 is a horizontal section taken on the line 5—5 of Fig. 3;

Fig. 6 is a view similar to Fig. 3 showing the toothed locking plates and operating means therefor for locking the stanchions in position to either the central or the lowermost longitudinally extending belt member;

Fig. 7 is a vertical section taken on the line 7—7 of Fig. 6;

Fig. 8 is a view similar to Fig. 6 broken away and showing a modified form of operating and locking means for holding the toothed locking plates in adjusted position;

Fig. 9 is a vertical section on the line 9—9 of Fig. 8;

Fig. 10 is a view similar to Fig. 8 showing a further modified form of means for moving and holding a locking plate in locked position, the modified form shown in Fig. 10 being of the toggle type and the figure of the drawing showing the parts in the locked position of the locking plate;

Fig. 11 is a view similar to Fig. 10 showing the toggle means and locking plate of Fig. 10 in unlocked position;

Fig. 12 is a vertical section on the line 12—12 of Fig. 10;

Fig. 13 is a side elevation of a pair of stanchions provided with means for securing in desired vertical position a pair of stirrups which are adapted to hold suitable transversely extending dunnage pieces for engagement with the tires of the front wheel of a completed automobile in an upwardly inclined position with the tires of the rear wheels of the automobile supported on the floor of the boxcar;

Fig. 14 is a vertical section taken on the line 14—14 of Fig. 13;

Fig. 15 is a section taken on the line 15—15 of Fig. 14; and

Fig. 16 is an exploded detail view of the cam actuating member of Figs. 3, 4 and 6 showing the manner in which a disc of metal is seated within and secured to a punched-out boss of the cam member.

As shown in Fig. 1 of the drawing, the numeral 20 indicates the side wall of a railway boxcar, 21 indicating a portion of the top thereof and 22 the bottom or floor of such car. Suitably secured at spaced intervals to the side wall 20, as by means of the bolts 23, is a plurality of belt members 24, 25 and 26; the belt member 24 being located adjacent to the top of the car, the belt member 25 extending along substantially the horizontal center line of the side wall and the belt member 26 being located adjacent to the bottom of the car. Each of the belt members, as shown, is in the form of a channel section having laterally extending flanges 27, 28 along the upper and lower edges, respectively, of the channel member. These flange members are formed along their entire length with a series of gear teeth 27a, 28a, respectively, for engagement by gear teeth provided on cooperating upper and lower locking plates carried by stanchions 30.

A plurality of stanchions 30 are carried by the belt members 24, 25, 26 on each side of the boxcar and are adapted to be moved along the belt members to any desired position longitudinally of the car and securely locked in adjusted position by any of the means hereinafter to be more fully described.

As shown most clearly in Fig. 1 of the drawing, each of the stanchions 30 is a U-shaped open channel member similar in general configuration

to the belt members 24, 25, 26 except that the flanges of the stanchions are not shown as provided with gear teeth 27a, 28a.

The flanges 31, 32 of each stanchion project inwardly, as shown best in Fig. 5, so that a T-head bolt 33, as indicated in dotted lines in Fig. 5, may be inserted into the open channel between the opposed inner ends of the flanges 31, 32 and turned crosswise to engage the inner faces of the flanges and thus serve to hold a supporting clamp 34 in any desired vertical position along the stanchion for supporting a dunnage piece such, for example, as the member 35 shown in Fig. 1. Likewise, similar T-head bolts 33 may be used at any other position along the length of the stanchions to hold dunnage supporting plates 36 in any desired adjusted vertical position.

As shown in Fig. 1, the dunnage supporting plates 36 are provided with elongated slots 37 adapted to receive horizontally extending dunnage pieces 38.

It will, of course, be understood that each side of the railway car is provided with a set of three belt members 24, 25, 26 which are secured in horizontal alignment with the belt members 24, 25, 26 on the other side of the car. Each of the belt members are provided with holes drilled at regular spaced intervals so that the operation of securing the belt members to the car merely involves drilling holes through the wood or metal side walls of a car and securing the belt members in position by the bolts 23. After the belt members have been secured in position, an equal number of stanchions are mounted on each side of the car so as to be secured in desired adjusted positions longitudinally of the car according to the characteristics and types of freight to be carried.

In order that the stanchions 30 may be readily moved to an adjusted position longitudinally of the car, each stanchion is provided adjacent to the top thereof with a roller carrier 40 (see Fig. 3) constructed of heavy sheet metal preferably stamped into a substantially U-shaped form and having at the ends of the U inwardly extending flanges 40a (see Figs. 4 and 5) which engage around the flanges 31, 32 of the stanchion. Mounted between the central web of the roller carrier 40 and the similar web 30a (see Figs. 3 and 4) of each stanchion 30 is a top locking plate 41 which is welded along its top edge, as at 42, to the web 30a of the stanchion 30. The lower edge of the locking plate 41 is provided with gear teeth 43 for engagement with the gear teeth 27a provided on the upper flange of the top belt member 24.

A backing plate 44 is interposed between the web of the roller carrier 40 and the locking plate 41 and is secured to the latter by the weld 45. The backing plate 44, as shown in Fig. 4, projects downwardly beyond the teeth 27a of the belt member 24 to engage with the flange 27 thereof and, in cooperation with the web 30a of the stanchion 30, serves to prevent lateral misalignment between the teeth 43 of the locking plate and the teeth 27a of the belt member.

Rotatably secured to the lower end of the roller carrier bracket 40 is a pair of rollers 46 which engage with the top face of the upper leg of the belt member 24 and thus serve to support each stanchion 30 upon the top belt member for ready movement thereof longitudinally along the car to the desired position.

Means are provided in connection with the roller carrier 40 to urge the stanchion 30 to a

raised upper position in which the gear teeth **43** of the locking plate **41** will be moved out of mesh with the gear teeth **27***a* whenever the lower locking plates are released and moved to inoperative position, as will hereinafter be more fully described. In order to accomplish this result the locking plate **41** which, as shown more clearly in Fig. 5 of the drawings, is also in the form of a U-shaped channel member having side walls **41***a* which embrace the side walls or legs **30***a* of the stanchions **30**; the edges of the side walls **41***a* being rigidly secured to the stanchion, as by welding, as indicated at **41***b*. Each side leg **41***a* of the locking plate **41** is provided with a laterally projecting tab or ear **41***c* (Fig. 3) which forms an abutment against which the upper end of a coiled compression spring **47** rests, the lower end of said spring abutting against a similar tab or ear **40***b* projecting inwardly from the side wall **40***c* of the roller bracket **40**.

As also shown most clearly in Fig. 5, the side walls **40***c* of the roller bracket **40** are formed in the stamping thereof with an outwardly pressed curved portion **40***d*, the inner side of which forms a groove for confining the springs **47** against lateral deformation when the said springs are compressed. In order to simplify and reduce manufacturing costs, the tabs **40***b* and **41***c* are formed by punching out a section of the side walls **40***c* and **41***a* of the respective members **40** and **41**.

The springs **47** are of sufficient strength that when the stanchions are mounted upon the top belt member **24** the upper ends of the springs acting upon the abutments or tabs **41***c* will hold the entire stanchion in an elevated position with the gear teeth **43** of the locking plate **41** raised out of engagement with the gear teeth **27***a* of the belt member **24**, the rollers **46** abutting against the upper face of the top leg and taking the downward thrust of the springs upon the tabs **40***b* that are integral with the roller bracket **40** and the upward thrust of the springs serving to raise the entire stanchion to which the top locking plates **41** are rigidly welded to an uppermost inoperative unlocked position.

As shown in Figs. 3 and 4, a pin **48** secured to the web **30***a* of the stanchion by welding, as at **48***a*, projects through suitable holes provided in the locking plate **41** and the backing plate **44**, and also through an elongated slot **48***b* formed in the central web of the roller bracket **40** and serves to limit the upward movement of the stanchion under the action of the springs **47**.

As will be seen from the foregoing, the desired number of stanchions can be placed upon the upper belt member by tilting the lower end of each stanchion outwardly toward the longitudinal center line of the car and after the rollers **46** have cleared the top edges of the gear teeth **27***a* and rest upon the upper face of the top leg of the belt member **24**, the lower end of the stanchion may then be moved toward the side wall **20** of the boxcar to a vertical position to be supported by the rollers **46** for ready adjustment longitudinally of the car.

Various means for locking the stanchions in adjusted position along the side walls may be provided, as will hereinafter be more fully described.

In Figs. 3, 4 and 6 of the drawings, I have shown a means for actuating the lower locking plate members by means of a cam and latch mechanism that has proven entirely satisfactory after a long period of experimental use in actual service. In each of these figures of the drawings, the numeral **50** indicates a lower locking plate, the upper edge of which is provided with gear teeth **51** for engagement with the gear teeth **28***a* provided on the lower lateral flange of each of the respective belt members **24**, **25** and **26**. This locking plate **50** is slidably secured to the central web **30***a* of the stanchion by means of a shouldered rivet **52** having adjacent to the head **52***a* thereof a portion of larger diameter **52***b* which passes through an elongated slot **52***c* provided in the web **30***a* of the stanchion and which terminates in a shoulder **52***d* that abuts against the inner face of the locking plate **50**. The length of the portion **52***b* is slightly greater than the thickness of the web **30***a* so as to provide a few thousandths of an inch clearance and thereby permit the locking plate **50** to slide readily along the stanchion member when the plate **50** is moved to locked or unlocked position. The reduced portion **52***e* of the rivet passes through a retaining plate **53** secured to the locking plate **50**, preferably by welding, as indicated at **53***a*. The upper end of the retaining plate **53**, as clearly shown in Figs. 3 and 4 of the drawing, projects upwardly beyond the gear teeth **51** a distance considerably greater than the root depth of the teeth **51** so that when the locking plate **51** is moved to unlocked position, the retaining plate will still remain in engagement with the outer faces of the gear teeth **28***a* and thus serve to hold the gear teeth **51** in proper lateral alignment with the gear teeth **28***a* and thereby insure proper intermeshing of the gear teeth **51** of the locking plate with the gear teeth **28***a* on the lower flange of each respective belt member.

The lower edge of each locking plate **50**, as shown in Fig. 3, is provided with a curved cam face **54** for engagement by a curved cam face **55** formed on the outer edge of a cam member **56**. The cam member **56** is in the form of a stamping which is punched to provide a laterally offset portion **56***a* at the center of which is formed a projecting boss **56***b* which fits rotatably into a hole **58** in a cover plate **59** suitably secured, as by screws **60**, to the stanchion **30**. A cam actuating member **57** (see Figs. 4 and 16) also preferably made as a stamping seats within the offset portion **56***a* and is also formed with a projecting boss **57***a* which fits rotatably in a hole **61** formed in the web **30***a* of the stanchion in axial alignment with the hole **58**. As shown in Figs. 3 and 4, the cam actuating member **57** has a radially projecting ear **57***b* which extends into an elongated arcuate slot **56***d* provided in the cam member **56**. Projecting outwardly and radially from the opposite side of the cam actuating member **57** is an ear **57***c* for engagement with a latch **62** rotatably mounted on a pin **62***a* within the housing **60**, the latch **58** being normally urged by a torsion spring **62***b* into engagement with the cam actuating member **57**.

For simplicity and economy of manufacture the cam member **56** and the cam actuating member **57** are stamped from heavy sheet metal, approximately $\frac{3}{16}$ of an inch thick, the offset and boss portions **56***a* and **56***b* of member **56** being formed simultaneously by the same stroke of the punch press which cuts the member **56** into the desired configuration to form the cam surface **55** and at the same time punch out and form the elongated slot **56***d*.

In the stamping of the cam actuating member **57**, shown most clearly in the perspective detail view of Fig. 16, its central punched out boss por-

tion 57a has a plurality of radially extending short ribs 57d formed on the inner web 57e thereof against which a circular disc 57f is seated and integrally united by welding the disc 57f to the ribs 57d. After the disc 57f has been fitted in place within the cam actuating member 57 and welded in place therein the disc is then provided with a non-circular, preferably square, aperture as indicated by the dotted lines 57g in axial alignment with the similar aperture 57h formed in member 57 when it is stamped out; the aligned non-circular apertures 57g and 57h serving to accommodate an angle bar wrench by means of which sufficient force may be exerted on the rugged parts 57 and 56 to force the gear teeth of the locking plates carried by the stanchions in tight wedging engagement with their cooperating gear teeth on the belt members.

The operation of the locking plate 50 by the cam 56 and cam actuating member 57, as shown in Figs. 3, 4 and 6 and as above described, is as follows:

Assuming that a stanchion has been mounted upon the upper belt member 24 with the rollers 46 resting upon the upper leg of the belt member and with the stanchion raised by the springs 47 so that the gear teeth 43 of the upper locking plate are out of engagement with the gear teeth 27a, the stanchion is rolled along to the desired adjusted position. A suitable wrench is then inserted into the square opening or bore formed by the apertures 57g, 57h in the cam actuating member 57 and the cam actuating member is rotated in a counterclockwise direction (Fig. 3). The ear 57b of the cam actuating member engages the left hand end of the elongated slot 56d thus rotating the cam member 56 and thereby causing the cam surface 55 of said cam member by its engagement with the cam surface 54 on the bottom end of the locking plate 50 to move the locking plate 50 upwardly into engagement with the gear teeth 28a of the lower stanchion and, after such gear teeth have become engaged, drawing the entire stanchion downwardly against the action of the springs 47 until the gear teeth 43 of the upper locking plate 41 have become tightly wedged into engagement with the gear teeth 27a on the upper flange of the belt member 24. After the gear teeth 43 and 51 have become tightly forced into engagement with the cooperating gear teeth 27a and 28a, the cam actuating member 57 will by then have been rotated into a position such that the latch 58 will be forced by the spring 62b into engagement with the cam actuating member 57 behind the ear 57c thereof, thereby to hold the cam member 56 securely and rigidly in locked position with the gear teeth 43 and 51 rigidly locked with a wedging engagement into their respective cooperating gear teeth 27a and 28a.

In order to disengage or unlock the locking plates, the cam actuating member 57, after having had a suitable wrench engaged with the non-circular bore thereof, is rotated in a clockwise direction (Fig. 3). During the first rotation of the cam actuating member 57, the ear 57c thereof causes the latch 58 to be pushed downwardly against the action of the spring 62b and during such period of rotation the ear 57b moves through the elongated slot 56d until after the latch 58 has become fully disengaged, the right hand side of the ear 57b engages the right hand side of the slot 56d and causes the cam member 56 to be rotated in a clockwise direction to permit movement of the locking plate 50 downwardly an amount sufficient not only to cause the gear teeth 51 to be completely disengaged from the gear teeth 28a, but also to permit the springs 47 to raise the stanchion upwardly and move the gear teeth 43 of the top locking plate 41 completely out of engagement with the gear teeth 27a.

In Figs. 6 and 7 of the drawings we have shown the locking members that are employed for locking each of the stanchions to the central and lowermost belt members 25 and 26, respectively. As shown in Fig. 6, an upper locking plate 66, preferably formed as a U-shaped stamping, has its side walls embracing the side walls 30a of the stanchion and is securely fastened to the stanchion preferably by welding the outer edges of the side legs of the locking plate to the outer faces of the side legs 30a of the stanchion. The lower end of the locking plate is provided with gear teeth 65a for engagement with the gear teeth 27a of either the central or lowermost belt member 25 or 26, as the case may be. The top edge of the locking plate 66 is also preferably welded to the web 30a of the stanchion, as indicated at 65b (Fig. 7). A retaining plate 65 similar to the retaining plates 44 and 53 is welded, as at 66a, to the locking plate 66.

In Fig. 6 we have shown the same construction for the cam member 56, the cam actuating member 57 and latch 58, as shown in Fig. 3 of the drawings where these parts have been shown in cooperation with the top roller carrying bracket 40.

Instead of employing a latch 58 to hold the cam member 56 against movement to an unlocked position, the left hand side 70 (Fig. 3) of the cam plate may cause to engage a shoulder 70a formed at the left hand end of the cam surface 54 of the locking plate 50, the curvature of the cam surfaces 54 and 55 being so designed as to hold or press the edge 70 of the cam members 56 into tight engagement with the shoulder 70a.

In Figs. 8 and 9 of the drawing is shown a modified form of construction for the cam member and cam actuating member shown and described in connection with Figs. 3, 4 and 6 in which the members 56 and 57 are shown as separate pieces. In Figs. 8 and 9, the cam member 71 is formed of a flat piece of heavy sheet metal and is provided with a curved cam face 71a for engagement with a curved cam face 72 provided on the lower edge of a locking plate 50a similar to the locking plate 50. The cam face 71a is provided with a raised portion 71b which terminates in a shoulder 71c adapted to engage a similar shoulder 72a formed by recessing the cam face 72 of the locking plate 50a. The cam member 71 is provided with a hex-shaped aperture 71d into which is received a hex-shaped shoulder 73a provided intermediate the ends of a boss piece 73 which is also formed with a rectangular, non-circular, preferably square, bore 73b. The boss member 73 is preferably formed from a piece of hexagonal bar stock which can readily be machined by a simple machining operation to provide the cylindrical bosses 73c and 73d with the hexagonal-shaped flange or shoulder 73a intermediate the ends of the boss piece for engagement with the hex-shaped opening 71d in the cam plate 71. The boss 73c is received rotatably within one of the openings 61 provided in the stanchion 30 while the boss 73d projects into and is also rotatable in the aligned opening 61a formed in a housing 60a similar to the housing 60 shown in Figs. 3, 4 and 6 of the drawing, the

openings 61 and 61a being in axial alignment and forming bearings for the boss member 73.

As will be obvious from the foregoing, when the cam member 71 is rotated in a counterclockwise direction (Fig. 8) the cam surfaces 71a and 72 thereof are so constructed that the locking plate 50a will be moved upwardly until the teeth 51a are bottomed in the teeth 28a of the belt member. Continued rotation of the cam member 71 after the gear teeth of both the upper and lower locking plates have become bottomed produces a slight distortion or springing of the webs of the belt member until the cam member has been moved to the extreme limit of its travel at which time the left hand or leading face 71d of the cam member engages against the shoulder 50b of the locking plate and the shoulder 71c of the cam member engages behind the shoulder 72a provided in the locking plate 50a.

The slight springing or distortion of the belt members produced when the cam member 71 is moved to locked position also occurs when the cam member is moved in a clockwise direction to unlocked position, the flanges of the belt members yielding sufficiently when a wrench is inserted in the bore 73a of the cam member to permit the cam member 71 to be forced in a clockwise direction to disengage the shoulders 71c and 72a.

In the forms of the invention heretofore described the lower movable locking plate is not positively withdrawn from locking engagement with the gear teeth 28a on the lower flanges of the respective belt members but the force of gravity must be relied upon to produce the required amount of movement of the lower locking plates to insure that the gear teeth thereof will become completely disengaged from the gear teeth on the belt members. It has been found as a result of a long period of experimental use that there is a tendency at times for the lower locking plates to stick, in which event, the plates must be struck with a hammer or other suitable striking tool to produce complete disengagement of the gear teeth thus to permit the stanchions to be moved longitudinally of the belt members.

In order to obviate this objection, the construction shown in Figs. 10 to 12 has been devised. As shown in these figures of the drawings, a member 75 somewhat similar to the cam actuating member 57 has projecting boss portions 75a, 75b which are rotatably received respectively in one of the apertures 61 formed in the web 30a of the stanchion and in the axially aligned aperture 61a of a housing member 60a. The member 75 has a radially extending ear portion 75c to which is pivotally secured, as by a pin 76, the lower end of a toggle arm 77. The toggle arm 77 which is preferably formed of a piece of heavy sheet metal terminates at its upper end in a cylindrical shaped portion 77a which fits within a correspondingly shaped recess 78 formed within the locking plate 50b. Immediately below the cylindrical recessed or apertured portion 78 the locking plate is provided with a flare cutaway portion 79 to provide sufficient clearance for the swinging movement of the toggle link 77 when the locking plate 50b is moved from the locked position shown in Fig. 10 to the unlocked position shown in Fig. 11. The boss portion of the member 75 is provided with a non-circular, preferably square, bore 80 to receive a similarly shaped end of a wrench for rotating the member 75 and thereby actuating the toggle to move the locking plate to and from locked and unlocked positions. The radial ear 75c of the member 75 is provided with a shoulder 75d for engagement with a cooperating shoulder 77c formed adjacent the lower end of the toggle link 77 to serve not only as a stop to limit movement of the toggle when it is moved to its locked position, but also to take the thrust reaction off the connecting pin 76.

Intermediate its ends the toggle link 77 is provided with a laterally projecting rib 77b which, when the toggle is moved to unlocked position, engages the lower face of the locking plate 50b at one side of the flared cutout portion 79, thus serving to limit the travel of the unlocking plate and toggle link 77 when the toggle is moved to unlocked position.

The operation of the modification just described, as will be readily understood, is as follows:

When it is desired to move the locking plate 50b into locked position a suitable angle bar wrench is inserted in the square opening 80 provided in the boss of the member 75 and the member is rotated in a clockwise direction from the position shown in Fig. 10 to the position shown in Fig. 11 thereby to cause the locking plate 50b to be moved upwardly until the gear teeth 51 thereof are forced snugly with a wedging engagement into the gear teeth 28a on the bottom flange of a belt member. This wedging engagement occurs just at about the time the toggle reaches its dead center position, the member 75 being rotated slightly beyond dead center at which time the shoulder 77a on the toggle link 77 engages with the shoulder 75d provided on the ear 75c of the member 75 thereby to hold the locking plate 50b and toggle securely in locked position.

When it is desired to unlock the locking plate 50b, the member 75, as will be readily understood, is rotated in a counterclockwise direction from the position shown in Fig. 10 to the position shown in Fig. 11, the connection of the upper end of the toggle link 77 serving to positively withdraw the teeth 51 of the locking member 50b completely out of engagement with the locking teeth 28a of the belt members.

It will be understood that each stanchion 30 will be provided at the upper end thereof with a roller carrier bracket 40 and rollers 46 together with the springs 47 to cause the entire stanchion, together with the various locking plates, to move in an upward direction an amount sufficient to cause each one of the upper locking plates for the belt members 25 and 26 to be raised clear out of engagement with the teeth 27a on each of the respective belt members.

Naturally, this upward movement of the stanchions cannot occur unless and until each one of the lower locking plates had been unlocked with the locking teeth 51 thereof moved downwardly a sufficient distance to permit the requisite upward movement of the entire stanchion so that the gear teeth 43 of the upper locking plate 41 are lifted clear out of engagement with the gear teeth 27a on the upper flange of the top belt member.

As each of the upper locking plates 65 for engagement with the gear teeth 27a of the central belt member 25 and the lower belt member 26 are rigidly secured to the stanchions, the movement of the entire stanchion bodily upward by the action of the springs 47 also insures the complete disengagement of the gear teeth 65a of each of the locking plate members 65.

As will be evident from the foregoing, any desired number of stanchions 30 may be em-

ployed, it being understood, however, that an equal number will be used on each side of the car. Each of these stanchions, when the locking devices have been unlocked, may be rolled freely and readily upon the rollers **46** to any desired position longitudinally the car.

For the purpose of transporting fully assembled automobiles or chassis equipped with wheels and tires an additional number of stanchions **301** which, as shown in Figs. 13 to 15, have secured thereto, preferably by welding a plate **81** provided with a plurality of vertically spaced keyhole slots **82** in which are adapted to be engaged the pins **83** and **84** projecting from and secured within a plate **85** to which is integrally united, also preferably by welding, a U-shaped stirrup **86**.

The pins **83** are provided with an enlarged head **83***a* adapted to pass freely through the round hole portion **82***a* of the keyhole slots **82** while the pins **84** are of a diameter such as also to pass freely through said round portions **82***a* but are much larger than the slot portion **82***b*. In attaching the stirrup plates to the plate **81**, the heads **83***a* of pins **83** are inserted through the round hole portions **82***a* of slots **82** and the stirrup plate is slid downwardly until the pin **83** nears the bottom of slot **82***b* at which time the pin **84** comes into alignment with the round hole portion **82***a* of the second keyhole slot from the one within which the pin **83** is engaged, the pin **84** is then entered into the second slot and the stirrup plate moved downwardly until the headed pin **83** is bottomed in its slot and pin **84** rests against the bottom of the round hole **82***b* of the slot **82** into which it has been entered.

The stirrups **86** are adapted to receive a pipe or other suitable dunnage piece **87**, the ends of which are engaged within a pair of opposed stirrups, one on each side of the car.

Except for the addition of the plates **81** the stanchions **301** are in all respects identical with the stanchions **30**. Assembled automobiles or chassis may be loaded in an inclined position by raising either the front or rear wheels thereof and adjusting the stirrup plates vertically and the stanchions **301** longitudinally until a pair of pipes **87** can be accurately positioned under the tires of the raised wheels to support the automobiles or chassis in the desired adjusted inclined position. The plates **81** of stanchions **301** extend from a point substantially midway between the lower and middle belt members to a point between the middle and upper belt members and said stanchions are provided with any of the forms of locking devices shown in Figs. 3 to 12. In securing the plates to the stanchions one of the holes **82***a* of a keyhole slot is located in axial alignment with the bore of the actuating member or the movable locking plate for the middle belt member.

It will be noted that after the pins of the stirrup plates have been engaged within the keyhole slots, as above described, the load of the cars carried by the pipes **87** is transmitted to the bottom of the stirrups thus producing a moment of force that tends to move the upper end of the stirrup plate away from the plate **81**. Such movement is, however, resisted and prevented by the locked engagement of the enlarged heads **83***a* of the pins **83** within the slotted portions **82***b* of the keyhole slots **82**.

As a freight car or other vehicle equipped with the dunnage apparatus of the present invention can be fully and compactly loaded with automobile parts such, for example, as fenders, hood sections and other sheet metal body parts as well as any other automobile parts, such as, engines, transmissions, axles or the like for assembly into chassis or fully completed automobiles, the same vehicle can be used for shipping the assembled jobs to dealers or distributors since after the cargo of parts and the dunnage pieces therefor have been removed, the stanchions **301** provided with the plates **81** can then be employed by placing the stirrups in proper adjusted position and adjusting the stanchions **301** longitudinally as the loading proceeds.

As in all forms of locking devices described and illustrated, the upper locking plates of each cooperating pair are firmly and rigidly secured directly to the stanchion by welding and as the movable lower locking plates are so designed and constructed that the cam surfaces thereof, as shown in Figs. 3, 6 and 8, cause the opposed gear teeth of the upper and lower locking plates to be tightly locked in engagement with the gear teeth **27***a* and **28***a* of each belt member and to be locked securely in such position against accidental displacement, the dunnage apparatus of the present invention is so securely locked in desired adjusted position that accidental movement thereof, as has been demonstrated as the result of a long period of experimental use in actual practice, is impossible, the construction being so shock proof against the shocks and jars to which the railway cars are subjected in ordinary usage that consequent accidental movement of the dunnage apparatus and damage of the freight being carried is entirely prevented.

It will, of course, be understood that the stanchions are located lengthwise of the car in accordance with the particular configuration of the articles to be carried and that the requisite wooden dunnage cross-pieces, such as the members **35** and **38**, will be placed in position to brace the articles securely in position against movement in transit. For example, if a boxcar load of automobile fenders or other sheet metal body parts is to be shipped, the parts are arranged in compact nested engagement in as many horizontal layers or tiers as may be required to fill the boxcar completely from floor to roof; the loading naturally starting at each end of the car and proceeding towards the central side door entrance.

It will also be understood that the stanchions will be securely locked in the desired positions, and such dunnage supporting plates **34** and **36** as may be necessary according to the characteristics of the items of cargo are secured to the stanchions by suitable T-bolts **33**. Supporting dunnage pieces **38** are then placed in position in the slots of plates **36** on adjacent stanchions on one side of the car and the other ends of such pieces are inserted in plates **36** of similarly located stanchions on the other side of the car. After the freight has been stacked upon the supporting dunnage pieces **38**, bracing dunnage pieces **35** are then placed in proper positions to securely hold and brace the freight against longitudinal movement.

While the stanchions in most cases will be locked in pairs in lateral or transverse alignment, if the configuration of the freight requires the bracing or supporting dunnage pieces to be inclined at an angle to the side walls instead of being perpendicular thereto, the stanchions can readily be secured in any desired offset position to obtain the requisite inclination of the dunnage pieces; the relatively close spacing of the gear

teeth 27*a*, 28*a* enabling very precise adjustments of the stanchions to be effected as desired.

Attention is directed to the fact that in all forms of the invention shown the locking plates and the means for actuating them are located between the outer face of the stanchion and the side wall of the car and that none of the operating means, as distinguished from the Reifer patent, is located within the channels of the stanchions. This is an important feature because when substantially the entire length of the inwardly facing channel of each stanchion is kept unobstructed the dunnage holding plates 35 or 38 can be placed at any desired vertical position and very fine and accurate vertical adjustments thereof may be made to insure snug contacting engagement of the dunnage pieces with the cargo to prevent any accidental movement thereof in transit.

It will further be understood that when a car has been equipped with the belt members and stanchions 30 preferably fifty of the latter, twenty-five on each sidewall, being used and sixteen of the stanchions 30*f*, eight to each side, the apparatus then remains as a permanent installation, a locker box preferably being provided in the car for storage of the dunnage retaining plates 34 and 36, T-bolts 33 and stirrup plates 81—86 when such parts are not in actual use.

In all forms of the invention shown the means for actuating the locking plates are constructed and arranged so that the locking means, for example, the latch 58 of Figs. 3, 4 or 6, the cam shoulders 50*b*, 71*c* and the toggle link stops 75*d* and 77*c* do not come into locked position until a slight distortion of the flanges of the belt members has occurred sufficient to produce a localized pre-loading of said flanges adjacent each stanchion by an amount greater than any weight to which they would be subjected in carrying any of the loads intended to be carried by the stanchions in the ordinary usage thereof. Therefore, no further distortion of the belt members in a downward direction as the result of gravitational force on the load can occur when the freight to be carried is loaded upon the dunnage pieces carried by the stanchions. In order to secure the greatest possible advantage of this pre-loading of the belt members, a block 90, as shown in Fig. 7, may be slidably secured as by a shouldered rivet 92, similar to the rivets 52, to the web 30*a* of each stanchion between each pair of locking plates to project into the channel of the belt member between the inner faces of the toothed flanges 27, 28 with which the said pair of locking plates are intended to engage. The thickness of the block 90 is slightly less than the distance between the opposed inner faces of the flanges 27, 28 of the belt members so that when said flanges are distorted by the pressure of the locking plates to effect a pre-loading of the flanges as above described, the block 90 will be clamped securely between the opposed inner faces of the flanges thereby tying the pre-loaded flanges together to act as a unit with the block 90 in such a way that each flange serves to complement its opposed flange in resisting any upward or downward distortion thereof due to the shocks and jars to which the freight car is subjected.

As the stanchions, as hereinbefore described, are caused to be moved upwardly by the springs 47 whenever the movable members of each pair of locking plates are moved to unlocked position, the blocks 90 are therefore slidably mounted on the stanchions by each rivet 92 being slidably received in an elongated slot 93 in the stanchion web 30*a*.

In connection with the pre-loading of the flanges 27, 28 of the belt members just described, it is to be noted that the dunnage pieces 38 which carry the weight of the loaded freight have their ends received in the slots 37 of the dunnage supporting plates 36 and it will be understood that each tier of freight will be snugly braced across the top thereof by similar dunnage pieces 38, the ends of which are also received in slots 37 of plates 36 so that any tendency of the freight to move upwardly due to the buckling or bending movements of the supporting beams of the freight car as well as downward motion thereof is communicated to the stanchions and thence directly to the pre-loaded flanges 27, 28 of the belt members. It will thus be seen that each tier of freight is so tied into the supporting stanchions and thence to the pre-loaded flanges 27, 28 of the belt members as to act as a unit with the latter.

While we have described the invention as installed in a railway boxcar, it will be apparent that the dunnage apparatus can readily be installed in any type of vehicle, such as moving or freight carrying automotive road vehicles. It is likewise to be understood that while we have described and illustrated preferred forms of the invention that have proved to be highly satisfactory in continuous experimental use, that many changes, variations and modifications thereof may be resorted to without departing from the scope of the invention as set forth in the claims hereunto appended.

We claim:

1. Dunnage apparatus for vehicles, of the type wherein a plurality of U-shaped channeled stanchions are mounted for longitudinal movement along longitudinally extending belt members secured to the inner sidewalls of the vehicle and said belt members are provided with upper and lower flanges each having an uninterrupted series of projecting gear teeth, and said stanchions being provided with a plurality of pairs of opposed cooperating plates, one pair for each belt member, each of said plates being provided with gear teeth for engagement with the gear teeth on said belt members, characterized by the upper member of each pair of locking plates being rigidly fixed to the stanchion, and means for moving the other member of each pair of locking plates until the gear teeth of the pair of locking plates are forced into opposed tight wedging engagement with the gear teeth of their cooperating belt member.

2. Dunnage apparatus for vehicles, of the type wherein a plurality of U-shaped channeled stanchions are mounted for longitudinal movement along longitudinally extending belt members secured to the inner sidewalls of the vehicle and said belt members are provided with upper and lower flanges each having an uninterrupted series of projecting gear teeth, and said stanchions being provided with a plurality of pairs of opposed cooperating plates, one pair for each belt member, each of said plates being provided with gear teeth for engagement with the gear teeth on said belt members, characterized by the upper member of each pair of locking plates being rigidly fixed to the stanchion, means for moving the other member of each pair of locking plates until the gear teeth of the pair of locking plates are forced into opposed tight wedging engagement with the gear teeth of their cooperating belt member, and means for locking said movable plate in said wedging engagement.

3. Dunnage apparatus for vehicles, of the type wherein a plurality of U-shaped channeled stanchions are mounted for longitudinal movement along longitudinally extending belt members secured to the inner sidewalls of the vehicle and said belt members are provided with upper and lower flanges each having an uninterruputed series of projecting gear teeth, and said stanchions being provided with a plurality of pairs of opposed cooperating plates, one pair for each belt member, each of said plates being provided with gear teeth for engagement with the gear teeth on said belt members, characterized by the upper member of each pair of locking plates being rigidly fixed to the stanchion, and means for moving the other member of each pair of locking plates until the gear teeth of the pair of locking plates are forced into opposed tight wedging engagement with the gear teeth of their cooperating belt member, said means including a housing secured to the outer wall of said stanchion and located between it and the sidewall of said vehicle, a wrench receiving member rotatably mounted in said housing and stanchion and means actuated thereby for causing the movable locking plate to be moved towards its cooperating fixed locking plate.

4. Dunnage apparatus for vehicles, of the type wherein a plurality of U-shaped channeled stanchions are mounted for longitudinal movement along longitudinally extending belt members secured to the inner sidewalls of the vehicle and said belt members are provided with upper and lower flanges each having an uninterrupted series of projecting gear teeth, and said stanchions being provided with a plurality of pairs of opposed cooperating plates, one pair for each belt member, each of said plates being provided with gear teeth for engagement with the gear teeth on said belt members, characterized by the upper member of each pair of locking plates being rigidly fixed to the stanchion, and means for moving the other member of each pair of locking plates until the gear teeth of the pair of locking plates are forced into opposed tight wedging engagement with the gear teeth of their cooperating belt member, said means including a housing secured to the outer wall of said stanchion and located between it and the sidewall of said vehicle, a wrench receiving member rotatably mounted in said housing and stanchion and means actuated thereby for causing the movable locking plate to be moved towards its cooperating fixed locking plate, said locking plates and the means for actuating said movable plate being located between the web of said stanchion and the sidewall of the vehicle whereby the U-shaped channel of each stanchion is left free and unobstructed in the region of said locking plates for the reception of dunnage retaining brackets and clamping bolts therefor in any desired vertically adjustable position.

5. Dunnage apparatus for vehicles, of the type wherein a plurality of U-shaped channeled stanchions are mounted for longitudinal movement along longitudinally extending belt members secured to the inner sidewalls of the vehicle and said belt members are provided with upper and lower flanges each having an uninterrupted series of projecting gear teeth, and said stanchions being provided with a plurality of pairs of opposed cooperating plates, one pair for each belt member, each of said plates being provided with gear teeth for engagement with the gear teeth on said belt members, characterized by the upper member of each pair of locking plates being rigidly fixed to the stanchion, and means for moving the other member of each pair of locking plates until the gear teeth of the pair of locking plates are forced into opposed tight wedging engagement with the gear teeth of their cooperating belt member, said means including a housing secured to the outer wall of said stanchion and located between it and the sidewall of said vehicle, a wrench receiving member rotatably mounted in said housing and stanchion, and means interposed between the movable member of the pair of locking plates and said rotatable wrench receiving member for causing rotation of the latter to produce movement of the movable locking plate towards its fixed cooperating plate.

6. Dunnage apparatus for vehicles, of the type wherein a plurality of U-shaped channeled stanchions are mounted for longitudinal movement along longitudinally extending belt members secured to the inner sidewalls of the vehicle and said belt members are provided with upper and lower flanges each having an uninterrupted series of projecting gear teeth, and said stanchions being provided with a plurality of pairs of opposed cooperating plates, one pair for each belt member, each of said plates being provided with gear teeth for engagement with the gear teeth on said belt members, characterized by the upper member of each pair of locking plates being rigidly fixed to the stanchion and the other member of each cooperating pair of locking plates being mounted on said stanchion for relative movement towards and away from the fixed member of said pair, said movable locking plate being provided with a curved cam surface, a rotatable cam member having a cam surface for engagement therewith, and a rotatable cam actuating member for actuating said cam member.

7. Dunnage apparatus for vehicles, of the type wherein a plurality of U-shaped channeled stanchions are mounted for longitudinal movement along longitudinally extending belt members secured to the inner sidewalls of the vehicle and said belt members are provided with upper and lower flanges each having an uninterrupted series of projecting gear teeth, and said stanchions being provided with a plurality of pairs of opposed cooperating plates, one pair for each belt member, each of said plates being provided with gear teeth for engagement with the gear teeth on said belt members, characterized by the upper member of each pair of locking plates being rigidly fixed to the stanchion and the other member of each cooperating pair of locking plates being mounted on said stanchion for relative movement towards and away from the fixed member of said pair, said movable locking plate being provided with a curved cam surface, a rotatable cam member having a cam surface for engagement therewith, and a rotatable cam actuating member for actuating said cam member, and means for locking said cam member against rotation when the gear teeth of said pair of cooperating locking plates have been forced into wedged engagement with the gear teeth of their cooperating belt member.

8. Dunnage apparatus for vehicles, of the type wherein a plurality of U-shaped channeled stanchions are mounted for longitudinal movement along longitudinally extending belt members secured to the inner sidewalls of the vehicle

and said belt members are provided with upper and lower flanges each having an uninterrupted series of projecting gear teeth, and said stanchions being provided with a plurality of pairs of opposed cooperating plates, one pair for each belt member, each of said plates being provided with gear teeth for engagement with the gear teeth on said belt members, characterized by the upper member of each pair of locking plates being rigidly fixed to the stanchion and the other member of each cooperating pair of locking plates being mounted on said stanchion for relative movement towards and away from the fixed member of said pair, said movable locking plate being provided with a curved cam surface, a rotatable cam member having a cam surface for engagement therewith, a rotatable cam actuating member for actuating said cam member, and a spring pressed latch for engaging said cam actuating member and locking it against rotation when the gear teeth of said pair of cooperating locking plates have forced into wedged engagement with the gear teeth of their cooperating belt member.

9. Dunnage apparatus for vehicles, of the type wherein a plurality of U-shaped channeled stanchions are mounted for longitudinal movement along longitudinally extending belt members secured to the inner sidewalls of the vehicle and said belt members are provided with upper and lower flanges each having an uninterrupted series of projecting gear teeth, and said stanchions being provided with a plurality of pairs of opposed cooperating plates, one pair for each belt member, each of said plates being provided with gear teeth for engagement with the gear teeth on said belt members, characterized by the upper member of each pair of locking plates being rigidly fixed to the stanchion and the other member of each cooperating pair of locking plates being mounted on said stanchion for relative movement towards and away from the fixed member of said pair, said movable locking plate being provided with a curved cam surface, a rotatable cam member having a cam surface for engagement therewith, a rotatable cam actuating member for actuating said cam member, a spring pressed latch for engaging said cam actuating member and locking it against rotation when the gear teeth of said pair of cooperating locking plates have forced into wedged engagement with the gear teeth of their cooperating belt member, and a lost motion connection between said cam and cam actuating members for permitting sufficient rotation of said actuating member to disengage said latch before it starts to move said cam member towards unlocking position.

10. Dunnage apparatus for vehicles, of the type wherein a plurality of U-shaped channeled stanchions are mounted for longitudinal movement along longitudinally extending belt members secured to the inner sidewalls of the vehicle and said belt members are provided with upper and lower flanges each having an uninterrupted series of projecting gear teeth, characterized by the provision of an upper and a lower belt member located respectively closely adjacent to the roof and to the floor of the vehicle, a third belt member located intermediate said upper and lower belt members, and said stanchions each being provided with a plurality of pairs of opposed cooperating upper and lower locking plates, one pair for each belt member, each of said locking plates having gear teeth for engagement with the gear teeth of its respective belt member, the upper member of each pair of locking plates being rigidly fixed to its stanchion and means for moving the lower member of each pair of locking plates until the gear teeth of said pair are forced into opposed tight wedging engagement with the gear teeth of their cooperating belt members, and means for normally urging each of said stanchions and the fixed locking plates carried thereby to an uppermost position when said lower plate is unlocked in which the gear teeth of all of the upper plates carried by said stanchion are completely disengaged from the cooperating gear teeth of their respective belt members.

11. Dunnage apparatus for vehicles, of the type wherein a plurality of U-shaped channeled stanchions are mounted for longitudinal movement along longitudinally extending belt members secured to the inner sidewalls of the vehicle and said belt members are provided with upper and lower flanges each having an uninterrupted series of projecting gear teeth characterized by the provision of an upper and a lower belt member located respectively closely adjacent to the roof and to the floor of the vehicle, a third belt member located intermediate said upper and lower belt members, and said stanchions each being provided with a plurality of pairs of opposed cooperating upper and lower locking plates, one pair for each belt member, each of said locking plates having gear teeth for engagement with the gear teeth of its respective belt member, the upper member of each pair of locking plates being rigidly fixed to its stanchion and means for moving the lower member of each pair of locking plates until the gear teeth of said pair are forced into opposed tight wedging engagement with the gear teeth of their cooperating belt member, a roller carrier mounted adjacent to the upper end of each stanchion and provided with rollers resting on the upper belt member, and compression springs confined between said roller carrier and the upper fixed locking plate of the top pair of said plates to cause said stanchion to be urged normally to an uppermost position in which the gear teeth of all of the fixed locking plates carried by said stanchion are completely disengaged from the gear teeth of their cooperating belt members.

12. Dunnage apparatus for vehicles, of the type wherein a plurality of U-shaped channeled stanchions are mounted for longitudinal movement along longitudinally extending belt members secured to the inner sidewalls of the vehicle and said belt members are provided with upper and lower flanges each having an uninterrupted series of projecting gear teeth, and said stanchions being provided with a plurality of pairs of opposed cooperating plates, one pair for each belt member, each of said plates being provided with gear teeth for engagement with the gear teeth on said belt members, characterized by the upper member of each pair of locking plates being rigidly fixed to the stanchion, and means for moving the other member of each pair of locking plates until the gear teeth of the pair of locking plates are forced into opposed tight wedging engagement with the gear teeth of their cooperating belt member, said means comprising a rotatable actuating member having a non-circular bore for the reception of a turning wrench, and a connecting link pivotally connected at one end to said actuating member and at its other end in abutting engagement with the movable member of a pair of locking plates.

13. Dunnage apparatus for vehicles, of the type wherein a plurality of U-shaped channeled stanchions are mounted for longitudinal movement along longitudinally extending belt members secured to the inner sidewalls of the vehicle and said belt members are provided with upper and lower flanges each having an uninterrupted series of projecting gear teeth, and said stanchions being provided with a plurality of pairs of opposed cooperating plates, one pair for each belt member, each of said plates being provided with gear teeth for engagement with the gear teeth on said belt members, characterized by the upper member of each pair of locking plates being rigidly fixed to the stanchion, and means for moving the other member of each pair of locking plates until the gear teeth of the pair of locking plates are forced into opposed tight wedging engagement with the gear teeth of their cooperating belt member, said means comprising a rotatable actuating member having a noncircular bore for the reception of a turning wrench, and a connecting link pivotally connected at one end to said actuating member and at its other end in abutting engagement with the movable member of a pair of locking plates, said actuating member and said connecting link forming a toggle linkage and being provided with cooperating shoulder abutments to lock said linkage in its extended condition.

14. Dunnage apparatus for vehicles, of the type wherein a plurality of U-shaped channeled stanchions are mounted for longitudinal movement along longitudinally extending belt members secured to the inner sidewalls of the vehicle and said belt members are provided with upper and lower flanges each having an uninterrupted series of projecting gear teeth, and said stanchions being provided with a plurality of pairs of opposed cooperating plates, one pair for each belt member, each of said plates being provided with gear teeth for engagement with the gear teeth on said belt members, characterized by the upper member of each pair of locking plates being rigidly fixed to the stanchion, and means for moving the other member of each pair of locking plates until the gear teeth of the pair of locking plates are forced into opposed tight wedging engagement with the gear teeth of their cooperating belt member, said stanchions having plates secured thereto provided with vertically spaced keyhole slots, cooperating plates having projecting pins for engagement with said slots and stirrups carried by said last-named plates adapted to receive tubular crosspieces for engaging a pair of tires of an automobile, and holding said automobile in an inclined position with the other pair of tires thereof resting on the floor of said vehicle.

15. Dunnage apparatus for vehicles, of the type wherein a plurality of U-shaped channeled stanchions are mounted for longitudinal movement along longitudinally extending channeled belt members secured to the inner sidewalls of the vehicle and said belt members are provided with upper and lower flanges each having an uninterrupted series of projecting gear teeth, and said stanchions being provided with a plurality of pairs of opposed cooperating plates, one pair for each belt member, each of said plates being provided with gear teeth for engagement with the gear teeth on said belt members, characterized by the upper member of each pair of locking plates being rigidly fixed to the stanchion, a plurality of abutment blocks carried by each of said stanchions, one between the members of each pair of locking plates and projecting into the channel of said belt member between the inner faces of the toothed flanges thereof, the width of each of said blocks being slightly less than the distance between said inner faces and means for moving the other member of each pair of locking plates to force the gear teeth of said pair of plates into tight wedging engagement with the gear teeth of said flanges and to effect a preloading of said flanges by distorting them into tight clamping engagement with said block and means for automatically locking and holding said movable locking plate against accidental displacement after said clamping engagement has been effected.

16. Dunnage apparatus for vehicles comprising upper, lower and intermediate longitudinal horizontally extending belt members of U-shaped cross section secured to the inner sidewalls of the vehicle and provided with laterally extending upper and lower flanges each having an uninterrupted series of projecting rack gear teeth, a plurality of vertical stanchions mounted for longitudinal adjustable movement along said belt members, each of said stanchions being provided with a plurality of pairs of cooperating toothed locking plates, one pair for each of said belt members, the upper member of each pair of locking plates being rigidly fixed to said stanchion and the lower member of each of said pairs being mounted on said stanchion for movement towards and away from its cooperating fixed pair member, a plurality of abutments carried by said stanchion, one for each pair of locking plates and projecting into said belt members between and in spaced relationship to the inner faces of the flanges of said belt member, means for moving the movable toothed locking plate of each pair thereof towards the fixed plate of said pair to first force the teeth of said pair of plates into wedging engagement with the toothed flanges of said belt member and then to force said flanges into clamped engagement with said abutment thereby to effect a localized pre-loading of said flanges in the region of each pair of locking plates, and means for automatically locking and holding said movable locking plate against accidental displacement after said preloading has been effected.

17. Dunnage apparatus for vehicles comprising upper, lower and intermediate longitudinal horizontally extending belt members of U-shaped cross section secured to the inner sidewalls of the vehicle and provided with laterally extending upper and lower flanges each having an uninterrupted series of projecting rack gear teeth, a plurality of vertical stanchions mounted for longitudinal adjustable movement along said belt members, each of said stanchions being provided with a plurality of pairs of cooperating toothed locking plates, one pair for each of said belt members, the upper member of each pair of locking plates being rigidly fixed to said stanchion and the lower member of each of said pairs being mounted on said stanchion for movement towards and away from its cooperating fixed pair member, a plurality of abutments carried by said stanchion, one for each pair of locking plates and projecting into said belt members between and in spaced relationship to the inner faces of the flanges of said belt member, means for moving the movable toothed locking plate of each pair thereof towards the fixed plate of said pair to first force the teeth of said pair

of plates into wedging engagement with the toothed flanges of said belt member and then to force said flanges into clamped engagement with said abutment thereby to effect a localized pre-loading of said flanges in the region of each pair of locking plates, means for automatically locking and holding said movable locking plate against accidental displacement after said pre-loading has been effected, and resilient means for normally urging each of said stanchions and the fixed locking plates carried thereby to a position such that the teeth of said fixed locking plates will be fully disengaged from the cooperating teeth of the flanges of each belt member when said movable locking plates are moved to their extreme non-operative unlocked positions.

18. Dunnage apparatus for vehicles comprising upper, lower and intermediate longitudinal horizontally extending belt members of U-shaped cross section secured to the inner sidewalls of the vehicle and provided with laterally extending upper and lower flanges each having an uninterrupted series of projecting rack gear teeth, a plurality of vertical stanchions mounted for longitudinal adjustable movement along said belt members, each of said stanchions being provided with a plurality of pairs of cooperating toothed locking plates, one pair for each of said belt members, the upper member of each pair of locking plates being rigidly fixed to said stanchion and the lower member of each of said pairs being mounted on said stanchion for movement towards and away from its cooperating fixed pair member, a plurality of abutments carried by said stanchion, one for each pair of locking plates

and projecting into said belt members between and in spaced relationship to the inner faces of the flanges of said belt member, means for moving the movable toothed locking plate of each pair thereof towards the fixed plate of said pair to first force the teeth of said pair of plates into wedging engagement with the toothed flanges of said belt member and then to force said flanges into clamped engagement with said abutment thereby to effect a localized pre-loading of said flanges in the region of each pair of locking plates, means for automatically locking and holding said movable locking plate against accidental displacement after said pre-loading has been effected, resilient means for normally urging each of said stanchions and the fixed locking plates carried thereby to a position such that the teeth of said fixed locking plates will be fully disengaged from the cooperating teeth of the flanges of each belt member when said movable locking plates are moved to their extreme non-operative unlocked positions, and means for slidably connecting said abutments to said stanchions whereby movement of said stanchions by said resilient means will not be impeded by said abutments

ARVIN C. WEBSTER.
GEORGE W. WEBSTER.

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The following references are of record in the file of this patent:

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