April 12, 1949. S. M. NAMPA 2,466,728

FREIGHT BRACING

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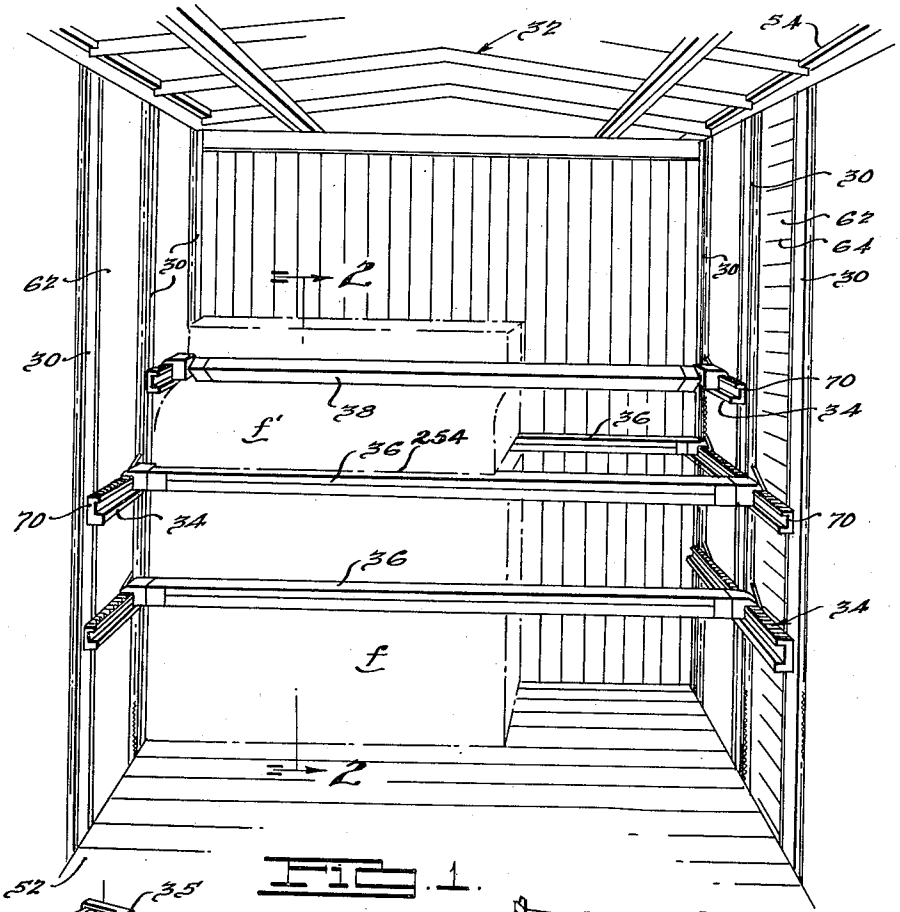


FIG. 1.

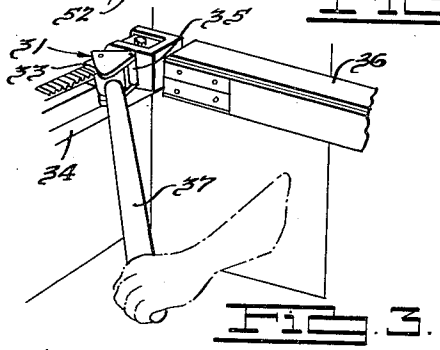


FIG. 3.

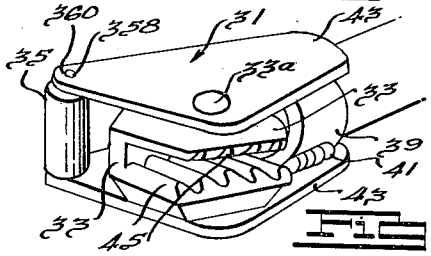


FIG. 4.

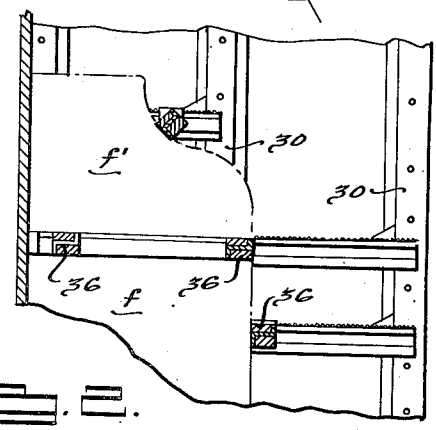


FIG. 2.

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Fig. 7.

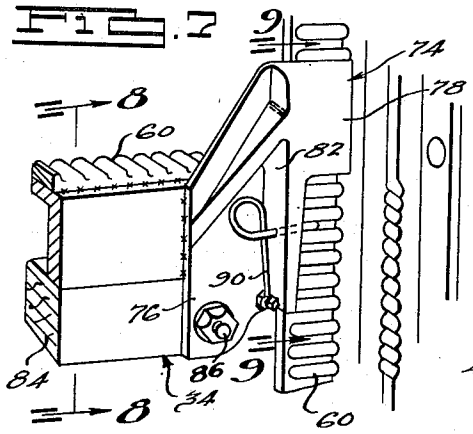


Fig. 8.

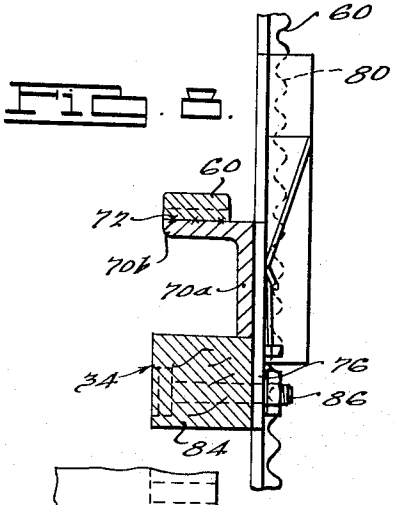
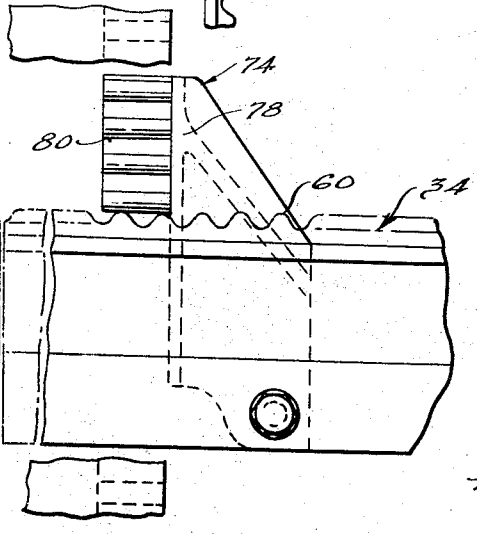


Fig. 9.



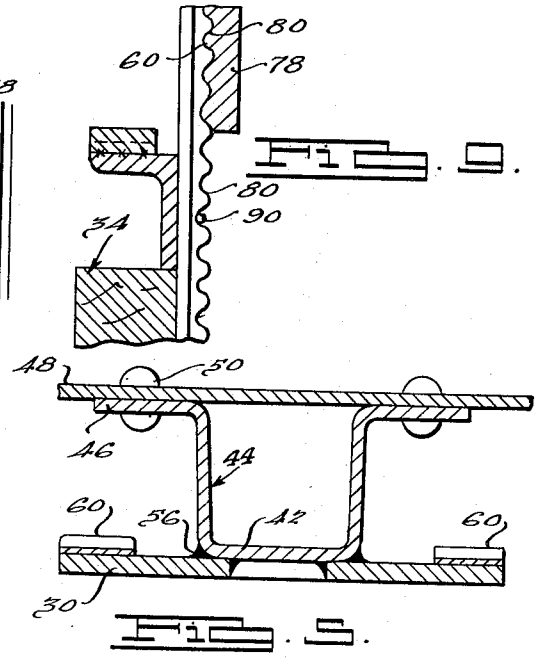


Fig. 5.

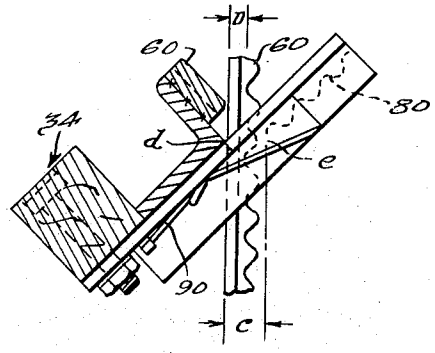


Fig. 10.

Fig. 6.

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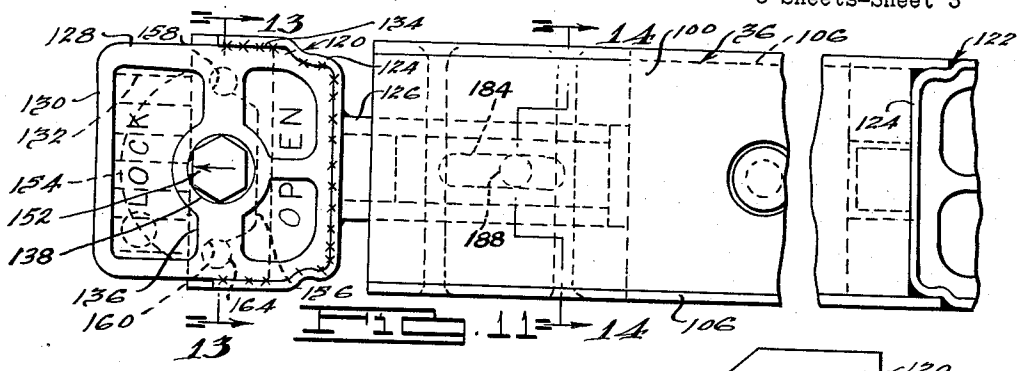


Fig. 11.

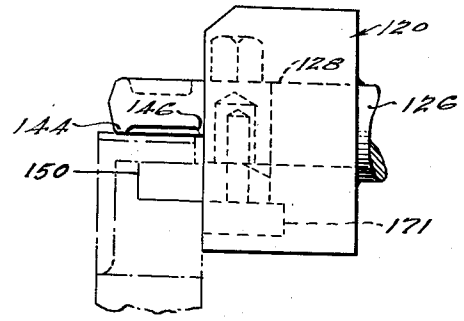


Fig. 12.

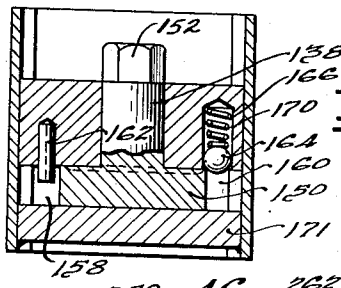


Fig. 13.

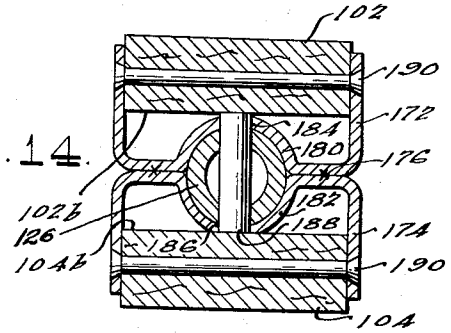


Fig. 14.

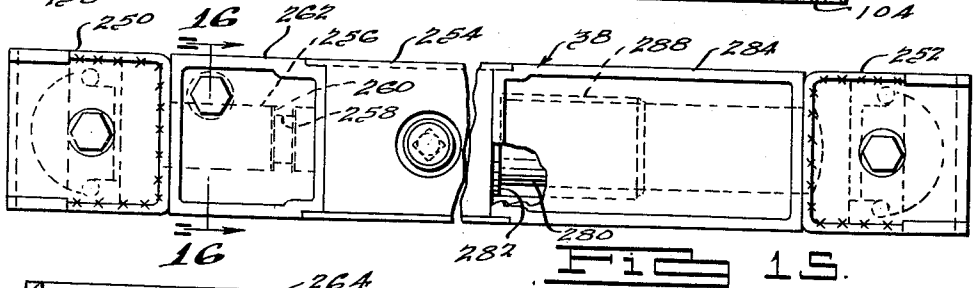


Fig. 15.

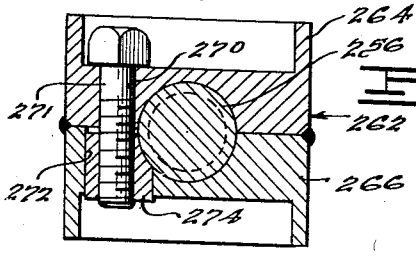


Fig. 16.

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UNITED STATES PATENT OFFICE

2,466,728

FREIGHT BRACING

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Original application March 12, 1942, Serial No. 434,357. Divided and this application February 8, 1943, Serial No. 475,082

14 Claims. (Cl. 105—369)

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The present invention relates to improved loading apparatus for freight articles of different types, and for use in vehicles or other storage spaces, and more particularly, to improved equipment of this nature having certain parts which are built into or combined with a vehicle, such as a railway freight car, or other storage space, and having certain other parts which are adjustably and variously cooperable with the built-in parts, the several parts of the equipment cooperating to hold (that is, for example, to brace, support or carry, space, wedge or provide shelves, partitions or bins for) a wide variety of freight articles. This application is a division of applicant's copending application Serial No. 434,357, filed March 12, 1942, now abandoned (a continuation thereof, Serial No. 740,330, having been filed April 9, 1947), and is directed to improved apparatus for moving freight articles to, or wedging or bracing such articles in, a desired position in a storage space, which apparatus is disclosed in said parent application.

Applicant's above-identified parent application discloses and claims certain features of a loading organization which, as specifically disclosed, comprises two series of upright supporting members arranged at the respectively opposite sides of, and permanently secured to, a freight car; wall members which are adjustably and removably supported by the uprights; and cross members which are disposed to be supported at their ends by wall members at the opposite sides of the car, so that the cross members extend across the car. The cross members may be used to form or to support bulkheads, to form or support decking arrangements, to support cooperating upright and horizontal members utilized to subdivide the storage space longitudinally, as well as for a variety of other purposes, all as set forth with greater particularity in the parent application.

The present apparatus is particularly concerned with the application to the freight, of bulkheads or other holding members, which serve to secure the freight articles in proper position on the floor of the car on decks, or the like, so as to prevent them from shifting movements in response, for example, to road shocks or shocks which are incidental to switching operations.

In a generic sense, the improvement, involves a tool having load engaging and anchor portions between which a force may be applied. The tool may be anchored to a fixed part of the storage space at any of a plurality of points therein, after which the load engaging portion may be applied to the load. With the parts thus engaged, a force

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may be applied between the anchor and load engaging portions, in response to which the load may be moved to or tightly held in a desired position. An important feature of the invention resides in arranging the tool so that it may be anchored to one of the afore-mentioned wall members, at any point along the latter's length, in which event the load engaging portion of the tool is applied to an associated cross member, and the tool thus serves to advance the cross member along the wall member. The latter movement may be utilized to advance freight articles to or tightly wedge them in a desired position. The invention thus comprehends an improved tool for freight loading, and improved combinations comprising the tool and cooperating freight loading members.

With the above as well as other considerations in view, the principal objects of the present invention are to provide an improved arrangement, as outlined above, which are simple and which may be economically and efficiently utilized; to provide such arrangements embodying an improved wedging tool; to provide such arrangements including an improved combination of a wedging tool with additional freight loading elements; and to generally improve and simplify freight loading operations.

Other and more detailed objects of the invention appear in the following description and in the appended claims.

In the drawings, which show preferred but illustrative embodiments of the invention, and throughout the several views of which corresponding reference characters are used to designate corresponding parts:

Figure 1 is a general view in perspective of a freight holding arrangement in conjunction or in combination with which the improved tool of the present invention may be utilized;

Fig. 2 is a fragmentary view, taken along the line 2—2 of Fig. 1;

Fig. 3 is a perspective view, illustrating the practice of the invention;

Fig. 4 is an enlarged perspective view of the present wedging tool;

Fig. 5 is a view in horizontal section, illustrating a preferred method of connecting one of the previously mentioned uprights to the supporting structure of the car;

Fig. 6 is a view of one of the wall members shown in Fig. 1;

Fig. 7 is a fragmentary view showing additional details of the supporting brackets associated with the wall member of Fig. 6;

Figs. 8 and 9 are views in vertical section, taken, respectively, along the lines 8—8 and 9—9 of Fig. 7;

Fig. 10 is a view corresponding generally to Fig. 8, but showing the wall member in a tilted position to which it may be moved for adjusting purposes;

Fig. 11 is a plan view of one of the cross members shown in Fig. 1;

Fig. 12 is a fragmentary view in side elevation of the end portion of the cross member of Fig. 11;

Figs. 13 and 14 are views in vertical section, taken, respectively, along the lines 13—13 and 14—14 of Fig. 11;

Fig. 15 is a plan view of a modified or rockable cross member, also shown in Fig. 1; and

Fig. 16 is a view in vertical section, taken along the line 16—16 of Fig. 15.

It will be appreciated from a complete understanding of the inventive features to be claimed in this application, that in a generic sense they may be embodied in or used with a wide variety of freight loading or other material handling systems. The disclosure of these features in particular forms, and as embodied in or used with particular types of loading apparatus, is, consequently, to be regarded in an illustrative and not in a limiting sense.

Referring first to Figs. 1 and 2, the illustrated arrangement comprises generally corresponding series of upright supporting members **30** arranged in aligned relationship at the opposite sides of a freight car **32**; a series of wall members **34** which are disposed at opposite sides of the car and are adjustably supported by and between adjacent pairs of uprights **30**; a series of cross members **36**, the length whereof is adjustable, as described below; and a cross member **38**, the length whereof is adjustable, but which also comprises a rotatable mid or freight-engaging section **254**. It will be understood that, if desired, both ends of the freight car may be equipped as indicated for the one end in Fig. 1 and that, in fact, in usual practice both ends would be so equipped. A description of the equipment for one end of the car is thus thought to be sufficient.

It will be noticed that the floor of the car immediately adjacent the end thereof is illustrated as being occupied by a freight article *f*, such as a crate, and the cross member **36**, which engages the face of the crate *f*, serves as a bulkhead, which wedges it against the end of the car and prevents shifting thereof. Above the freight article *f* an additional article *f'* is illustrated, which article is supported upon a deck constituted by a pair of cross members **36**, which are spaced apart lengthwise of the car. The article *f'* is wedged in place by means of the special cross member **38**, the midsection whereof is rotatable relative to the end portions so as to conform to the angled face of the article *f'*. In the drawings, it is assumed that the articles *f* and *f'* are sufficiently wide to span the full width of the car.

In the preferred use of the wedging tool **31**, shown in Figs. 3 and 4, the jaw **33** thereof is enchored to one of the wall members **34** and the load engaging portion **35** thereof is brought into engagement with the body of a cross member **36**, which is to be used for wedging purposes. Thereafter, the handle **37** of the tool is swung in a counterclockwise direction, as viewed in Fig. 3, which action forces the corresponding end of the cross member **36** to advance along the wall member **34** in the direction of the freight article. Such movement may either serve to initially position the freight article against the end of the car, or to tightly wedge it in place in such position. Such preferred method of utilizing the wedging tool may best be understood after a description of the illustrated complete organization.

Considering first the structure of the wedging tool, it comprises the previously mentioned handle **37**, which may be suitably secured into a short sleeve **39**. The sleeve **39** is secured, as by welding along the line **41**, and along a corresponding upper line, to the side or main frame plates **43**. These relatively stiff frame plates are rigidly spaced apart by sleeve **39**, and by pin **358**, which is secured in holes **360** in each plate, and also serves as a pivot for the freely rotatable sliding roller sleeve **35**, previously referred to as a load engaging portion. The jaw member **33**, which may be and preferably is formed as a steel forging, is generally U-shaped with opposing faces and with two opposed sets of identical curved teeth **45**, which are complemental to and may be mated with the hereinafter described teeth **60** on the side wall members **34**. The use of the two opposed sets of teeth **45** enables the same tool to be used on either the right or left-hand sides of the car. The space between the two sets of teeth **45** is proportioned to accommodate the combined thicknesses of the hereinafter described teeth **60** and the angle portions **70b** of the corresponding wall member **34**. Jaw **33** is pivotally connected to the plates **43** by the pivot pin **33a**.

Considering now the constructions of the other above-mentioned elements of the illustrated freight loading system, the uprights **30** may themselves constitute the vertical members of the car structure. Preferably and as shown, however, particularly in Fig. 5, the uprights **30** are relatively wide plate-like members, which are secured to the inner faces **42** of the corresponding car uprights **44**. As shown in Fig. 5, these uprights **44** are of usual outwardly presenting channel form, having outwardly turned flanges **46** to which the outer paneling **48** of the car is secured, as by means of rivets **50**. It will be understood that the uprights **44** may be conventionally secured to the floor and roof structures **52** and **54** of the car. The uprights **30** are illustrated as being welded, as indicated at **56**, to the associated car uprights **44**, and it will be understood that the welded joints may extend continuously or interruptedly throughout the full length of the uprights **30**. It is to be noted that it is preferred to use uprights **30** of relatively heavy metal, so that these uprights, in addition to affording a support for the cooperating freight loading elements, also serve to reinforce and strengthen the car structure as a whole.

As shown, the uprights **30** extend from the floor of the car entirely to the roof structure, although it will be understcod that for certain classes of loading, in which the unit weight of the freight is too large to permit loading of the car entirely to the roof, the uprights **30** may be extended only part way from the floor to the ceiling.

For cooperation with the hereinafter described wall members **34**, each upright **30** is provided on its outer face with two vertical rows of evenly spaced, tooth-like projections **60**, the crowns and roots whereof are preferably of rounded form and which projections **60**, consequently, are of rack-like form. This construction affords, as described below, a very efficient, adjustable connection between the wall members and the uprights, which allows a very close spacing, for example, one-half inch, between adjusted positions. Teeth **60** may be variously applied to the uprights **30**,

and are illustrated as formed separately therefrom in convenient lengths, which are secured, as by welding, to the uprights.

It will be understood that preparatory to the installation of the uprights **30**, it is preferred to remove the usual wood paneling or lining of the car, which lining normally affords a buffer surface for the freight. In order to provide such a buffer surface, it is preferred to maintain the inner surfaces of the uprights **30** free of projecting portions, and it is further preferred to secure panels, such as **62**, to the car walls, in the spaces between the uprights **30**, the inner faces of the panels **62** being substantially flush with, but projecting slightly inwardly of, the surfaces of the uprights **30**. The panels **62** may be formed of wood or other like material and, desirably, may be provided with graduations or markings **64** so as to facilitate the location of the wall members, at opposite sides of the car, at the same elevation. In order to accommodate the cross members **34**, a space is left between the opposed edges of each upright **30** and the adjacent panel **62**. Various means for securing the panels **62** to the car structure are described in the parent application and need not be described here.

Referring particularly to Figs. 1, 2 and 6 through 10, the wall members **34** are illustrated as comprising generally an angle member **70**, the longer flange **70***a* whereof is arranged vertically and the shorter flange **70***b* is arranged horizontally. The shorter flange **70***b* is provided on its upper surface with a series of tooth-like projections **60**, which are similar in form to the previously mentioned projections **60** and which may, in fact, be identical therewith. As shown, the projections **60** are formed separately of the angle member **70** and are secured thereto as by welding at the points **72**. It will be appreciated that the use of a plurality of such teeth **60** is advantageous since the load may thus be divided between them. This allows the use of relatively small, closely spaced teeth, and, consequently, provides a very close spacing between successive adjusted positions of the members, such as **36** and **38**, which are supported by the wall members **34**. The length of each member **34** is substantially equal to the center-line distance between adjacent uprights **30**. Thus, the members **34** in successive bays may be vertically aligned with each other and the teeth **60** thereon form a continuous series of teeth over which a cooperating cross member, as **36**, may be moved, as described below. It will be noted from Fig. 6, that the teeth **60** are so proportioned that, allowing for a slight spacing between the ends of successive wall members **34**, the end tooth on one member **34** is spaced from the end tooth on the adjacent bar by substantially the same distance as the spacing between adjacent teeth **60** on the individual members. This allows the just-mentioned continuous movement of a cross member **36**, for example, from one wall member **34** to the next succeeding one.

Each end of each angle member **70** is provided with a forged or otherwise formed bracket **74**, having a base portion **76**, which abuts and is secured to the outer face (considered from the inside of the car) of the corresponding angle member **70**. Each bracket **74** also has an upper and outwardly offset portion **78**, the inner and vertical face whereof is provided with a series of tooth-like projections **80**, which are complemental to the previously described tooth-like projections **60** on the upright.

The bracket **74** also comprises a wall or web **82** which extends between the base **76** and the toothed portion **78**. When the wall member **34** is located between adjacent uprights **30**, the walls or webs **82** at the respective ends of the member lie near enough to the opposed edges of the uprights **30** and limit the movement of the wall member **34** longitudinally of the car, but are sufficiently spaced therefrom to allow the endwise tilting discussed below.

Preferably and as illustrated, each cross member **34** is provided at its underside with a buffer bar **84**, made of wood, for example, and which is secured to the angle member **70** by means of studs **86** passed through the buffer and through the base **76** of each bracket **74**. As clearly appears, the buffers **84** extend inwardly of the car a distance slightly in excess of the distance represented by the flanges **70***b*. The buffers **84** present a relatively large surface to the freight and prevent the same from being injured by being pushed against the toothed flanges.

The wall members **34** are shown in Figs. 1, 2, 6, 7, 8 and 9 in the applied or connected positions, in which the outer faces of the flanges **70***a* thereof bear against the inner faces of the corresponding uprights **30**, and in which the tooth-like projections **80** are interlocked with a corresponding number of the teeth **60** on the outer faces of the uprights **30**. The center of mass of each wall member **34** is positioned to the left, as viewed in Fig. 8, of the junction between the bearing areas **70***a* and the uprights **30**. Consequently, even while in an unloaded condition, the weight of each wall member **34** urges it in a counterclockwise direction, about its longitudinal axis, as viewed in Fig. 8, and serves to hold the mating tooth-like projections **80** and **60** in properly interlocked relation to each other. If desired, a biasing spring, such as **90**, may be provided at each end of each member **34**, so as to positively urge the member in the just-mentioned interlocking direction. It will be understood, too, that when a vertically downward load is applied to each cross member **34**, such load acts to augment the just-mentioned interlocking tendency and holds the tooth-like projections in solid interlocking relationship.

In order to adjust the members **34** vertically, it is only necessary to rock them, about their longitudinal axis, in a clockwise direction from the locked position shown in Fig. 8 to the adjusting position shown in Fig. 10. This movement spaces the associated upright **30** and the teeth **60** carried thereby between the points *d* and *e* (Fig. 10) on the member **34**, and it is to be noted that the spacing between the latter two points is slightly in excess of the combined thickness of the member **30** and the teeth **60**. Consequently, when the member **34** is so rocked, it may be freely moved vertically upwardly or downwardly to any desired position of adjustment along the uprights **30**. If, during the course of such an adjusting movement, the member **30** is released, the natural tendency thereof to rotate counterclockwise, as viewed in Fig. 10, causes it to again assume a locked position, even though the operator fails to rock it back to the vertical position of Fig. 6.

In order to remove the wall members **34**, it is only necessary to rock them, as described above, and to thereafter tilt them, so as to elevate one end to a position above the other end. This tilting movement brings the horizontal distance between the bracket portions **78** to a value less than the horizontal spacing between the opposed edges of the adjacent uprights **30**, and enables the wall member **34** to be freely withdrawn

through the slots between the uprights and the buffer panels 62. It is noted that the width of these slots is sufficient to accommodate this movement. A reverse movement enables the members 34 to be applied to the uprights 30, as will be understood.

In practice, a relatively large number of the wall members 34 are preferably provided so that each bay (the area between adjacent uprights 30) at each side of the car may be provided with several wall members. Since the individual wall members 34 are independently adjustable, any desired distribution of the wall members along the sides of the car may be provided. In certain cases, the staggered relation shown in Fig. 1 is utilized. In other instances, as where it is desired to furnish a car with platforming or decking, it is desirable to have a plurality of wall members, positioned in successive bays, at the same elevation so as to provide, in effect, a single wall member greater in length than the width of any one bay.

One of the cross bars 36 is shown in detail in Figs. 11 through 14. The intermediate portion 100 of the main length of the bar is preferably formed of wood so as to present a satisfactory buffer surface to the freight articles engaged thereby and while such intermediate portion may, if desired, be formed of a single piece of wood, it is preferred to form it of two similar strips 102 and 104. These wooden strips 102 and 104 are stiffened and separated by a steel Z-bar 106, which, as will be understood, may be rolled or otherwise formed into shape. The respectively opposite ends of the bar 36 are provided with heads or jaws 120 and 122, which may be and preferably are identical to each other except in the hereinafter mentioned respects which enable the head 120 to move telescopically into or out of the body of the bar so as to enable the length of the bar to be adjusted.

The head or holding unit 120 comprises a generally U-shaped steel member 124. The base portion of the member 124 has a tubular stub shaft 126 secured thereto as by welding. A relatively heavy member 128, which may be a steel casting but is preferably a forging, and which is provided on the underside of its outwardly projecting portion 130 with a series of tooth-like projections 132, is secured within the U-shaped member 124, as by welding along the line indicated at 134 in Fig. 11.

The member 128 is provided with a stiffening rib 136 which extends across its top surface and is provided with an enlarged central bore which receives the post 138. The recessed areas at either side of the rib 136 may be provided with suitable indicia, such as the words "lock" and "open," to indicate locking and unlocking positions for the arrow on the top of the post 138. The underside of member 128 is substantially flat except for the previously mentioned outwardly projecting portion which carries the downwardly presenting tooth-like projections 132. Any suitable number of teeth 132 may be utilized, seven being illustrated in Fig. 11. It will be understood, of course, that these teeth are complemental in form to the teeth 60 on the upper surfaces of the wall members 34, so as to enable them to mesh therewith. The outer ends of the several teeth 132 are joined together by a rib-like member 144 which, consequently, closes the outer ends of the grooves between the several teeth 132. The rib 144 is thus effective to interlock with the ends of the several teeth 60 which mesh with the teeth 132 and prevent axial movement of the head 120 to the right relative to the member 34, as viewed in Fig. 11. The other ends of the grooves between successive teeth 132 are closed by the adjacent body portion of the member 128, as is indicated at 146, which body portion, consequently, serves to prevent or limit movement of the head 120 to the left relative to the member 34.

It will be appreciated that in view of the rounded character of the teeth 60 and 132, the cross members 36 may, after having been seated upon the cooperating oppositely disposed members 34, be pushed lengthwise of the members 34, during which movement the cross bar 36 moves vertically sufficiently to enable the crests of the teeth 132 to ride over the crests of the teeth 60.

In order to prevent vertical dislodgment of the bar 36, there is provided a rotary latch 150, which is either formed integrally with or is fixed to the lower end of the previously mentioned post 138, and the upper end whereof is formed as a hex nut 152, for engagement by a suitable wrench. The latch 150 may also be a forging. The periphery of the body of the latch 150 is shaped, as shown in Fig. 11, to have an arcuate portion 154 and a flat portion 156. The portions 154 and 156 are joined together by curved portions which define two recesses 158 and 160 for cooperation, respectively, with a stop pin 162 and a detent 164. The stop pin 162 is fitted into the member 128 and projects downwardly for cooperation with the just-mentioned recesses. The detent 164 comprises a ball which is received in a pocket 166 in the member 128 and is urged to the position shown by a spring 170. The parts are shown in Figs. 11, 12 and 13 in the locked position, in which the rounded locking portion having the surface 154 is disposed below and in substantially abutting relation to the underside of the flange 70b on the cooperating wall member 34. In this position, the pin 162 engages the recess 158 and prevents further rotation of the latch member 150 in a clockwise direction, as viewed in Fig. 11. In this position, also, the detent 164 engages the recess 160 and yieldably resists rotation of the latch member 150 in a counterclockwise or unlocking direction. It will be understood, however, that by rotating the nut 152 in a counterclockwise direction, the latch 150 is correspondingly rotated, during which rotation the detent 164 rides along the upper surface. 180° of such rotation brings the latch 150 to the unlocked position in which the pin 162 cooperates with the recess 160 to prevent further such rotation, and in which the detent cooperates with the recess 158 to yieldably hold the latch 150 in the unlocked position. This unlocking movement brings the member 150 out from under the flange 70b on the wall member 34 and enables the corresponding end of the bar 36 to be freely lifted away from the wall member.

After the latch 150 and the above described cooperating elements are assembled in place relative to the member 128, a supporting plate 171 is welded or otherwise secured to the legs of the U-shaped member 124.

In order to enable the cross bar 36 to be freely adjustable in length, so as to accommodate variations in the width of the car, the previously mentioned tubular post 126 is telescopically received within a fitting comprising two relatively short channel members 172 and 174, which are secured together, as by welding at the points 176, in back-to-back relation. The wood strips 102 and 104

are extended beyond the corresponding end of the Z-bar. A leg of the channel member 172 thus abuts the end of one flange of the Z-bar and the opposite leg of the other channel member 174 thus abuts the end of the other flange of the Z-bar. These abutting joints may be completed by welding or otherwise, as will be understood, and, as shown, through-rods 190 may be passed through the strips 102 and 104 and through the flanges of the members 172 and 174 to secure these parts together.

The webs of the channel members 172 and 174 are provided with semi-circular portions 180 and 182, which together define a cylindrical sleeve to receive the tubular post 126 and to accommodate this sleeve, the outer ends of the wooden strips 102 and 104 are cut away to afford a recess having the upper and lower surfaces 102b and 104b. In order to limit the degree to which the post 126 may move relative to the sleeve, and in this instance, to also prevent rotation of the head 120 relative to the cross bar 36, the arcuate portions 180 and 182 are slotted, as indicated at 184 and 186, to receive the corresponding ends of a cross pin 188, which is fitted in the tubular post 126.

The opposite or right-hand head 122 of the cross bar 36 may and preferably does embody the same construction described with reference to the left-hand head 120, with the exception that the right-hand head 122 is not provided with the tubular post 126. Instead, the U-shaped member 124 of the head 122 is directly welded to the extended end portions of the flanges 108 of the Z-bar 106, so that the head 122 is rigidly connected to the body of the bar 36 and all adjustments in length of the bar 36 are afforded by the slidable (in this case, freely slidable) but non-rotative connection between the head 120 and the body of the bar.

The special bar 38 shown generally in Figs. 1 and 2, and in detail in Figs. 15 and 16, may be constructed in accordance with the description of bar 36, except that it also includes a rotary or tilting feature which is achieved by building into the bar an axially extending pin received in the sleeve to provide an axial pivot. These two elements, the pin and the sleeve, are secured between the heads 250 and 252 of the bar and the intermediate portions of the bar, and include suitable stop means to prevent the bar from coming apart axially.

More particularly, as shown in Figs. 15 and 16, the intermediate portion 254 of the bar may be and preferably is constructed as described in connection with Figs. 11 and 14. The left-hand head 250 may be and preferably is constructed as described in connection with the head 120 (Fig. 11) with the exception that the rearwardly extending post 256, associated therewith, is provided with an annular groove or depression 258 which receives a rib 260 provided in the cooperating socket 262. The socket 262 is illustrated as comprising two similarly arranged forging portions 264 and 266, secured together in back-to-back relation. The opposed faces of the portions 264 and 266 are provided with semi-circular grooves (provided with corresponding portions of the rib 260), which cooperate to define a recess to receive the post 256. It will be understood that, in assembly, the head 250 is positioned adjacent one of the portions 264 and 266, with the post 256 properly seated in the groove therein, after which the other portion is fitted over the post, enabling the operation to be completed by securing the portions 264 and 266 together as by welding along the joints 268.

With the construction as thus far described, it will be appreciated that the head 250 is freely rotatable, about the axis of the post 256, relative to the bar 38. A further feature resides in the provision of means whereby the head 250 may be locked in selected positions of adjustment. As shown, the locking is accomplished by providing the upper socket portion 264 with an opening 270 suited to freely receive the shank of a stud 271, and by providing the lower socket portion 266 with an enlarged opening 272, which receives a locking cam 274, which cam may be and preferably is arranged to be vertically slidable within the opening 272, but is not rotatable therein. The bore 272 opens into the cylindrical sleeve which receives the post 256, and it will be understood that by turning the stud 272, the cam 274 may be drawn upwardly into solid engagement with the surface of the post 256, whereby to clamp or lock the post 256 between the cam 274 and the sleeve-like surface on the upper socket portion 264. The post-engaging face of the cam 274 is complemental to the portion of the post engaged thereby.

The socket 262 may be and preferably is secured to the body of the bar 38 in the manner described for the connection between the socket members 172 and 174 and the body 100 of the bar 36 (Fig. 11).

The right-hand head 252 may be and preferably is constructed as described in connection with the head 250, with the exception that the post 280 associated therewith is of greater length and is provided at its extreme left-hand end with an annular rib or enlargement 282. The post 280 and the rib 282 are received in a socket 284, which may be and preferably is formed of a single forging. The socket 280 is provided with a bore 286, which snugly but slidably receives the body of the post 280 and is also provided with an enlarged counterbore 288, which snugly but slidably accommodates the annular rib 282. A limit to the inward movement of the head 252 relative to the body of the cross bar 38 is afforded, of course, by the abutting engagement between the back of the head 252 and the right-hand end of the socket 284. Similarly, a limit to the lengthening movement of the bar is afforded by the engagement between the annular rib 282 and the right-hand end of the counterbore 288. It will be understood that the head 252 and the socket 284 may be assembled together by first passing the post 280 axially through the socket and by thereafter securing the rib 282 to the post 280 by welding along the joint 290. After the members 252 and 284 are thus assembled together, the socket 284 may be secured to the body of the bar 38 in the manner described in connection with the socket 262.

By way of a summary of the operation of the freight holding elements described above, and a particular description of the preferred use of the wedging tool, it may be noted that the wall members 34 may be appropriately distributed relative to the uprights 30 to accommodate the sizes of the freight articles to be loaded. Thereafter, the article *f*, for example, may be moved into place in the car, after which the deck for the article *f'* may be erected by applying the illustrated decking cross members 36 to their associated and previously positioned wall members 34. Also, as will be obvious, the article *f'* may be suitably deposited upon its deck. The loading

operation may be completed by applying the bulkheading cross members 36 and 38 to the respective articles *f* and *f'*.

The latches 150 associated with these cross members normally occupy the retracted positions, when not in use, and these members may, consequently, be preliminarily positioned simply by resting the ends thereof upon the corresponding wall members. When so positioned, they may be manually advanced into initial engagement with the surfaces of the corresponding articles. With the member 36 thus preliminarily positioned, for example, the wedging tool 31 may be applied to the wall member 34 at one end of the member 36, by fitting the jaw 33 thereof over the toothed portion of the wall member 34. This brings one series of teeth 45 on the wedging tool into meshing engagement with a corresponding number of the teeth 60 on the wall member 34, and brings the other series of teeth 45 into abutting relation to, or immediately adjacent, the underside of the flange 70*b* on which the teeth 60 are supported. It will be noticed that the spacing between the opposed sets of teeth 45 is sufficient to accommodate the vertical dimension of the teeth 60 and the flange 70*b* of the member 34. The jaw 33 may thus be freely fitted over or withdrawn from the member 34 in a direction normal to the length of the latter, but when it is so positioned, it cannot be moved lengthwise of the member 34. The jaw 33 thus firmly anchors the tool 31 to the member 34.

Preparatory to the step of fitting the jaw 33 over the member 34, the jaw 33 is preferably rotated about the pin 33*a* relative to the handle 37, so that, when the jaw is applied, as aforesaid, the handle 37 is spaced at a relatively wide angle from the cross member 36. It will be understood, also, that the jaw 33 is fitted to the cross member 34 at a point sufficiently near the cross member 36 to bring the roller 35 into engagement with the face of the cross member 36. Thereafter the handle 37 may be forced in a counterclockwise direction, as viewed in Fig. 3, which action causes the roller 35 to roll along the face of the member 36 from its initial point of engagement to a point nearer the end thereof. During and by virtue of this movement, the member 36 is forced towards the corresponding freight article, causing a take-up of any space between the end adjacent articles, or between it and the end of the car or an associated bulkhead. Having effected this take-up movement at one end of the member 36, a similar operation may be performed at the other end thereof since, as previously mentioned, the tool may be used either right-handed or left-handed. If one such take-up movement is not sufficient to effect the desired amount of wedging, it will be appreciated that the tool may be repositioned at the respective ends of the member 36, and additional take-up movements may be effected.

After the cross member 36 is advanced to its desired wedging point, the latches 150 at the respective ends thereof may be turned into locking position, which, it will be recalled, positively locks the heads at the ends of the member to the corresponding wall members 34. In many instances, in which the freight articles are relatively incompressible, the normal interlocking between the teeth 60 and 132 is sufficient to temporarily hold the members 36 in their proper position. In such instances, the tool 31 may be removed before the latches 150 are turned into locking position. In other instances, it may be desirable to utilize the tool 31 to hold the member 36 in its wedged position until the corresponding latch 150 is turned into locking position.

The wedging of the rockable cross member 38 may be similarly effected, as will be understood. In connection with this member, it may be additionally noted that it is preferred to leave the mid-section thereof freely rotatable until the wedging operation is completed, and to thereafter secure it in the rocked position, by tightening the holding means described in connection with Fig. 16.

Considering another but related aspect of the above system, it will be noticed that the advance of the cross bars, such as 36 and 38, along the bay members 34, under the influence of a manually applied force or under the influence of the wedging or bracing force, is a non-rotary or sliding motion, during which the cross bar proceeds with a bumping or wave-like motion, as the interfitting teeth ride into and out of usual meshing engagement. Throughout the entire such advance, however, the co-engaging teeth remain effective to support the full weight of the cross bar, thus relieving the operator of this duty. It will be noted, also, that the weight of each cross member acts to hold it seated on its cooperating members 34, which seating relation is obtained not only with the illustrated horizontal disposition of the side bay members, but is also obtained to a materially beneficial degree with side bay members which extend at any of a relatively wide range of angles to the horizontal.

Although only a single embodiment of the invention has been described, it will be appreciated that various changes may be made in the structural aspects thereof, all within the spirit and scope of the invention.

What is claimed is:

1. In a freight loading system, the combination of a freight load engaging member, means including a support for supporting the member, the member and the support having co-engaging interlocking means which enable the member to interlockingly engage the support at any of a plurality of points along the support, said interlocking means being adjustable to permit or prevent movement of the member along the support, and an adjusting member having means engageable respectively with the said support and with the first-mentioned member and including means whereby a force may be applied through it between said first-mentioned member and said support, so as to force said first-mentioned member along said support from one said point to another, while said interlocking means is adjusted to permit such movement.

2. In a freight loading system for applying a force to and adjustably moving a freight loading member, the combination of a support having a plurality of interlocking surface means distributed thereover for direct supporting engagement by the loading member, and an adjusting member having means cooperable with the loading member and having additional means engageable with any of the said surface means so that when a said force is applied to the adjusting member the said engaged surface means act as an anchor point for the adjusting member and cause said force to be transmitted to and move the loading member.

3. In an adjusting tool for cooperation between a freight loading member to which a force is to be applied, to effect an adjusting movement

thereof, and a support having a plurality of interlocking surface means distributed thereon for direct supporting engagement by the loading member, the combination of means cooperable with the loading member, additional means engageable with any of the said surface means, and means for applying a force between the said cooperable and engaging means, the said engaged surface means acting as an anchor so that said force is transmitted to and moves the loading member.

4. In a system for bracing a freight load, the combination of a freight load engaging member, means including a support for supporting the member, the member and the support having coengaging interlocking means which enable the member to interlockingly engage the support at any of a plurality of points along the support, said interlocking means opposing movement of the member along the support, but permitting such movement in response to an adjusting force and while said member directly engages and its weight is supported by said support, and an adjusting member having means engageable respectively with the said support and with the first-mentioned member and including means whereby a force may be applied through it between said first-mentioned member and said support, so as to force said first-mentioned member along said support from one said point to another.

5. In a system for applying an adjusting force to a freight loading member, the combination of a support having a plurality of interlocking surface means distributed thereover for direct supporting engagement by the loading member, said interlocking means opposing movement of the load along the support, but permitting such movement in response to an adjusting force and while said loading member directly engages and its weight is so supported by said member, and an adjusting member having means cooperable with the loading member and having additional means engageable with any of the said surface means so that when a said force is applied to the adjusting member the said engaged surface means act as an anchor point for the adjusting member and cause said force to be transmitted to the loading member.

6. The combination of claim 1 wherein the adjusting member has means which engage the said interlocking means on the support.

7. The combination of claim 2 wherein the adjusting member has means which engage the said interlocking means on the support.

8. The combination of claim 1 wherein the interlocking means on the support comprises a series of tooth-like projections distributed along the support in the direction in which the force is to be applied, and wherein the adjusting member is provided with a complemental series of tooth-like projections which mesh with the aforesaid projections.

9. In an adjusting tool for co-operation between a freight loading member to which a bracing force is to be applied and a support having

a rack-like member extending therealong in the direction in which the bracing force is to be applied, said rack-like member being arranged for direct interlocking engagement by the loading member, the combination of means cooperable with the loading member, additional means including a plurality of rack-like teeth complemental to the first mentioned teeth, and means for applying a force between the said cooperable means and the last-mentioned means while the said teeth are interengaged with each other, the said interengaged teeth acting as an anchor so that said force is transmitted to the loading member.

10. The combination of claim 9 wherein the additional means of the tool comprises a jaw containing the teeth of the tool, which jaw is adapted to be fitted over the teeth of the support from the side thereof.

11. The combination of claim 9 wherein the additional means of the tool comprises a jaw containing two opposed and similar sets of teeth whereby the tool may be fitted over the support in either of two diametrically opposite positions.

12. In a freight loading system for applying a force to and adjustably moving a freight loading member, the combination of a support having a plurality of interlocking surface means distributed lengthwise thereof for direct supporting engagement by the loading member, and an adjusting member having a pair of relatively movable elements, one of said elements having means adapting it to cooperate with any of said surface means to afford an anchor for said adjusting member, the other said element having a portion engageable with said loading member and effective to apply force thereto in response to the application of a force to the adjusting member tending to cause relative movement between said elements, and means for applying a said force to said adjusting member.

13. The combination of claim 12 wherein said last-mentioned means comprises lever means carried by the first-mentioned element and which fulcrums about said one element.

14. The combination of claim 12 wherein said force applied to the adjusting member causes said other element to advance, in a direction lengthwise of said support, relative to said one element.

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