# United States Patent [19]

**Balinksi**

[11] **3,782,295**

[45] **Jan. 1, 1974**


[54] **CARGO RESTRAINING BAR**


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[73] Assignee: **United States Gypsum Company,** Chicago, Ill.



[22] Filed: **May 9, 1972**

[21] Appl. No.: **255,872**

**Related U.S. Application Data**

[63] Continuation-in-part of Ser. No. 79,583, Oct. 9, 1970, abandoned.

[52] **U.S. Cl.** ..... **105/369 B**

[51] **Int. Cl.** ..... **B61d 45/00,** B60p 7/16

[58] **Field of Search** ..... 105/369 B



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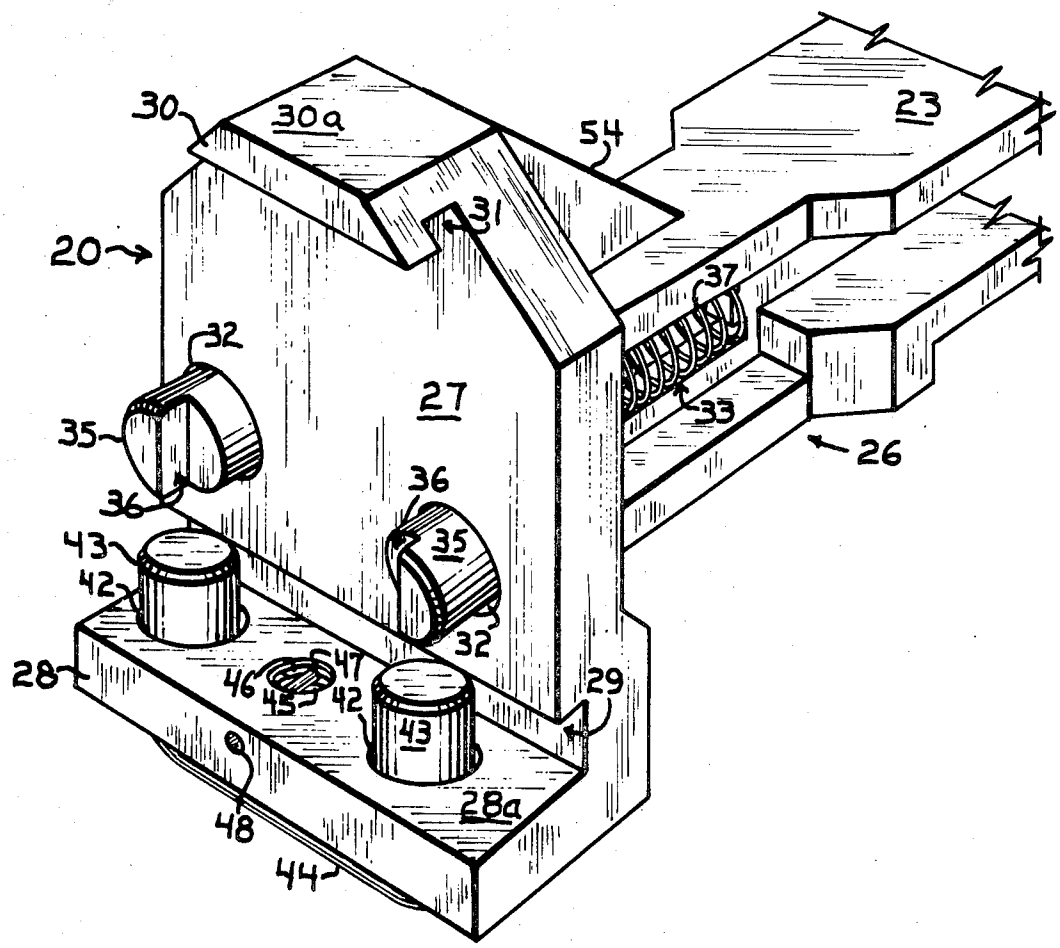
*Attorney*—Stanton T. Hadley et al.



[57] **ABSTRACT**

A load bracing apparatus adapted to fit a multiplicity of the belt rail systems used to support and restrain freight in transportation vehicles such as railway freight cars, trucks and ships.


**22 Claims, 13 Drawing Figures**



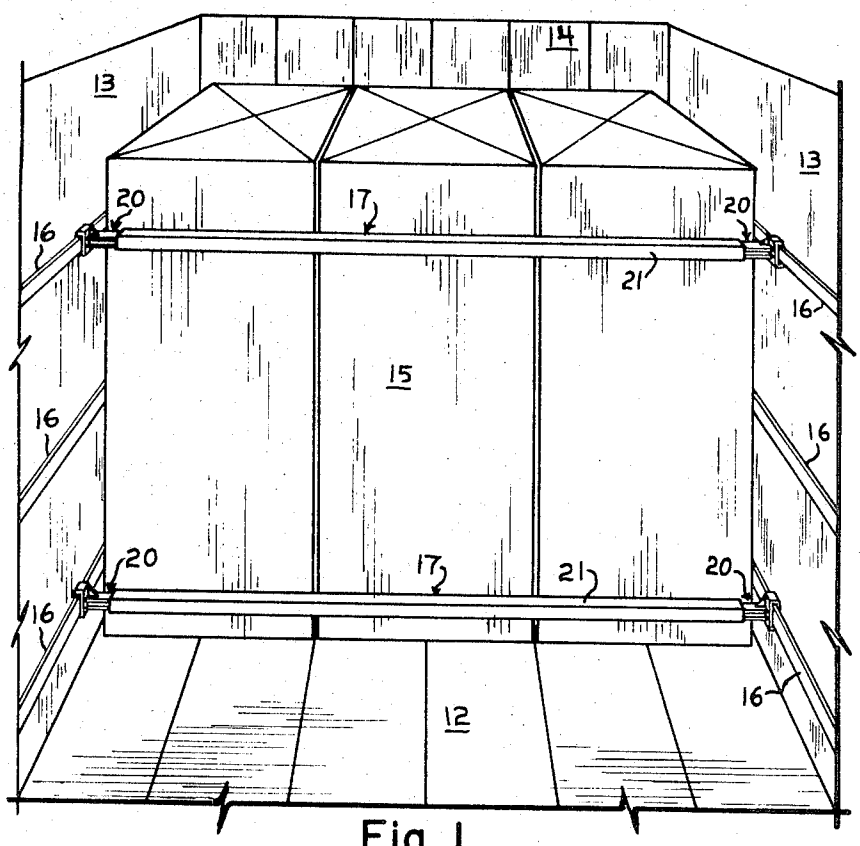

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Fig. 1

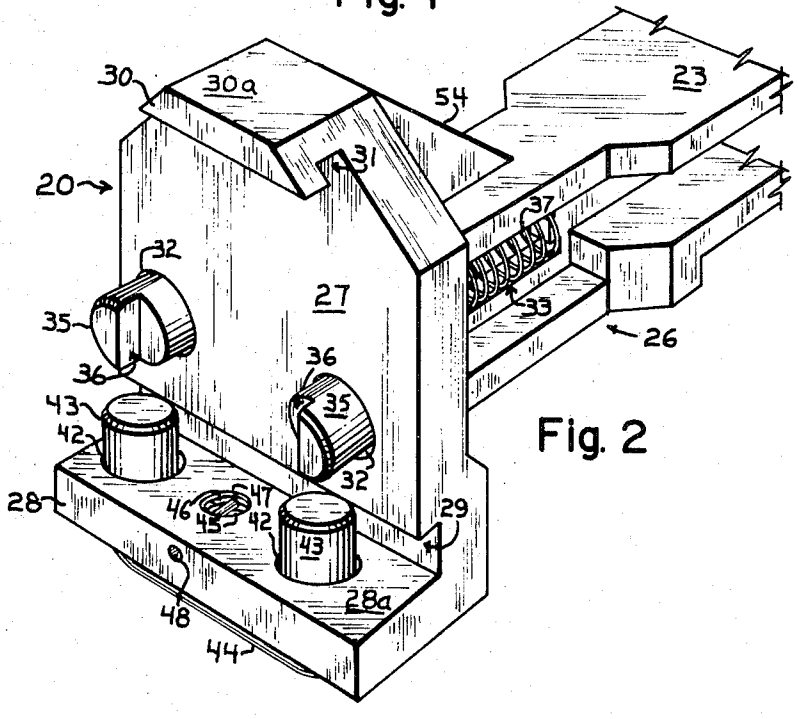
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Fig. 2

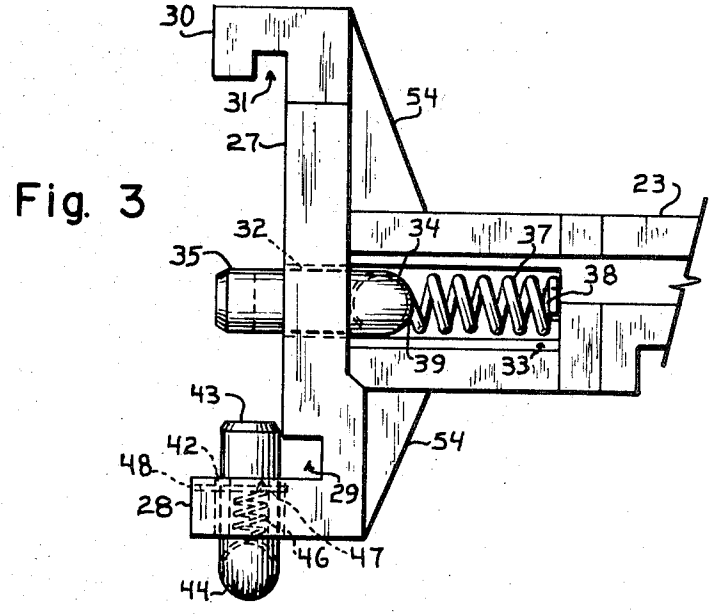


Fig. 3

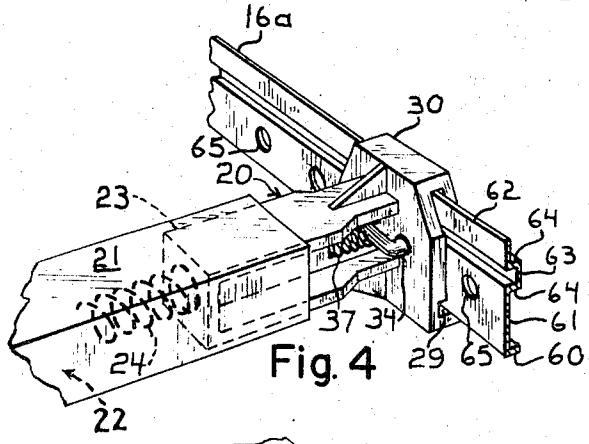


Fig. 4

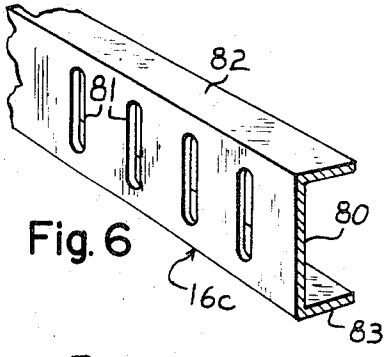


Fig. 6

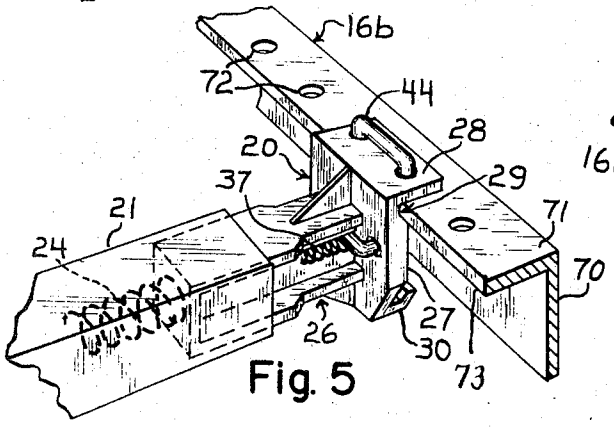


Fig. 5

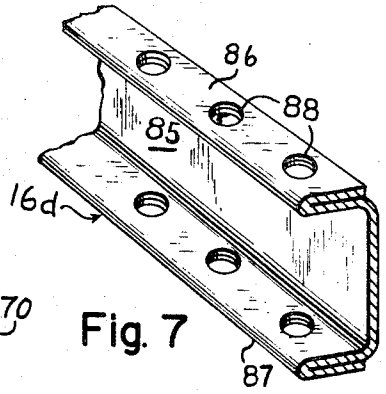


Fig. 7

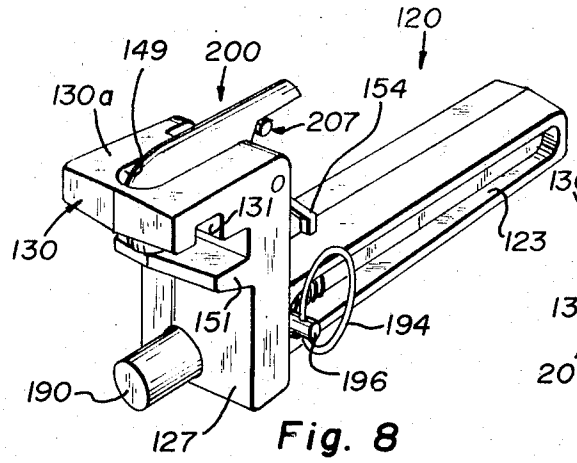


Fig. 8

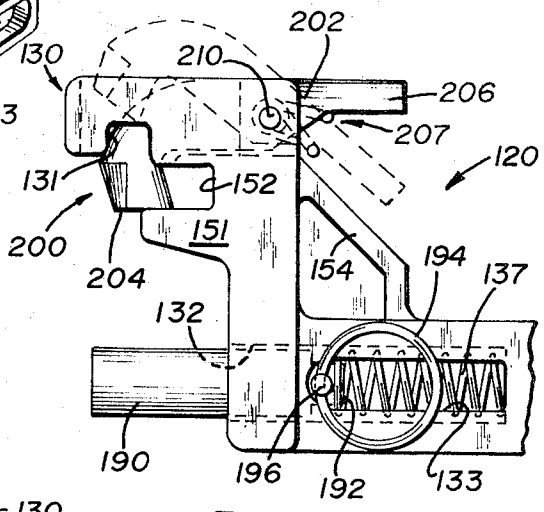


Fig. 9

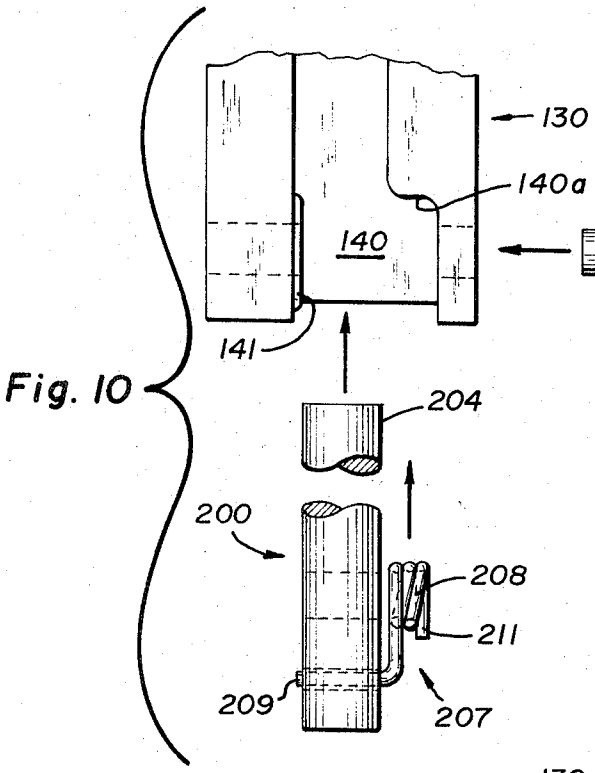


Fig. 10

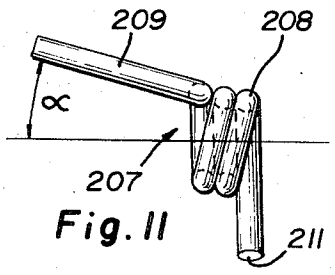


Fig. 11

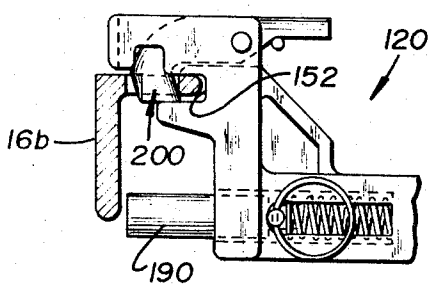


Fig. 13

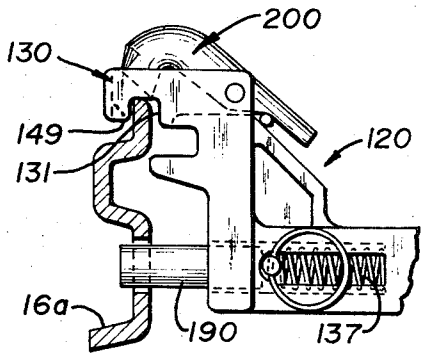


Fig. 12

# CARGO RESTRAINING BAR

## RELATION TO PREVIOUS APPLICATIONS

This application is a continuation-in-part application of my copending U.S. Pat. application Ser. No. 79,583 filed on Oct. 9, 1970. now abandoned.

## BACKGROUND OF THE INVENTION

It has become increasingly important to provide in freight transportation vehicles means to reduce damage to freight from sudden movement, such as occurs in switching of railway cars. One system which has evolved comprises a pair of rails running the length of railway cars, one along each interior side of the car, to each of which one end of a restraining crossbar may be fixed, thus permitting division of the interior of the car into a series of "compartments" so that shifting of the contents is restricted in magnitude. If the bars are mounted in contact with the compartmental load portions, damage from longitudinal shifting essentially can be eliminated.

As might be expected, this general development has appeared in a variety of forms, so that the various railroad lines have adopted differing systems not suitable to common usage or interchangeability, in spite of the use by each line of the cars of all others. This has resulted in a complex and excessive inventory of crossbars, each type adapted for use to only a particular type of longitudinal or belt rail.

## SUMMARY OF THE INVENTION

This application relates to a novel crossbar capable of mounting on and attachment to various differing types of belt rails employed by the railroad lines, so that most of the railroad cars in use will be able interchangeably to use a single crossbar.

Accordingly, the objects of the invention are to provide a restraining crossbar which is capable of use on a variety of different belt rail configurations, is highly durable under the difficult conditions typically encountered, is simple and inexpensive to manufacture, and is easily mounted and dismounted.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view, partially in outline, of the inside of a freight transportion vehicle or compartment such as a railroad boxcar, showing belt rails and the restraining crossbar of this invention;

FIG. 2 is an enlarged perspective view, partly cut away, of the end fitting of the crossbar;

FIG. 3 is a fragmentary, side-elevational view of the crossbar end fitting of FIG. 2;

FIG. 4 is a lesser enlarged perspective view showing the end fitting of the restraining bar according to the present invention, secured to one type of belt rail adapted to be secured to the walls of a freight vehicle;

FIG. 5 is a view similar to FIG. 4 showing the end fitting as used with a second type of belt rail;

FIG. 6 is a fragmentary perspective view of another conventional type of belt rail;

FIG. 7 is a view similar to FIG. 6 of still a fourth type of conventional belt rail;

FIG. 8 is a perspective view of an alternate embodiment of the end fitting of the invention;

FIG. 9 is a fragmentary side elevational view of the embodiment shown in FIG. 8;



FIG. 10 is a fragmentary, exploded plan view of the embodiment shown in FIG. 8;

FIG. 11 is a rear elevational view of the spring shown in FIG. 10; and

FIGS. 12 and 13 are side elevational views partly in section illustrating the embodiment of FIGS. 8–11 utilized with the rails shown in FIGS. 4 and 5, respectively.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, and particularly to FIG. 1, the preferred form of this invention is practiced in conjunction with a pair of metal rails, termed belt rails, affixed to the side walls of a freight compartment such as a railroad car, trailer, hold of a ship or the like. The belt rails may be of any of several conventional designs, as an important feature of the invention is its adaptability to fit a majority of the presently-used belt rail systems.

FIG. 1 shows the interior of a freight compartment having a floor 12, and side walls 13 and an end wall 14 reaching from the floor to the ceiling (not shown), and having a containerized cargo 15. One or more pairs of vertically spaced belt rails 16 are anchored to the side walls, rails of each pair being mounted in opposed position on the respective walls. The belt rails generally are made of formed steel plate, extruded aluminum, or rolled steel section, having slots or holes spaced along their length for mounting of the restraining crossbars 17. For the most part, the belt rails extend along the entire length of the side walls and may be welded or otherwise suitably secured thereto. The belt rails on the opposed side walls are disposed in pairs at corresponding identical levels so that crossbars supported thereon will be substantially horizontal.

The crossbars comprise heads or end pieces 20 mounted one at each end of a central beam 21. The beams 21 may be of the present conventional constructions such as a pair of wood members bolted together, an extruded aluminum or formed steel shell, or other construction capable of having the heads 20 suitably mounted at the ends thereof. The end pieces preferably are an iron casting.

Referring also to FIGS. 2, 3 and 4, the central beam 21 has a cavity 22 at least at one of its end portions so that shank 23 of the corresponding crossbar end piece 20 may fit slidably therein. This slidable relationship permits extension or contraction of the total length of the cross-bar, to accommodate relatively small variations in the distance between corresponding belt rails 16. The end pieces 20 may be retained in their engagement within the end of beam 21 by means such as a chain, slot-mounted pin or bolt, or compression or tension spring. As illustrated, a compression spring 24 is mounted between a pin fixed in beam 21 and the inner end of end piece 20 to resiliently urge the end piece respectively into a somewhat extended position so that the normal length of crossbar 17 is slightly greater than the distance between a pair of rails 16.

The shank of the end piece may be tapered as at 26, with means for engaging the belt rails integrally provided at the distal end of the shank. This means includes a base or face portion 27 in a plane essentially perpendicular to the axis of the shank, a flange 28 formed at one vertical end of the base 27 and lying in a plane perpendicular to the face portion, a channel 29 in base 27 adjacent flange 28, and a hook-like element

30 with an engaging channel 31 formed at the opposite vertical end of base 27.

Base 27 has two horizontally shaped holes 32 formed therein, these holes being formed coplanar with a slot 33 provided in shank 23 immediately behind base 27. A U-shaped locking pin 34 is positioned in slot 33, with the legs 35 thereof extending through holes 32 and beyond the face of base 27. A portion of legs 35 is chamfered away as at 36.

Compression spring 37 is mounted in slot 33, the rear end of the spring being retained in the slot by a protrusion 38 formed in shank 23 at the rear of the slot and extending into the end of the spring, the front end 39 of the spring being fastened to the central base portion of U-shaped pin 34. Spring 37 resiliently urges pin 34 into extended position where legs 35 protrude beyond the face of base 27 to the maximum extent.

Flange 28 similarly has a pair of spaced holes 42 therein, through which protrude the legs 43 of a U-shaped pin 44, mounted from below (as seen in FIGS. 2 and 3) flange 28. A third hole 45 is formed centrally in flange 28 in which is mounted a tension spring 46. This spring at its upper end is fastened to flange 28 by a pin 47 inserted through a hole 48 in the front of flange 28 and at its lower end is fastened to the base of U-shaped pin 44. Thus, pin 44 is resiliently urged upwardly as seen in FIG. 2, to extend legs 43 upwardly through flange 28 to the maximum extent.

The end piece 20 may be provided with strengthening fillets 54.

Referring particularly to FIG. 4, one form of belt rail 16*a* with which the crossbar described is adapted to function typically is formed of a rolled steel plate or extruded aluminum section and comprises a bottom flange 60, a central section 61, a retaining flange 62, and a mounting section 63 connected to section 61 and flange 62 by sections 64. Section 61 of rail 16*a* has a series of holes 65 formed therein, the spacing between related pairs of holes, such as adjacent ones, being equal to the spacing between legs 35 of pin 34.

As depicted in FIG. 4, the end piece as thus far described may be positioned onto belt rail 16*a* and securely pinned thereto, by lifting the end piece onto the rail so that channel 31 of hook portion 30 engages flange 62, pin 34 having been retracted against the urging of spring 37 during this positioning step, and pin 34 then being released to permit engagement of legs 35 within the appropriate pair of holes 65. With this engagement of flange 62 into channel 31, the belt rail supports end piece 20 and the adjacent end of crossbar 17. Release of pin 34 to permit engagement of legs 35 within a pair of holes 65 results in a secure interlocking engagement of the end piece and the belt rail. In the relationship just described, pin 44 plays no part in providing the engagement of the crossbar and the belt rail.

At the end of the crossbar opposite to that just described an identical end piece 20 will provide for attachment of that other end of the crossbar to a corresponding belt rail. The crossbar thus is conveniently and firmly fixed to a pair of belt rails, in position immediately adjacent the cargo, thus to prevent shifting of the cargo upon sudden movement or jarring of the freight compartment.

Referring to FIG. 5, there is shown a different form of belt rail 16*b* in substantial use in the railroad industry, the rail being L-shaped and including an attaching flange 70 by which the rail conventionally may be fixed to the side of the freight compartment, and a horizontal mounting flange 71 having holes 72 formed therein at a spacing such that pairs of the holes, such as adjacent holes, are spaced apart a distance equal to the spacing of legs 43 of pin 44.

To attach end piece 20 of the crossbar to this form of belt rail, the crossbar is rotated 180° (as compared to FIG. 4), and the end piece is extended so that flange 28 overlies flange 71, with a distal end 73 of flange 71 engaging within channel 29 of the end piece. Pin 44 is retracted against the urging of spring 46 as necessary to facilitate this mounting of end piece 20 on to belt rail 16*b*, pin 44 then being released for insertion of legs 43 into a pair of holes 72 as necessary to provide the proper relationship between crossbar 20 and the cargo to be restrained. A secure interengagement is seen to result.

The opposite end of crossbar 21 will have an identical end piece 20 connected therewith and similarly engaging an opposed belt rail 16*b*. In the usage just described, pin 32 and channel 51 play no part in the engagement of the cross-bar and the belt rail.

FIG. 6 discloses a third type of belt rail 16*c*, in lesser usage in the railroad industry, with which the present invention is adapted to engage. The belt rail includes a central portion 80 having vertically elongated holes or slots 81 therein, and upper 82 and lower 83 flanges by which the rails are affixed to the sides 13 of the freight compartment, as by welding. Slots 81 are arranged in pairs to receive legs 35 of pin 34 for retention of crossbars 17 in cargo restraining position. Compression spring 24 urges the end piece 20 into extended position to insure contact between base 27 and rail portion 80.

It will be seen that end piece 20, when in use with the belt rail 16*c* of FIG. 6 may be in the position of FIG. 4, or inverted 180° therefrom as in FIG. 5, though the position of FIG. 5 is preferred so that the weight of the crossbar is supported by flange 28 resting on rail flange 82.

FIG. 7 discloses yet another type of belt rail 16*d* for use with which the crossbar is intended. The belt rail includes a central portion 85 and upper 86 and lower 87 flanges extending from the edges thereof, the flanges having spaced holes 88 therein. It will be clear that end piece 20 may be engaged with the rail 16*d* by means of legs 43 extending into the holes 88 in upper flange 86, the position of the end piece being generally as shown in FIG. 5, with the distal portion of flange 86 extending into channel 29. The dimension between the upper faces of flanges 86 and 87 is somewhat greater than the distance from the upper face (FIG. 1) 28*a* of flange 28 to the upper face 30*a* of element 30. Whether or not flanges 86 and 87 are doubled back on themselves, as shown in FIG. 7, is not material to the invention.

Thus, the present invention is nearly universal in its utility with current belt rail embodiments, being completely suited to use with the four most common types, representing the great majority of belt rail systems encountered in the railroad industry. It will be obvious that if the means by which end piece 20 is connected to beam 21 is a tension spring tending to contract the total length of crossbar 17 to less than the distance between opposite rails 16, the specific construction will not work in connection with the belt rail 16*c* disclosed in FIG. 6; and in fact the 16*c* rail essentially requires an

extension-urging mounting of end piece **20**, such as is provided by compression spring **37**.

For mounting to belt rails **16***a*, **16***b* and **16***d*, the mounting of the end piece of the central beam may be by extension urging (compression spring), contraction-urging (tension spring), or non-urging means, though the compression spring means has been found to be most convenient.

Various modifications of the end piece shown and described herein are possible, with no departure from the spirit of the invention. For example, any of several appurtenances readily may be added to facilitate withdrawl of pins **34** and **44** as an aid to engaging the pins within and disengaging them from the belt rails.

Yet a further possible modification is illustrated in the alternate embodiment depicted in FIGS. **8–13**, wherein two separate single retractable members are used to engage either the horizontal type of rail, or the vertical type. Parts similar to those previously described bear the same reference numeral, to which the prefix **100** has been added.

Thus, end piece **120** is formed with a shank **123**, a face portion **127** extending generally perpendicularly to the shank, and a reinforcing or strengthening fillet **154** connecting the two, as in the previous embodiment. Therefore, the connection of the end piece to the crossbar is generally the same as in the previous embodiment. End piece **120** is provided with a flange element **130** having a top surface or upper face **130a** and a hook-defining channel **131**, element **130** projecting generally perpendicularly from the face portion **127** as in the previous embodiment. A hole **132** extends inwardly from the face portion **127**, and joins a slot **133** in the shank portion to accommodate a retractable pin or projection **190** described below. Outward biasing of the pin is accomplished by a compression spring **137** mounted in the slot **133**, the front end **139** of the spring being connected to pin **190**, as in the previous embodiment.

Unlike the previous embodiment, the releasible connection of the endpiece to the variety of belt rails with which it is usable is accomplished by one of two single pin-like projections **190** and **200**. Projection **190** is a cylindrical pin the rear end **192** of which is connected to spring **137**, and which may have a pull-ring **194** connected thereto by a pin **196**. Pin **190** is positioned in hole **132** for retractable linear movement therewithin, as more fully described below. Projection **200** is a hook-like member pivotally mounted by a pin **210** in the junction of the flange element **130** with the face portion **127**. More specifically, projection **200** comprises a hook having a body **202**, a rail-engaging head **204** depending from the body, and a flattened tail portion **206**. A wire spring **207** is mounted by the pin **210** (FIGS. **10** and **11**), and comprises a coiled portion **208**, an L-shaped end **209** projecting generally at an angle "alpha" of about 15° from the axis of the coiled portion, and a straight opposite end portion **211**. The L-shaped end **209** abuts against the flat of tail portion **206**, while end **211** rests against a shoulder **140** formed in the element **130**, a cut-out **140***a* being provided to accommodate the coil portion of the spring. A shoulder **141** opposite to the cut-out **140***a* may be provided to prevent the leg **209** from binding. It will thus be seen that spring **207** biases the hook or projection **200** so as to pivot counterclockwise as shown in FIG. **9** from the position shown in dotted lines. The flange element **130** is further provided with an opening **149** through which the head **204** may move when body portion **202** is pivoted. The opening **149** of course communicates with the channel **131**. When pivoted its full counterclockwise extent as shown in FIG. **9**, the bottom surface of body portion **202** rests upon shoulder **140**, while the bottom surface of head **204** rests upon a lip **151** extending generally perpendicular from the face portion **127** and spaced from flange element **130** by a channel **152**.

Turning now to FIG. **12**, end piece **120** mounts the crossbar to the vertical type of belt rail **16a** in the following manner. Element **130** hooks over the top edge of the rail with the rail edge located within channel **131**. This positions the pin **190** so that it can be aligned with the perforations of the belt rail, pin **190** being forced thereinto by spring **137**. Meanwhile, hook **200** is forced to pivot clockwise by virtue of the projection of the top edge of the rail into opening **149**.

The same end piece **120** can then be removed from its engagement with vertical rail **16***a*, and used to mount a crossbar on a horizontal rail **16b** as shown in FIG. **12**. In this case, the rail projects into chAnnel **152**, supporting the end piece **120** by contact with the upper surface of that channel. Hook **200** projects through flange **130** and into the perforations of the rail, thus releasibly holding the cross-bar in place. Pin **190** freely projects outwardly in its fully extended position, as there is nothing on rail **16***b* to interfere with it, except in the case of the door bar portion of the rail (not shown), wherein pin **190** is forced inwardly.

Still another rail can be used to mount the cross-bar using end piece **120**, this being rail **16***d* shown in FIG. **7**. The engagement of end piece **120** therewith (not shown) operates in substantially the same manner as the engagement of the end piece with rail **16***b*. Thus, operatively speaking, rail **16***d* is a horizontal type more akin to rail **16***b* than to **16***a*.

Yet another embodiment of the end piece, not shown, is one in which the end piece is identical to that shown in FIGS. **8–13**, except that the shank **123** is raised with respect to the remainder of it, the slot **133** thus being stepped down from the shank.

What is claimed is:

**1.** A cargo-restraining bar adapted to enage belt rails mounted along sides of cargo compartment, comprising a central beam and an end piece extensibly mounted at one end of the central beam, said end piece including a shank portion connecting the end piece to the beam, a base portion formed at the distal end of and approximately perpendicular to the shank, a flange portion extending from one end of and approximately perpendicular to the base portion, first engaging means extensible through the base portion and adapted to engage mating elements in a belt rail positioned adjacent the base portion, and second engaging means extensible through the flange portion and adapted to engage mating elements in a belt rail positioned adjacent the flange portion.

**2.** A cargo-restraining bar according to claim **1**, including first urging means resistably to urge said end piece into extended position with respect to the central beam.

**3.** A cargo-restraining bar according to claim **2**, also including second urging means resistably to urge said first engaging means into extended position through the base portion.

4. A cargo-restraining bar according to claim 3, further including third urging means resistably to urge said second engaging means into extended position through the flange portion.

5. A cargo-restraining bar according to claim 4, in which said first urging means is a compression spring mounted between elements of the central beam and the end piece, said second urging means is a compression spring mounted between said first engaging means and an element of said shank portion, and said third urging means is a tension spring mounted between the second engaging means and an element of said flange portion.

6. A cargo-restraining bar according to claim 5, in which said first and second engaging means are U-shaped pins the legs of which are extensible through the base portion and flange portion respectively to engage said mating elements.

7. A cargo-restraining bar according to claim 6, further including a hook-shaped portion at the end of the base portion opposite said one end where the flange portion is formed, said hook-shaped portion having its hook opening directed toward said flange portion and adapted to engage a belt rail element positioned adjacent thereto.

8. A cargo-restraining bar according to claim 7, said base portion having a channel formed therein adjacent the juncture of the base portion and said flange portion, said channel being adapted to engage an element of a belt rail positioned adjacent the flange portion.

9. A cargo-restraining bar according to claim 8, further including a second said end piece mounted at the other end of said central beam.

10. A cargo-restraining bar according to claim 1, in which said first and second engaging means are U-shaped pins the legs of which are extensible through the base portion and flange portion respectively to engage said mating elements.

11. A cargo-restraining bar according to claim 1, and further including a hook-shaped portion at the end of the base portion opposite said one end where the flange portion is formed, said hook-shaped portion having its hook opening directed toward said flange portion and adapted to engage a belt rail element positioned adjacent thereto.

12. A cargo-restraining bar according to claim 1, further including a second said end piece mounted at the other end of said central beam.

13. A cargo-restraining bar according to claim 1, said base portion having a channel formed therein adjacent the juncture of the base portion and said flange portion, said channel being adapted to engage an element of a belt rail positioned adjacent the flange portion.

14. A cargo restraining bar as defined in claim 1, wherein said second engaging means is a hook.

15. A cargo restraining bar as defined in claim 14, and further including means for pivoting said hook from a position in which it is withdrawn into the flange portion, to a position in which it projects through the flange portion.

16. An end piece for engaging cargo restraining bars to belt rails mounted along sides of a cargo compartment, said end piece comprising a shank portion connecting the same to the bar, a base portion formed at the distal end of and aproximately perpendicular to the shank portion, a flange portion extending from one end of and approximately perpendicular to the base portion, first engaging means extensible through the base portion and adapted to enage mating elements in a belt rail positioned adjacent the base portion, and second engaging means extensible through the flange portion and adapted to engage mating elements in a belt rail positioned adjacent the flange portion.

17. The end piece as defined in claim 16, including urging means resistably to urge said first engaging means into extended position through the base portion.

18. The end piece as defined in claim 16, in which said first and second engaging means are U-shaped pins the legs of which are extensible through the base portion and flange portion respectively to engage said mating elements.

19. The end piece as defined in claim 16, and further including a hook-shaped portion at the end of the base portion opposite said one end where the flange portion is formed, said hook-shaped portion having its hook opening directed towards said flange portion and adapted to engage a belt rail element positioned adjacent thereto.

20. The end piece as defined in claim 16, wherein said base portion has a channel formed therein adjacent the juncture of the base portion and said flange portion, said channel being adapted to engage an element of a belt rail positioned adjacent the flange portion.

21. The end piece as defined in claim 16, wherein said second engaging means is a hook.

22. The end piece as defined in claim 21, and further including means for pivoting said hook from a position in which it is withdrawn into the flange portion, to a position in which it projects through the flange portion.

* * * * *

# UNITED STATES PATENT OFFICE
# CERTIFICATE OF CORRECTION

Patent No. 3,782,295 Dated January 1, 1974

Inventor(s) Henry A. Balinski

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

The inventor's name should read -- Henry A. Balinski -- instead of "Henry A. Balinksi".

Column 5, line 13, "drawl" should read -- drawal --.

Claim 1, lines 1 and 2 thereof should read -- A cargo-restraining bar adapted to engage belt rails mounted along sides of a cargo compartment, compris- --.

Claim 16, line 9, "enage" should read -- engage --.

Signed and sealed this 4th day of June 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

FORM PO-1050 (10-69)

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