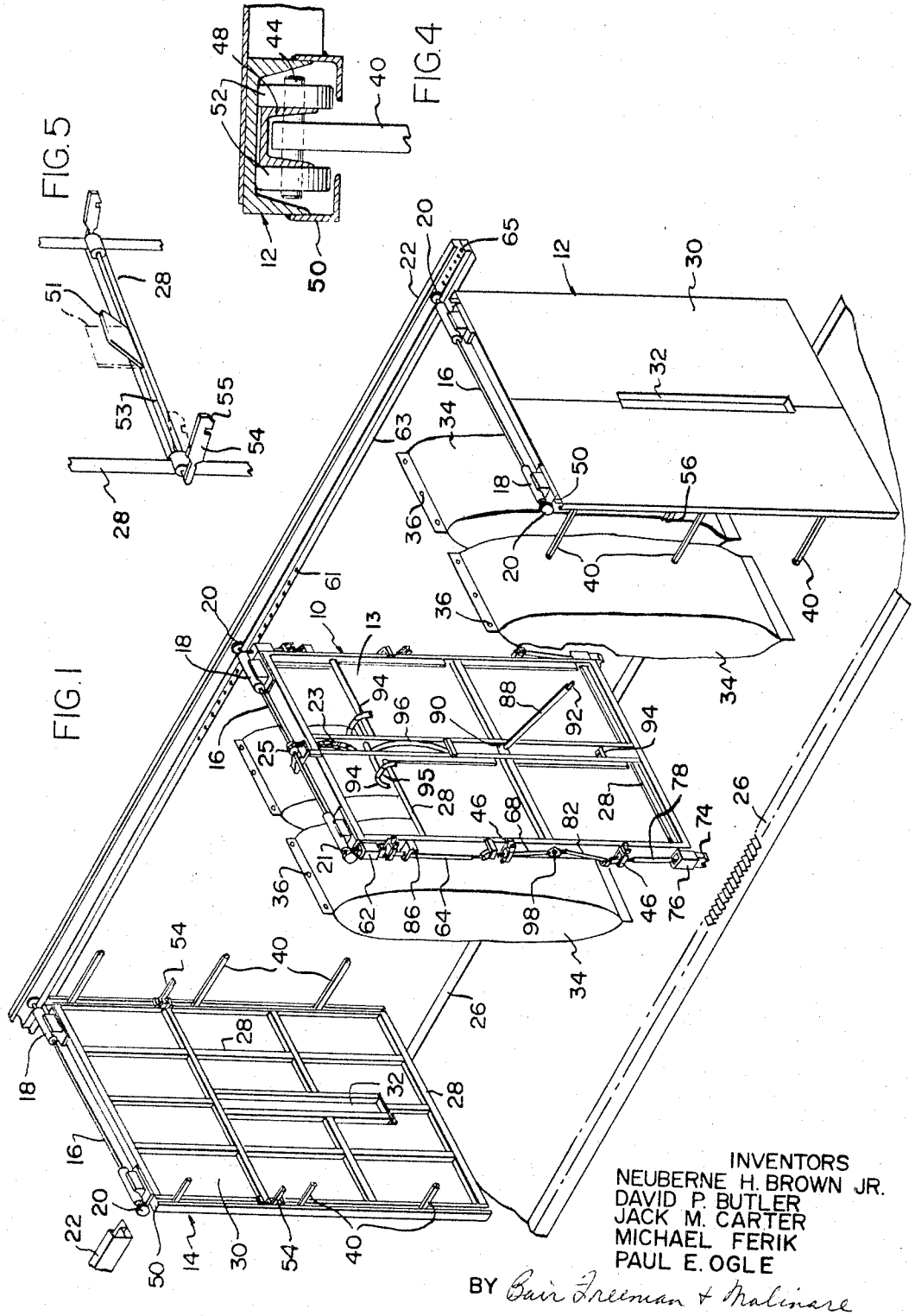
Feb. 18, 1969

N. H. BROWN, JR., ET AL 3,427,997

INFLATABLE BULKHEAD FOR RAILROAD CAR

Filed May 19, 1967

Sheet 1 of 3



INVENTORS
NEUBERNE H. BROWN JR.
DAVID P. BUTLER
JACK M. CARTER
MICHAEL FERIK
PAUL E. OGLE

BY Bair Freeman & Molinare
ATTORNEYS.

Feb. 18, 1969 N. H. BROWN, JR., ET AL 3,427,997

INFLATABLE BULKHEAD FOR RAILROAD CAR

Filed May 19, 1967

Sheet 2 of 3

FIG.2

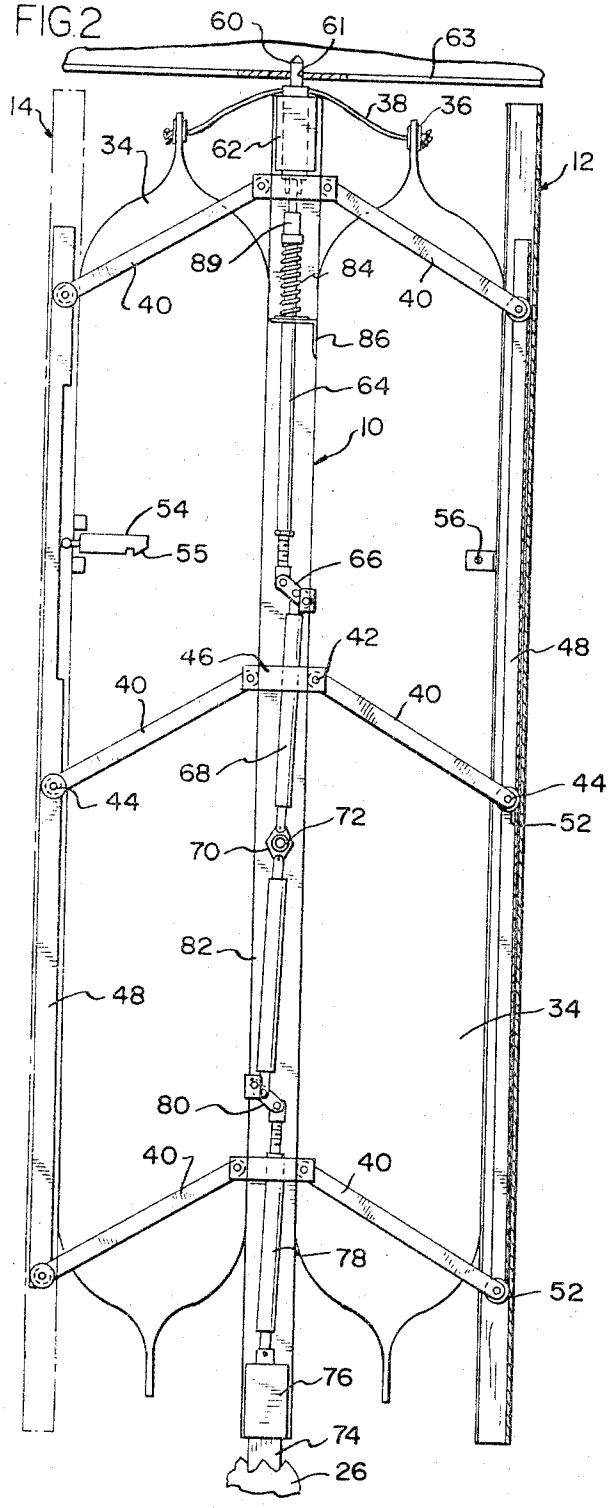
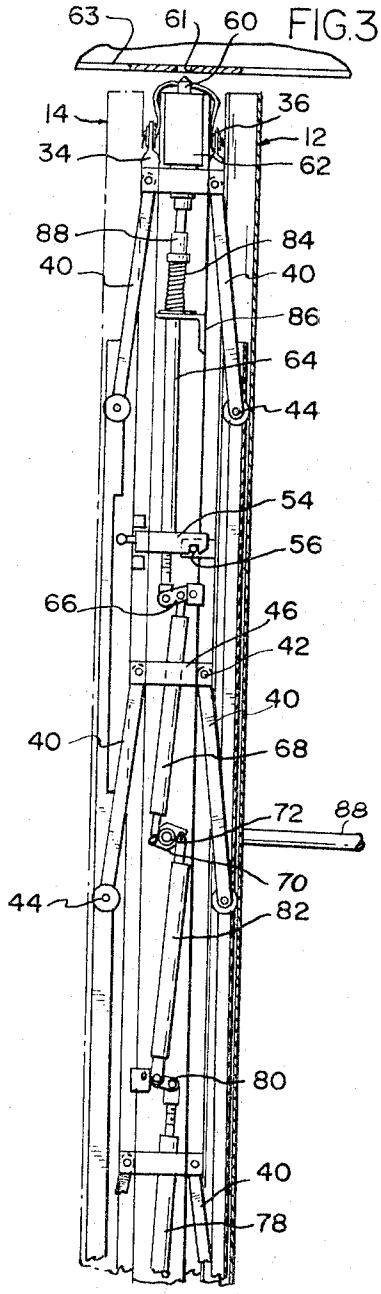


FIG.3



Feb. 18, 1969 N. H. BROWN, JR., ET AL 3,427,997

INFLATABLE BULKHEAD FOR RAILROAD CAR

Filed May 19, 1967 Sheet 3 of 3

FIG.6

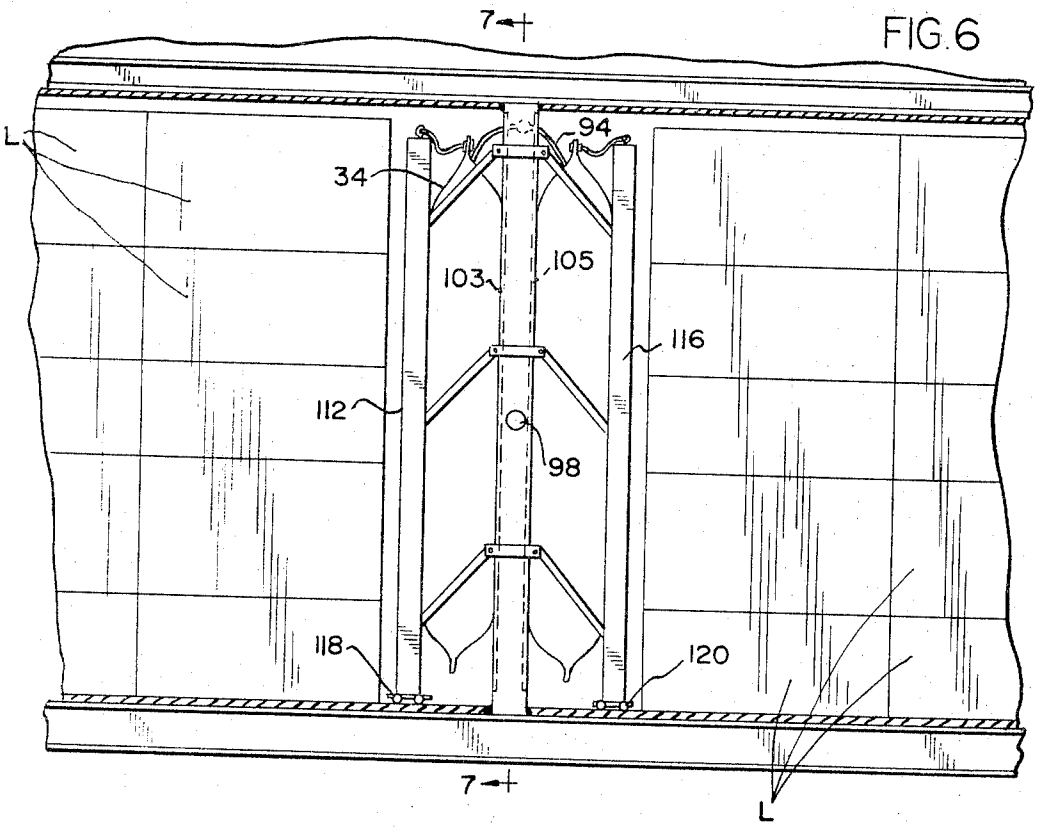
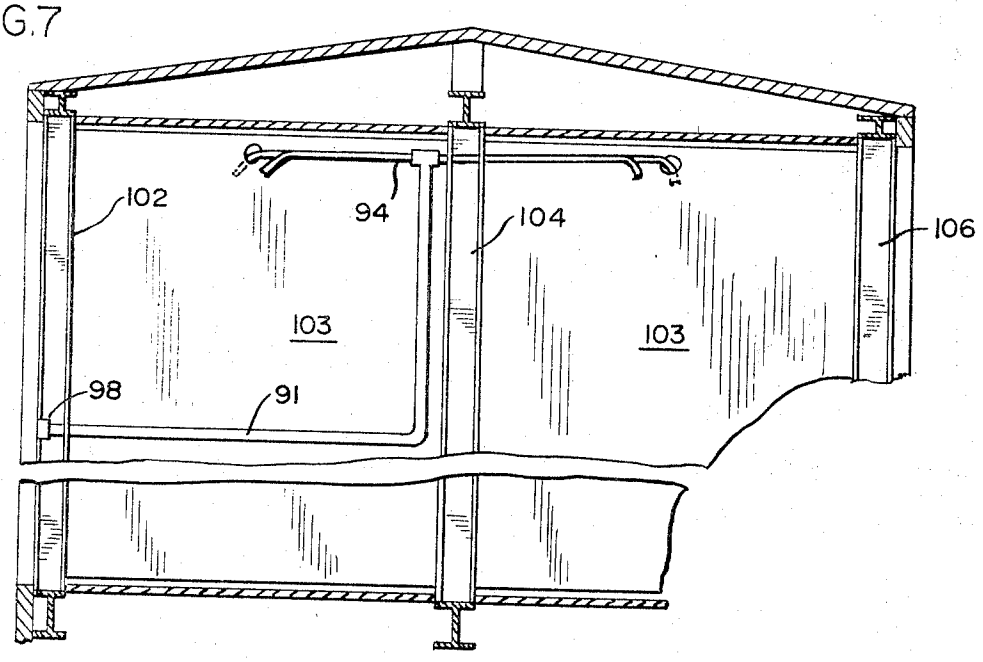


FIG.7



United States Patent Office 3,427,997 Patented Feb. 18, 1969

3,427,997

INFLATABLE BULKHEAD FOR RAILROAD CAR

Neuberne H. Brown, Jr., Colts Neck, N.J., David P. Butler, 29 Woodside Drive, New City, N.Y. 10956, Jack M. Carter, 345 Main St., White Plains, N.Y. 10601, Michael Ferik, Metuchen, N.J., and Paul E. Ogle, Elmwood Park, Ill., said Ferik assignor to said Ogle and said Brown

Filed May 19, 1967, Ser. No. 639,696
U.S. Cl. 105—369 13 Claims
Int. Cl. B65d *45/00, 15/00*

ABSTRACT OF THE DISCLOSURE

This specification discloses inflatable cushioning bulkheads for protecting lading in a freight car by locking the lading against the end of the car or against another of the bulkheads. Each bulkhead consists of three rigid panels made from sheet metal, plywood, or the like, mounted on a frame with inflatable rubber bags sandwiched between the center and each of the end panels. The bulkhead may be expanded many times its original thickness by inflating the bags. The end panels are free to move toward and away from the center panel which is fixed to the car. The bags cushion the lading with a resilient resisting force which increases with the load imposed on the outer panel by the inertia of the lading. Links maintain the panels in parallel relation in all positions, from fully closed to fully opened. Means in the form of a pipe accessible through the end panels is provided to actuate latches at the top and bottom of the center panel to lock the center panel to the car. The same pipe is also used to conduct air to the inflatable bags and is accessible at the edge of the center panel. In an alternative form, the center panel is built into the car as a stationary load bearing member.

Background of the invention

This invention relates to a system for cushioning cargo or lading in freight-carrying vehicles such as railway freight cars, motor trucks, or the like. More specifically, it relates to expandable bulkheads of sandwich construction comprising three rigid panels with inflatable bags or mattresses interposed between the center and end panels and means for operating said bulkheads within a freight car to shore the lading against damage due to sudden stopping or starting of the car.

It has been proposed heretofore (Scott 2,674,206) to divide the lading into units, dispose inflatable pneumatic members in the space between the units and urge the units against the end walls of the car by inflation of the pneumatic members. Dasey 2,896,867 proposes similar inflatable cushioning units suspended from a trolley at the top of the car. Such cushioning has not provided a satisfactory answer to the shoring problem because the inflated cushion units are not latched to the car. They work upwardly as the lading units shift and vibrate due to motion of the car. Attempts to anchor the inflatable cushions to the floor of the car have been unsuccessful since the forces exerted on the anchors by the moving lading is so great that they break loose. Thus, adjoining lading units move together against the inflated bags at the bottom of the load and gradually force the air into the top of the bags or push the bags themselves toward the top of the car. Once the air cushion is gone, the lading is free to shift in any direction and becomes damaged as the car jerks back and forth.

It has also been proposed to equip railroad cars with rigid bulkheads which travel on overhead tracks and latch at the bottom and top to compartmentize the lading. A typical structure of this type is shown in Vanderhyde et al. 3,168,055. Rigid bulkheads of this kind minimize the mass of the lading, but do not expand or contract to accommodate voids in the load. Cars so equipped must be packed with no voids between the individual packages of the lading or between the packages and the bulkhead. As a practical matter, it is not possible to load the cars this tightly. The latching location for the bulkheads are spaced at least three inches apart and this is bound to result in some space between the bulkhead and the lading. Such voids permit slight shifting of the load which increases at an accelerated rate as the lading itself is compressed to produce additional voids.

It has also been suggested that rigid panels separated by inflatable bags be used to separate the lading. These devices separated the lading, but did not truly divide it into units of smaller mass because the separators were not latched to the car. Thus, the entire cargo was able to shift as a single unit. Though the separators were resilient and compressed or expanded with the force imposed, the shock was transmitted through the separators and moved back and forth through the load like a wave.

Summary of the invention

The present invention is designed to obviate the deficiencies in the prior devices just mentioned by providing a bulkhead which not only cushions the load by resiliently resisting shock forces imposed by the inertia of the load, but also compartmentizes the load into separate lading units. The bulkhead will expand to fill all of the space between and within units, not only at the time the car is loaded, but as the size of the load changes in transit. Thus, the invention substantially eliminates voids and effectively cushions the lading by absorbing the shock resulting from shifting the load.

Another object of the invention is to provide an expandable bulkhead having latch-actuating means accessible from the edge and/or either side thereof and an air filler fitting exposed at the edge of the bulkhead for ready filling of the pneumatic bags at the car door after the car has been completely loaded.

Another object is to provide an expandable bulkhead of the type described, having a plurality of panels which are maintained in parallel relation, and which automatically close together and lock when the bags are deflated so that the bulkhead may be moved as a unit from one end of the car to the other on an overhead track.

Another object is to provide an expandable bulkhead comprising a central rigid panel fixed against longitudinal movement within the car and a pair of longitudinally movable panels parallel to said central panel and separated therefrom by inflatable members, the inflatable members being interconnected to permit flow of air therebetween in response to force bearing against said movable panels.

Description of the drawings

FIGURE 1 is an exploded perspective view of the bulkhead construction of the invention showing the individual components of a single bulkhead and the suspension and latching means comprising part of the railway freight car.

FIGURE 2 is an end view of a bulkhead constructed in accordance with the invention showing the bulkhead in partially inflated condition.

FIGURE 3 is a view similar to FIGURE 2 in which the bulkhead is completed collapsed with the bags deflated.

FIGURE 4 is a sectional view taken along the line 4—4 of FIGURE 2.

FIGURE 5 is a perspective view of an automatic lock mechanism for securing the outer panels together.

FIGURE 6 is a longitudinal sectional view of a freight car showing an alternative construction in which the center panel of the inflatable bulkhead is built into the car.

FIGURE 7 is a sectional view taken along the line 7—7 of FIGURE 6.

Referring to FIGURE 1, the bulkhead consists of a center panel **10** and cooperating end panels **12** and **14**. Each panel is suspended individually from a rod **16** extending from one side of the car to the other which rotates in bearings **18** near the ends thereof. The panel frame is welded to the bearings **18** through blocks **19**. Mounted on the ends of the rods **16** are wheels **20** having spokes or studs **21** extending radially from the rolling surface thereof. These wheels run freely in tracks **22** mounted near the top of the railway car at either side thereof. The tracks contain holes **65** to receive the studs **21** on the wheels, thus preventing longitudinal movement of the panels when the shaft **16** is locked against rotation. A chain **23** trained about a gear **25** fixed to shaft **16** of the center panel **10** facilitates moving the bulkhead against the lading at the top. Means not shown may be provided for locking the chain **23** to prevent movement at the top of the bulkhead until the latches are actuated. To lock the bulkhead securely at the bottom and top thereof and thereby divide the lading into units, latching studs are provided on the center panel which cooperate with depressions in fixed members at the top and bottom of the car.

The end panels **12** and **14** are of identical construction and consist of a frame made from tubular stock **28** to which an outer panel **30** is secured by welding or other suitable means. The panel may be made from plywood if desired and attached by means of fasteners. An opening **32** is provided in the framework and a similar opening is cut in the panel **30** to provide access to the actuating means for the latching studs as described below.

Interposed between the center panel **10** and the end panels **12** and **14** are inflatable pneumatic bags **34**. The bags are approximately one-half as wide as the panels and extend the full length thereof. Preferably two bags are provided between adjacent panels, with lateral spacing therebetween coincident with the opening **32** through the end panels. The bags are made from rubber-coated fabric, preferably more than one-ply so that they will withstand the considerable forces imposed by the inertia of the load when the railway car is in motion. Grommets **36** are provided in a flange at the top of each bag and an extendable cord such as elastic rope **38** is provided to suspend the bags from the panels. Grommets and connecting ropes may also be used at other points about the periphery of the bags. The securing means for the bags must be resilient to accommodate change in dimensions of the bags due to expansion and contraction.

The panels are locked together by means of links **40** pivotally connected at their ends to pins **42** fixed to the center panel and pins **44** movable with respect to the end panels. Preferably there are three sets of links mounted in vertically spaced relation on each end of the bulkhead, as best shown in FIGURE 2. Box-like brackets **46** are welded to the ends of the center panel adjacent the side walls of the car at three locations—the top, the center, and the bottom. The ends of the brackets are bifurcated and have openings therethrough to provide a mounting for the pins **42**. The brackets **46** have a central opening to permit the latching linkage to extend therethrough as shown in FIGURE 1. The outer ends of the links **40** are pivotally secured to the pins **44** mounted on relatively heavy rods **48** at each side of each end panel. The rods **48** slide up and down in tracks **50** comprising part of the frame of the end panels **12** and **14**. The pins **44** also serve as a stub shaft on which wheels **52** are mounted. The wheels serve as trucks to facilitate vertical movement of the rod **48** up and down within the vertical side members of the frame at either side of the end panels, as best shown in FIGURE 4. The weight of the rods **48** tend to move the pins downwardly to cause the end panels to move in toward the center panel by action of the links **40**. Alternatively, springs (not shown) may be provided on the frame to bias the rods downwardly. It is only the interposition of the bags **34** which prevents the panels from closing together. When the bags **34** are completely deflated, the panels assume the relative position shown in FIGURE 3.

In order to lock the outer panels together, a pair of latches **54** is provided, one at either side of the panel **14**, and cooperating pins are provided on the panel **12** as shown in FIGURE 2. When the outer panels move together, the cam surface **55** on the latch **54** slides up the side of the pin **56** and locks therewith to secure the end panels together at both sides. Thus, the bulkhead may be moved longitudinally of the car on the tracks **22** as a unit.

In a modified form of the invention, the latches **54** are fixed to the end of a rod **53** extending laterally of the panel **14** and mounted for rotation thereon as shown in FIGURE 5. A plate **51** welded to the rod is normally biased by a spring to a position inclined about 20° toward the center panel. The plate assumes this inclined position when the bags are deflated and the latch is locked. When the bags are inflated, the plate is rotated into the plane of the panel **14**, thus causing the rod **53** to rotate and lift the latch **54** so that the end panels are unlocked and are free to move away from the center panel.

The parallelogram linkage provided by the links **40** and the cooperating fixed pins **42** and movable pins **44** serve to maintain the panels in parallel relation at all times. As the bags **34** are inflated, the end panels are forced away from the center panel, the movable ends of the links **40** moving upwardly and outwardly as the rods **48** move upwardly in their tracks **50**. When the bags are fully inflated, the links are in substantially horizontal position.

For latching the bulkhead with respect to the car, we have provided a stud **60** at the top which cooperates with openings **61** in the strip **63** secured to the lower portion of the track **22**. At the lower end of the center panel a foot **74** is provided having a V-shaped depression therein which is of the same configuration as the rack **26** mounted on the floor of the car. A duplicate pair of latching means is provided on the other side of the center panel **10**. The stud **60** moves up and down within the bearing **62** welded to the side of the frame of panel **10**. The up and down motion of the stud **60** to move it into and out of engagement with the openings **61** is produced through the action of rod **64**, lever **66**, and rod **68**. The end of rod **68** is pivotally connected to the upper end of lever **70** fixed to the end of a pipe or hollow rod member **72** running laterally of the panel **10** and mounted for rotation on the frame thereof. The foot **74** moves up and down within the bearing **76** welded to the lower end of the edge of panel **10**. In like manner, the foot **74** is actuated by rod **78**, lever **80**, and rod **82**. The upper end of rod **82** is pivotally connected to the lower end of the lever **70**. Thus, when the pipe **72** is rotated from the position shown in FIGURE 2 to the position shown in FIGURE 3 (counterclockwise), the lever **70** turns through 90° lifting the foot **74** from engagement with the rack **26** and simultaneously removing the stud **60** from the opening **61**. In this position, the bulkhead is free to move along the tracks to any position within the freight car.

The latching studs **74** and **60** are normally engaged with the cooperating latching member as shown in FIGURE 2 by reason of the force imparted to the rod **64** by means of the coil spring **84**. The bottom of the spring **84** is seated on the bracket **86** welded to the edge of the panel frame and the spring is compressed by the sleeve **89** fixed to the shaft **64** by means of a set screw.

The latch is actuated by means of an actuating lever **88** rigidly fixed to the pipe **72** at the point **90**, midway between the sides of the panel **10**. At the outer extremity of the actuating lever **88**, we have provided a telescoping

pin **92** which fits into an opening **94** in the frame of the panel **10**. When the studs **60** and **74** are in the latched position, the actuating lever **88** is in the plane of the panel **10** and is locked to the frame. To unlatch the bulkhead, the actuating lever **88** is unlatched and pulled outwardly to the position shown in FIGURE 1. The lever may be used to pull the bulkhead to move it along the track **22**. As previously indicated, the opening **32** in the end panels **12** and **14** permits the operator to reach the actuating lever **88** so that it can be lifted against the action of spring **84** to unlatch the bulkhead and move it about. When released, the lever will automatically move into the plane of panel **10** due to the force of the spring **84** to latch the bulkhead and thus prevent longitudinal movement thereof within the car.

To inflate the bags **34**, we have provided flexible air conduits **94** which lead from the bags to the hose **96** which in turn connects to the interior of the pipe **72**. The ends of the pipe **72** extend through the edge of the frame of panel **10** at each side and terminate in valved fittings **98** to which an air hose may be connected. Thus, the bags may be filled by connecting the end **98** of the pipe **72** to a source of compressed air. It will be observed that the pipe **72** serves not only to conduct air to the bags, but to actuate the latch as well. The bags on both sides of the center panel connect to a common conduit **95** which contains no check valves. Thus, air at all times may pass freely from the bags on one side of panel **10** to the bags on the other side depending upon the forces imposed upon the bags.

If it is desired to actuate the latches from the side of the car, the pipe **72** may be extended further beyond the edges of the frame of panel **10** and the lever **88** welded to it at this point, rather than at **90**. A second lever may be provided at the opposite side.

Preferably, the center panel **10** has thin metal plates **13** welded within the four spaces defined by the frame members **28**. The plates prevent the bags **34** from distending into the openings and reducing the effective thickness of the bags. If the bags become distorted in this manner in transit, slack may result and this in turn permits shifting of the lading.

Atlhough one bulkhead is shown in the drawings and is usually adequate, it will be understood that the car may be equipped with two or more. To load the car, the bulkheads are compressed as indicated in FIGURE 3 with bags **34** deflated. If there are two inflatable bulkheads in the car, these are pushed to one end of the car and the opposite end is loaded until one third of the space in the car is occupied. The two bulkheads are then pushed against the end of the unit load in the car. The opposite end of the car is then loaded to one-third capacity of the car. One of the two bulkheads is then pushed into contact with the exposed end of this unit of lading. Both bulkheads are then latched at the top and the bottom by locking rod **88** at **94**. The studs **60** and **74** engage their cooperating latch members and cannot disengage until the lever **88** is lifted. The center third of the car is then loaded to completely fill the car. At this point, an air hose is connected to the valved fitting **98** and the bags are inflated to compress the lading. The bulkheads are designed so that they will expand from about eight inches to about forty inches, although any degree of expansion can be built into the bulkhead by lengthening the links and enlarging the bags.

Because the individual packages in the lading units are compressed against the end of the car or against an adjacent bulkhead, the friction betwen the packages prevents them from falling laterally. For this reason, it is not necessary to provide side filler. This is an important advantage of this invention. In prior constructions, the bulkheads were not capable of holding lading in this fashion and consequently side fillers were required to prevent individual packages in a lading unit, which does not fit the car, from toppling into the side space. Side filler is a source of constant irritation to carriers, primarily because it becomes damaged so frequently during loading and requires repair or replacement.

In cars equipped with the bulkhead of the invention, the lading unit remains intact because the bulkheads are capable of expanding to take up any voids in the lading which might result from jostling the load. Although the center panel is locked, the outer panels are free to move independently back and forth against the bags as forces are imposed by the lading. It is this yielding which cushions the lading. Yet the lading is effectively divided into units of reduced mass because the forces imposed by one unit are not transferred through the bulkhead to the adjoining unit. Instead they are resisted by the locked center panel. By reason of the parallelogram linkage, the outer panels which are in contact with the lading remain perfectly parallel and there is no tendency for the lading to work the bulkheads upwardly as is the case where inflatable dunnage bags are used without rigid panels adjacent thereto.

It will be noted that the combination of a fixed center panel and independently movable outer panels permits expansion to different dimensions on either side of the center, thereby providing precisely the amount of flexible filler desired. The quality of the shock absorption provided by the invention is unique. Resistance to shifting of the lading gradually increases as the yielding bags are compressed between the panels. When the slab-shaped bag is inflated it changes from a flat to a rounded contour. Fully inflated bags, therefore, have a larger volume (hence lower air pressure) and a relatively small area in contact with the outer panels. Any force applied to the inflated bulkhead squashes the rounded bag toward its original low volume slab shape. As more of the bag area contacts the panel and the air pressure increases, the resistance to the force increases. The result is a resilient yielding akin to a baseball catcher catching a ball by drawing back his mitt upon impact. Lading thrown against the inflated bulkhead is gently cushioned with a resisting force proportional to the thrust. No damage to the lading results. In similar manner, when the lading is compressed to eliminate voids upon initial inflation, the force imposed on the lading is reduced as the packages are pushed closer together, again avoiding damage to the lading.

It will be appreciated that because the air bags on either side of the fixed panel are interconnected, some of the air from the compressed bags will flow into the bags on the opposite side of the panel, which have been relieved to some extent due to movement of the lading away from the bags on that side. This flow of air automatically minimizes changes in pressure that would result due to inertia of the lading if the bags were not interconnected. By maintaining the pressure in the bags at approximately the desired predetermined level, the force on the lading remains approximately constant to keep the individual packages "locked in" by friction and to prevent lateral tumbling.

When the car reaches its destination, the air is released by opening a valve in the fitting **98** to permit the bags **34** to deflate. The weight of the rods **48** then causes the bulkhead to close to the position shown in FIGURE 3. The outer panels are automatically latched together by means of the latches **54**. After the cargo has been removed from the center section of the car, the bulkhead is unlatched from the rack **26** and the strip **63** by releasing the actuating lever **88**. The bulkheads then will move freely from one end of the car to the other as desired. If extra cushioning is desired, two additional bulkheads may be used, one at either end of the car adjacent the end members.

Various modifications of the bulkhead construction of our invention will be apparent to those skilled in the art.

For example, the bulkhead may be vertically divided to accommodate lading of various sizes on either side of

the car. The number of slab-like pneumatic bags covering a railroad car bulkhead may vary from one to four.

In another form of the invention, means other than the disclosed linkage may be used to maintain parallelism between the center and end panels. For example, pairs of racks like **26** may be mounted on the floor and top of the car to cooperate with pinions fixed to a rotatable shaft at the top and bottom of the panels. The rotation of the pinions at the top and bottom may be synchronized by a roller chain trained about sprockets coupled to the pinion shaft. Thus, when the movable panels are installed in the car, they are mounted vertically and are maintained in this attitude because the top and bottom must move in unison by reason of the coupled sprockets on the pinion shaft. Other means for maintaining parallelism will be apparent to those skilled in the art.

It will also be appreciated that although the illustrative form of the invention uses a movable center panel which latches to the car, the center panel need not be movable. For example, the bulkhead of the invention may be permanently installed at the midpoint of the car.

Such a construction is illustrated in FIGURES 6 and 7. The center panel here comprises a rigid frame built into the car, consisting of stud members **102**, **104**, **106** welded or otherwise secured at the bottom and the top to the longitudinal beams of the car. The frame is covered on both sides with smooth panels **103**, **105**. The air supply is fed to the bags **34** through pipe **91** which connects to a manifold and tubing **94** as previously described in the form of the invention shown in FIGURE 1. Air inlet fitting **98** is valved so that air may flow in or out by unscrewing the plug. The bags **34** are identical to those previously described. The movable panels **112**, **116** are tied to the fixed center bulkhead by the parallelogram linkage, but roll on trucks **118**, **120** instead of being suspended from the roof or top of the car. The movable panels expand to compress the lading L toward opposite ends of the car.

This construction is economical to manufacture and has certain structural advantages over the movable bulkheads of FIGURES 1–5. By using the stud members **102**, **104**, and **106** as load bearing members, great rigidity is imparted to the car and the roof beams can be made lighter. This is especially important in cars which are 50 or 60 feet long or cars which have long doors at the sides. Of course, in this construction all of the rails, tracks, and latching mechanisms are dispensed with.

It is claimed:

1. A movable, expandable bulkhead assembly for dividing and cushioning lading in a freight car comprising a center panel and a pair of end panels one on each side of said center panel, each panel being independently suspended from the top of said car for travel lengthwise of said car, inflatable bags disposed between said center and end panels, link means pivotally connecting a set of pins on said end panels with a set of pins on said center panel to provide a parallelogram linkage to maintain said panels in substantially parallel relation, one set of said pivot pins being fixed and the other set being vertically movable with respect to the panel on which they are mounted, whereby said end panels move toward and away from said center panel to provide variable cushioning thickness according to the extent said bags are distended, and means for latching said center panel against longitudinal movement within said car.

2. The bulkhead assembly of claim **1** in which said set of fixed link pins are mounted on said center panel and said end panels carry vertical track means, movable slides for traversing said track means, and said set of movable link pins mounted on said slides, whereby the downward movement of said slides cause the links to close said bulkhead when said bags are deflated.

3. A movable expandable bulkhead assembly for dividing and cushioning lading in a freight car comprising a center panel and a pair of end panels one on each side of said center panel, each panel being independently mounted for travel lengthwise of said car, inflatable bags disposed between said center and end panels, conduit means extending across said center panel interconnecting the bags on either side thereof to conduct air freely therebetween, link means connecting said end panels to said center panel at the side edges thereof to maintain the said panels in substantially parallel relation whereby said end panels move toward and away from said center panel to provide variable cushioning thickness according to the extent said bags are distended, and means for latching said center panel against longitudinal movement within said car.

4. The bulkhead assembly of claim **3** which includes a pair of cooperating latch members, one mounted on each of said end panels, which members mate to lock said bulkhead in closed position when said bags are deflated.

5. The bulkhead assembly of claim **3** in which said center panel carries air tubing for inflating said bags, said tubing connecting to said conduit means and terminating at the side of said center panel in an air filler fitting so that the bags may be inflated after the car is loaded.

6. The bulkhead assembly of claim **3** in which said center panel latching means comprises stud means mounted at the top and bottom of said panel and cooperating slot means at the roof and the floor of said car, and actuating means for said stud means accessible through openings in either of said end panels.

7. The bulkhead assembly of claim **6** in which said actuating means includes a laterally disposed pipe mounted for rotation on said center panel, said pipe being linked to said stud means and having an air fitting on at least one end thereof, said conduit means communicating with said pipe, and said actuating means is connected to said pipe.

8. The bulkhead assembly of claim **3** in which said center and end panels comprise a frame and a skin mounted on said frame for distributing evenly the force imparted to said skin by inflating said bags against lading adjacent said bulkhead.

9. The bulkhead assembly of claim **1** which includes a rotatable shaft mounted laterally on one of said end panels, a latch member fixed to each end of said shaft, a plate projecting from said shaft intermediate the ends thereof, said plate being normally biased toward said center panel out of the plane of said end panel when said bag is deflated, pin means on the other of said end panels for cooperation with said latch to lock the outer panels together, whereby upon inflation of said bag said plate is pushed into the plane of said end panel to rotate the shaft and lift the latch from said pin to automatically unlock the bulkhead.

10. The bulkhead assembly of claim **3** in which said bags are secured to one of said panels by means of stretchable cords.

11. A movable expandable bulkhead assembly for dividing and cushioning lading in a freight car comprising a rigid center panel and a pair of rigid end panels, each panel being independently suspended from supporting members near the top of said car for travel lengthwise of the car, slab-shaped inflatable bags disposed between said center panel and each of said end panels, link means between said center and end panels to provide a parallelogram linkage for maintaining the end panels in parallel relation whether the bags are deflated or fully inflated, latching depressions longitudinally spaced along both sides of the car near the floor and top thereof, studs on said center panel for cooperating with said depressions to lock said panel against longitudinal movement in the car, conduit means mounted on said center panel for conducting air to and between said inflatable bags, and actuating means for said latching studs, whereby upon inflation of said bags the contour thereof changes to increase the volume thereof and decrease the area of said bags in contact with said outer panels, thus providing resilient cushioning having a resisting force proportional to the mag-

nitude of a force imposed upon said outer panel by said lading.

12. A bulkhead assembly for dividing and cushioning lading in a freight car comprising a center panel and a pair of end panels, one on each side of said center panel, a slab-shaped inflatable bag which tends to become rounded when inflated, disposed between said center panel and end panels and being substantially coextensive with said panels, means for securing said center panel against longitudinal movement within said car, said end panels being mounted for longitudinal movement within the car to permit expansion and contraction of said bulkhead, and means interconnecting said panels for maintaining all three in substantially parallel relation, whereby said bulkhead may be expanded to fill voids in said lading on either side thereof and serves to provide resilient cushioning for said lading against longitudinal shock forces imparted to the lading by movement of the car.

13. The bulkhead assembly of claim **12** in which said center panel is built into the car as a load bearing member.

References Cited

UNITED STATES PATENTS

1,613,057	1/1927	Ryerson	105—369
2,856,867	10/1958	Dasey	105—369
3,115,977	12/1963	Mirando	105—369
3,145,853	8/1964	Langenberg	214—10.5
3,177,816	4/1965	Daberkow	105—369
3,192,879	7/1965	Pier	105—369
3,208,403	9/1965	Magarian et al.	105—376

DRAYTON E. HOFFMAN, *Primary Examiner.*

U.S. Cl. X.R.

105—376