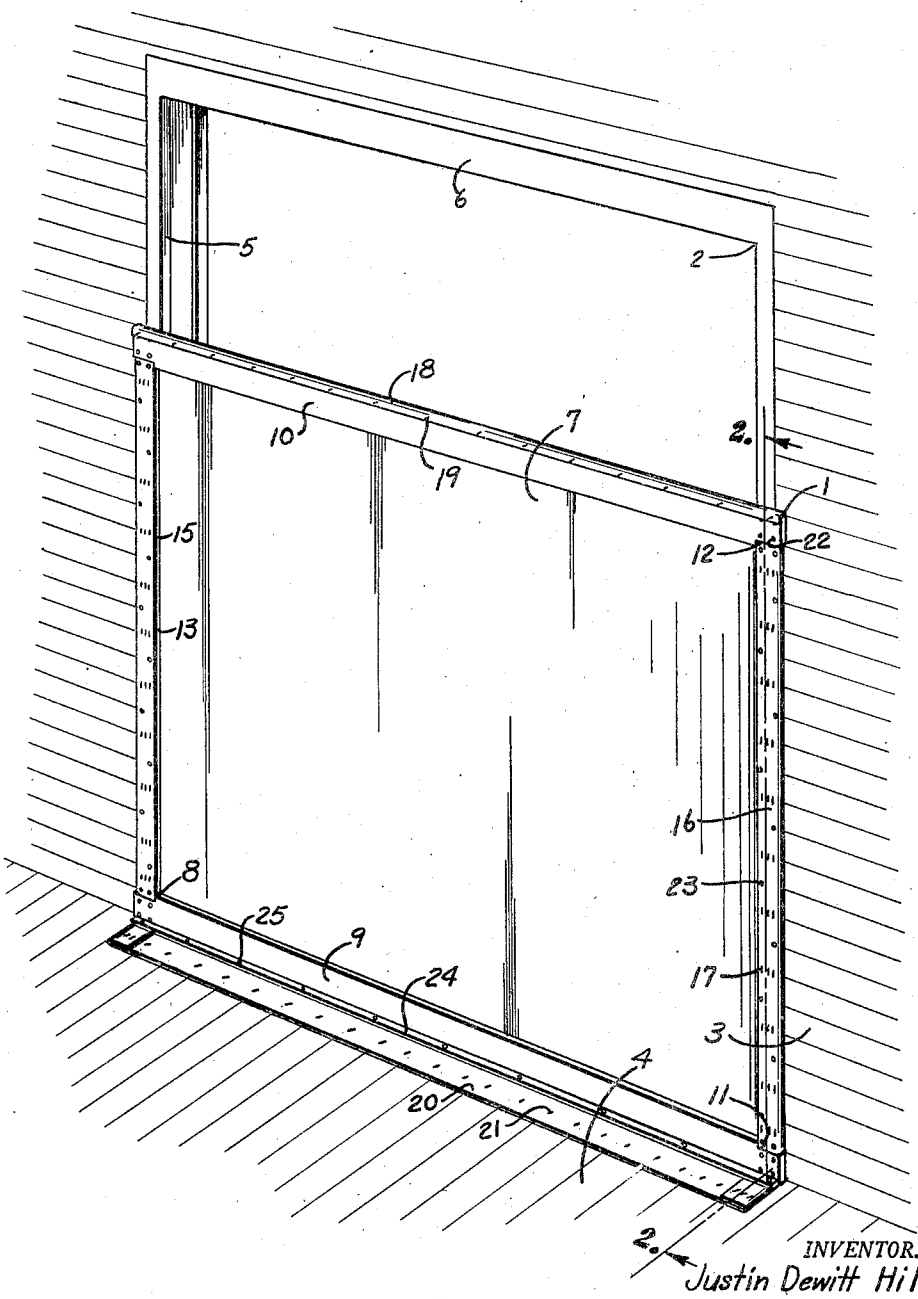
Feb. 18, 1958 J. D. HILL 2,823,745

LOAD RETAINING DOORS

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Fig. 1.



INVENTOR.
Justin Dewitt Hill.

BY

Fishburn & Mullendore

ATTORNEYS.

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Fig. 2.

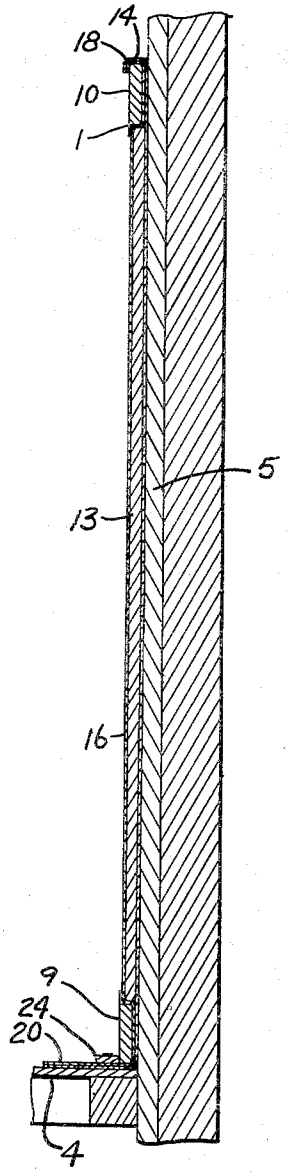


Fig. 3.

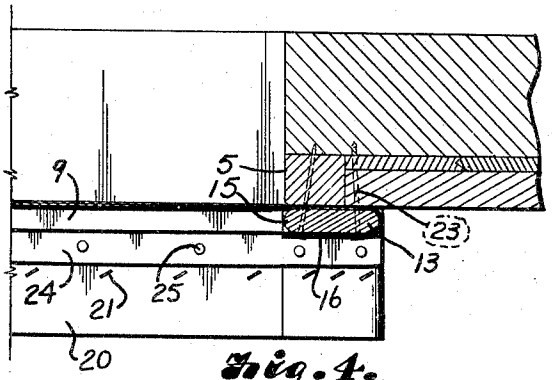


Fig. 4.

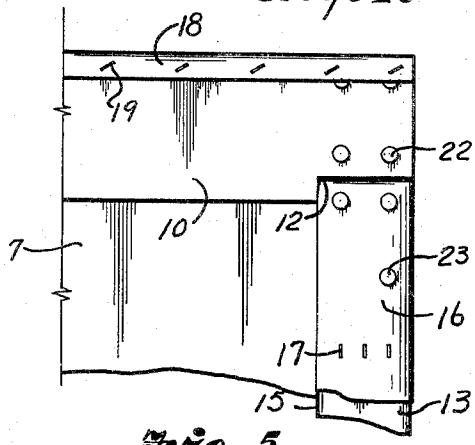
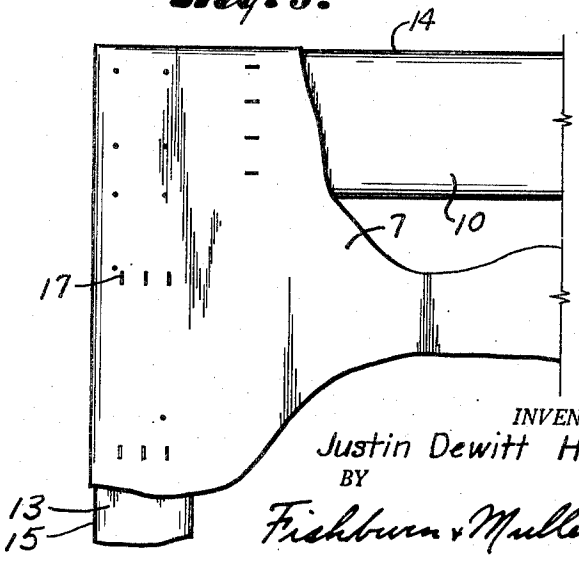


Fig. 5.



INVENTOR.
Justin Dewitt Hill.
BY
Fishburn & Mullendore
ATTORNEYS.

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LOAD RETAINING DOORS

Justin Dewitt Hill, Lawrence, Kans., assignor to The Lawrence Paper Company, Lawrence, Kans., a corporation of Kansas

Application August 3, 1953, Serial No. 371,767

1 Claim. (Cl. 160—368)

This invention relates to load retaining doors and barriers for use in the bulk shipment of grain and the like in railway cars, and as closed or partially closed doorways and barriers, as bin walls, concrete forms and the like in bulk load occupying spaces.

Grain car and like load retaining doors have been made of paper or other fabric with reinforcing strips of wood, steel strapping and the like. Weight of the bulk load, such as grain, tends to bulge the door outwardly and cause slippage, or rupture of the paper or other fabric panels, particularly at the area in which the panel is secured to door posts and the like at the sides of the door opening. Due to the tendency of the panel to bulge outwardly and destroy the usefulness of the load retaining door it has been the practice to reinforce the panel by means of steel strapping, stitched, stapled or otherwise secured to the exterior of the paper or board, or between the sheets of paper. Such steel strapping or other reinforcing usually has considerable spacing whereby the support provided by such strapping is not uniformly distributed over the door height and permits bulging of the paper or board between the steel strapping which results in additional stress being applied to the area of the panel secured to the door posts and breakage of the paper in that area, and then excessive bulging to a point where the panel is scraped by the storm door of the railway car.

The present invention particularly relates to novel load retaining doors and panels therefor of paper, paper board or other flexible sheets of fabric and the like, of ample tensile strength with or without lamination with no or reduced stretch, and/or flexible sheets of laminated paper or the like reinforced with glass or other fibers, strands or strapping with the marginal edges of the panel turned inwardly around frame members having rounded or curved edges and suitably anchored so that the pull or tension resulting from the load acting on the door is resisted by the portion of the panel extending around said rounded edges.

The objects of the present invention are to provide a load retaining door of a plurality of laminated sheets of paper or other flexible fabric cooperating with rounded edges of frame members at the marginal edges of the panel to uniformly distribute stress in the panel along said marginal edge; to provide load retaining door frame member structure which eliminates shift of the parts thereof; to provide a load retaining door structure with panel and frame anchoring structure to distribute stress therein which materially increases the load retaining strength of flexible panels of laminated paper and/or flexible panels with suitable reinforcing, such as steel strapping, glass or other suitable fibers or strands; and to provide a load retaining door which is economical to manufacture and ship and easily and quickly secure to a

door frame with load distribution such as to resist bulging from outward thrust on the door panel.

In accomplishing these and other objects of the present invention I have provided improved details of structure, the preferred forms of which are illustrated in the accompanying drawings, wherein:

Fig. 1 is a perspective view of a load retaining door constructed in accordance with the present invention and in place across the door of a railway car.

Fig. 2 is a vertical sectional view through the load retaining door and the railway car door post on the line 2—2, Fig. 1.

Fig. 3 is a horizontal sectional view through a side portion of the door showing its mounting on the railway car door structure.

Fig. 4 is a front elevation of a portion of the load retaining door.

Fig. 5 is a rear elevation of a portion of the load retaining door.

Referring more in detail to the drawings:

1 designates a load retaining door for attachment to the inside edges of an opening 2 in the side wall 3 of a railway car or other bulk load occupying structure. The railway car has a floor 4 and the door opening 2 is surrounded by two, spaced apart, vertical posts 5, and a horizontal header 6. The area covering portions of the load retaining door 2 consist of a panel 7 formed of a flexible sheet or sheets of laminated paper, fiberboard or other fabric. While in the illustrated structure the panel 7 is of laminated two-ply kraft paper or board which can be rolled without injury, it is obvious the panels may be of suitable flexible or relatively stiff paper or fabric with or without lamination and with or without reinforcing of wire, glass or like strands, strapping and the like, suitably secured between the plys or to the outer surface thereof. It is desirable the panel have no or reduced stretch and such characteristic may be obtained by lamination, adhesive, coatings and pressure in processing as well as by reinforcing with fibers or strands in or on the paper or fabric sheets or boards. The reinforcing preferably extends longitudinally of the panel substantially horizontally across the door opening 2 shown in Fig. 1. The panel 7 is preferably formed of suitable width to provide the desired height of the grain door, and is of suitable length to extend across the doorway 2 and overlap the vertical doorway side posts 5 with the marginal edges turned inwardly to provide suitable anchoring flaps or strips.

When assembled the load retaining door 1 includes a frame 8 having a pry board or bar 9 and a climb board or bar 10, each of which are of substantial thickness and extends across the doorway 2 and overlaps the vertical doorway side posts 5. The pry board and climb board form vertically spaced horizontal bars, the pry board 9 being at the lower portion of the doorway and the climb board 10 being at the upper edge of the load retaining door. The upper edge of the pry board and lower edge of the climb board preferably have notches 11 and 12 respectively in the portions thereof overlying the side posts 5. The frame 8 includes vertical bars or side battens 13 of substantial thickness relative to the thickness of the panel 7 and arranged vertically adjacent the ends of the pry board and climb board, with the ends of said side battens 13 extending into the notches 11 and 12, said side battens 13 overlying the vertical doorway side posts 5. The upper edge 14 of the climb board 10 is preferably curved or rounded. Both vertical edges 15 of the vertical battens 13 are curved or rounded whereby said bat-

tens are interchangeable to present rounded outer edges which are engaged by reversely turned portions of the panel 7. It is also preferable that the lower edge of the pry board 9 be rounded so it corresponds to and is interchangeable with the climb board 10. The rounded edges of the boards 9 and 10 and battens 13 are of such curvature or radius that the margins of the panel 7 may be turned therearound and pulled tight without breaking or injuring the fibers of the paper in said panel. The panel 7 has marginal side portions 16 which extend around the curved edge 15 of the battens 13 and overlie the inner face of said battens. The panel portions overlying the opposite faces of the battens 13 are both suitably secured to said battens as by staples 17. In addition or in place of the staples or other suitable fastening devices the panel may also be secured to the battens by suitable adhesive or other non-slip agents such as rubber, sandpaper, emery or abrasive paint on one or both sides of the portions of the sheet adjacent the edges thereof for reducing the strain on the paper and preventing cutting or tearing of the paper. Such non-slip coatings or material may be applied to the paper and/or frame but preferably on both sides of the paper so as to be between the paper and frame and between the paper and doorway side posts.

The upper marginal portion 18 of the panel 7 is turned inwardly and downwardly around the rounded edge 14 and the downwardly extending portion secured to the climb board by suitable fastening devices such as staples 19 and/or with suitable adhesive or other non-slip agent. The lower marginal edge 20 of the panel extends inwardly under the lower edge of the pry board 9 and is suitably secured as by fastening devices 21 and/or with suitable adhesive or other non-slip agent to the floor 4 of the railway car. The portions of the pry board 9 and climb board 10 overlying the side posts 5 are suitably secured to said side posts as by nails 22 and the battens 13 are secured to the side posts 5 by suitable fastening devices, such as nails 23, which extend through the marginal edges 16 of the panel 7.

A toe strip 24 extends longitudinally of the pry board 9 adjacent the lower edge thereof and overlies the inturned strip portion 20 of the panel, said toe strip being suitably secured to the floor 4 of the railway car by fastening devices such as nails 25.

In constructing a door such as described, the panel 7 is cut to desired size and the pry board, climb board and battens 13, and toe strip 24 are cut to desired length. The upper edge of the pry board and the lower edge of the climb board are notched and the edges of the pry board 9, climb board 10 and battens 13 rounded. The rounded edges of said boards and battens preferably have small scores extending longitudinally thereof or are otherwise roughened to reduce the tendency of the panel 7 to slip thereon. The roughened or scored rounded edges also cooperate with any non-slip agent on the paper to reduce tendency of the paper to slip or tear. The battens 13 are then arranged on the panel 7 and said panels stapled or otherwise suitably secured thereto. Then the marginal portions 16 of the panel 7 are turned around the outer rounded edges of the battens and said marginal portions stapled or otherwise suitably secured to the opposite side of said battens. The panel 7 and battens 13 may then be rolled or otherwise formed in a bundle, together with the pry board 9, climb board 10 and toe strip 24 for storage and also shipment to a point of use.

In mounting the load retaining door in a load containing structure, such as a railway car, the bundle is opened and the panel 7 stretched across the door opening 2, with the lower marginal portion 20 turned inwardly. The pry board 9 is placed over the inturned marginal portion 20 with the lower ends of the battens 13 extending into the notches in the upper edge of the pry board, and while the pry board is held in place the inturned portion 20 is pulled inwardly to tightly engage the lower ends of the battens in said notches and then the inturned portions 20, pry board 9 and battens 13 are fixed in place with the panel taut as by nailing or otherwise suitably securing the inturned portion 20 to the floor 4 and the pry board and battens to the side posts 5. The climb board is then arranged in overlying relation to the upper portion of the panel 7, and with the upper ends of the battens 13 extending into the notches 12 of the climb board. The climb board is then nailed or otherwise suitably secured to the side posts 5. The upper marginal portion 18 of the panel 7 is then turned inwardly and downwardly over the upper rounded edge 14 of the climb board and said marginal portion secured to the climb board as by staples or the like 19 and/or suitable non-slip agent. The toe strip 24 is then arranged over the strip or flap 20 in engagement with the lower portion of the pry board and said toe strip 24 nailed or otherwise suitably secured to the floor 4 of the railway car.

The toe strip reinforces the pry board and also holds the inturned portion 20 of the panel in engagement with the floor of the car to prevent material leaking out under the door. The climb board 10 supports the upper central portion of the panel and adds strength thereto and also protects the body portion of the panel against injury from spouts of loading and unloading machinery.

When the load retaining door is secured to the doorway side posts and car floor as described and grain or other contents loaded in the car, outward pressure of the load on the door causes the panel to be placed in tension but the arrangement of the panel extending around the rounded edges of the door frame uniformly distributes the stress along the edges of said frame, thereby resisting breakage of the panel or tendency of portions thereof to slip. This holding of the edges of the panel reduces tendency for outward bulging of the panel whereby it maintains the desired position under any load within the strength limits for which the door panels are designed.

It is believed obvious that I have provided a load retaining door which is economical to manufacture for stress distribution to resist bulging from outward thrust on the door.

What I claim and desire to secure by Letters Patent is:

A load retaining door applicable to bulk material containing structures having doorways with a floor member and spaced vertically disposed posts defining the bottom and sides of the doorway comprising, a door frame having spaced relatively stiff upper and lower horizontal bars and spaced relatively stiff vertical bars, said horizontal bars of substantial thickness having end portions overlapping the doorway side posts and said vertical bars overlying said doorway side posts, said end portions of the upper and lower horizontal bars having notches in the lower edge of the upper horizontal bar and upper edge of the lower horizontal bar for receiving the respective upper and lower ends of the vertical bars, said notches forming outwardly facing shoulders engaging the inner edges of the vertical bars adjacent the ends thereof to maintain the spacing of said vertical bars, the vertical bars of the door frame having rounded outer edges, a flexible sheet of fabric underlying the door frame and having marginal portions extending beyond the bars of said frame, means securing the sheet to the vertical bars in underlying relation thereto, said marginal portions adjacent the vertical bars being turned around the rounded edges and overlying said vertical bars, means securing said marginal portions to said vertical bars, a lower marginal portion of said sheet extending under the lower horizontal bar and overlying the floor, means extending through the vertical bars and portions of the sheet overlying and underlying same for securing the vertical bars and sheet to the doorway side posts whereby the sheet is under tension resisting pressure of the bulk material in the containing structure, means securing the end portions of the horizontal bars to the doorway side posts, an upper marginal portion of said sheet being turned around the upper horizontal bar and overlying same, means securing the overlying upper marginal portion to the upper horizontal bar,

said rounded outer edges of the bars being of a curvature whereby the engagement of the sheet and the surface of said rounded edges provide a frictional contact tending to hold the sheet against slippage and in such a manner that the sheet is characterized by absence of bending injury adjacent the bars of the frame, and a strip overlying the lower marginal portion of the sheet adjacent the lower horizontal bar and secured to the floor.

References Cited in the file of this patent

UNITED STATES PATENTS

723,899	Moyer	Mar. 31, 1903
1,124,426	Hambrock	Jan. 12, 1915
2,116,260	Corkran	May 3, 1938
2,559,783	Moon	July 10, 1951
2,599,433	Ford	June 3, 1952
2,646,117	Hodgins	July 21, 1953
2,689,608	Suess	Sept. 21, 1954