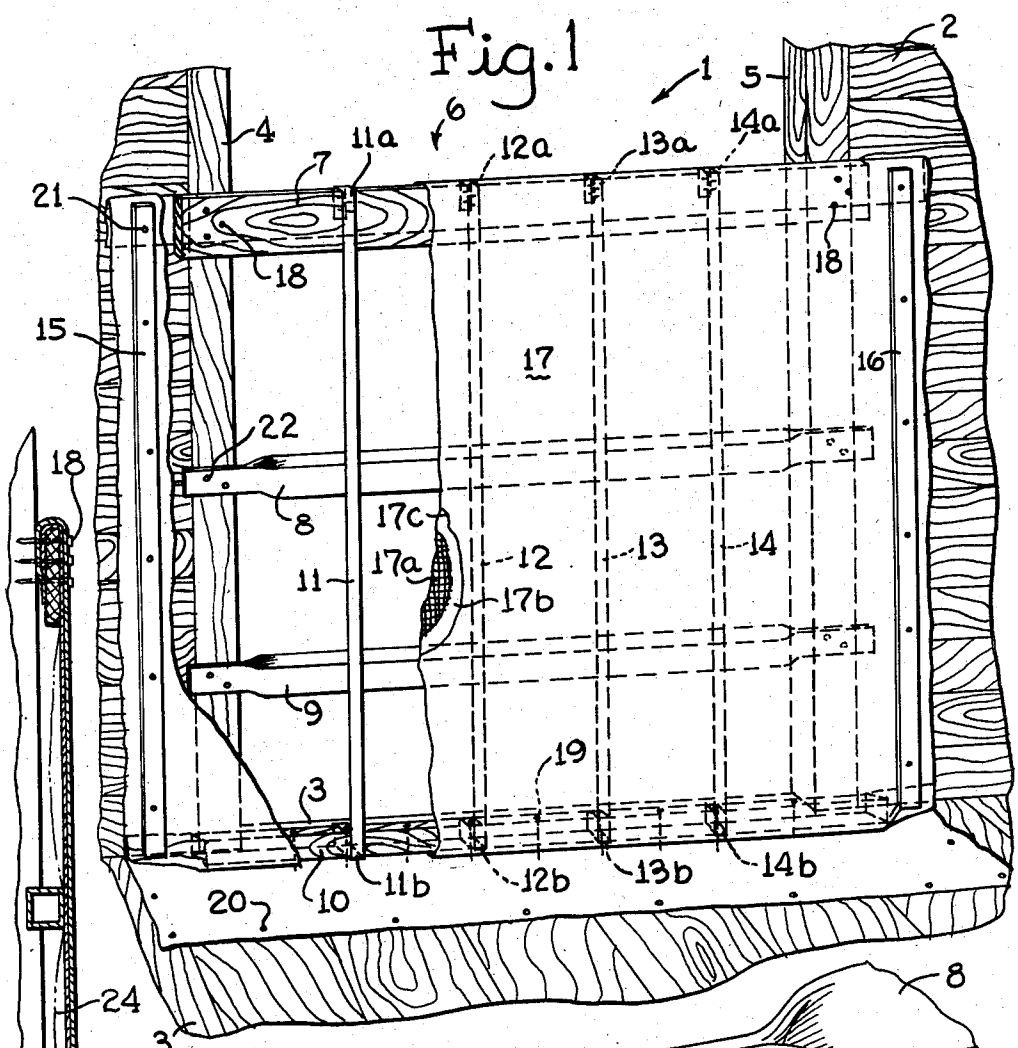
Feb. 3, 1959 T. J. FULLERTON 2,871,937

GRAIN CAR DOOR

Filed Jan. 3, 1955

Fig. 1



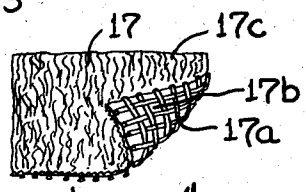


Fig. 4

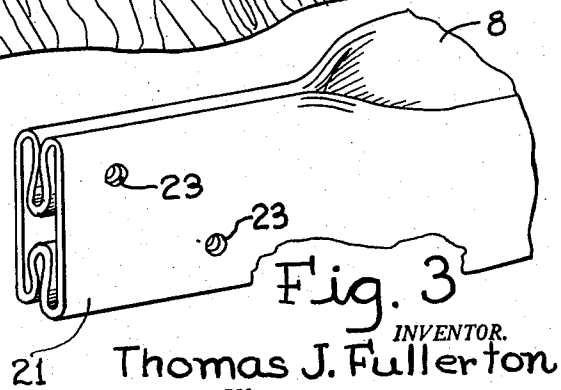


Fig. 3

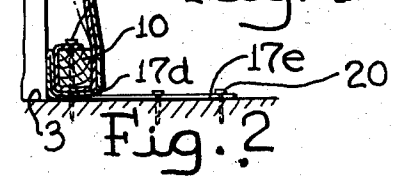


Fig. 2

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GRAIN CAR DOOR

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5 Claims. (Cl. 160—368)

This invention relates to an improved railway car door structure and particularly to an improved temporary door used to cover the inside area of a railway car door opening for purposes of retaining grain or other small size particles within the car.

Many attempts have been made to provide railway car grain doors constructed primarily of simple inexpensive expendable materials such as paper, metal strapping and small boards. However, even on the most successful, there have been disadvantages which so far have not been overcome. The principal difficulties have been failure of the paper sheet by bursting or ripping, releasing of tensioned strap ends nailed in place on the car door posts, both causing grain leakage, and excessive bulging which hampers opening of the permanent outside car door because of pressure of the bulged paper door against it. Also, even in cases where the nails have properly held the tensioned strap ends in the car door posts without yielding, excessive damage has resulted to the railway cars as car door posts have been rotated and partially unsecured from their rigid mountings. In addition to this, the paper doors have required so many nails that an excessive number of nail holes have further damaged and weakened the car posts. It is therefore the principal object of this invention to substantially overcome these difficulties by providing an improved temporary grain door which is more resistant to bursting or ripping, does not bulge excessively and which will considerably reduce the overall damage to car door posts. I accomplish these objects by providing a door having in combination a resilient flexible paper backing over relatively rigid horizontal members resting against the car posts and vertical flexible members fastened between the upper and lower door margins so that the paper stretches under the grain pressure load and distributes the major portion of the load more evenly to the rigid members. By having a resilient flexible paper backing and vertical flexible members, the resultant distribution of the load minimizes and even prevents paper bursting and ripping and even keeps certain marginal rigid brace members from pulling away from the car door frame under shock conditions, which are customary during transit when railway cars are bumped during coupling and decoupling and jerked while being started in movement and stopped. By properly using some relatively rigid load resisting members rather than flexible straps between the car posts of the doorway, fewer are needed with the result that far fewer nails are required in the door posts and less damage is thereby done to the car posts. Also, by having the ends of the rigid members resting against the car rather than tensioned between the car posts, it is possible to minimze car post rotation and related damage.

Other details, objects and advantages of the invention will become apparent from the following description of a preferred embodiment thereof which is shown in the accompanying drawings, in which—

Fig. 1 shows a perspective view of a railway car grain door assembled in position across a car door opening; and

Fig. 2 shows a sectional view of the door shown looking toward the right in Fig. 1 in a vertical plane extending transversely of the door; and

Fig. 3 shows a perspective view of an end portion of a support beam used in the grain door shown in Figs. 1 and 2; and

Fig. 4 shows a perspective view of a cut away portion of the paper used as a backing sheet for the grain door of Fig. 1.

A preferred embodiment of a grain retaining door embodying the principles of this invention is shown positioned to cover an opening 1 which is the doorway of a railway car 2. This opening is bounded at its lower portion by the floor 3 of the car and at its lateral margins by two car posts 4 and 5 which are all securely fastened to and integral with the car. The upper margin of the opening 1 is not shown, but ordinarily consists of a wall section or beam joining together the upper ends of the two car posts 4 and 5. The preferred embodiment of the temporary grain door 6 of this invention comprises an upper board 7, two intermediate support beams 8 and 9, a lower board 10, four straps 11, 12, 13 and 14, two batten boards 15 and 16 and a flexible sheet cover 17. The upper ends 11*a*, 12*a*, 13*a* and 14*a* of the straps 11, 12, 13 and 14 are passed around to contact the rear surface, the upper edge and the front surface of the board 7 and stapled in place thereto. These straps are spaced parallel to and approximately equidistant from each other and extend vertically downwardly to where their lower ends 11*b*, 12*b*, 13*b* and 14*b* are wrapped around the four faces of the board 10 and stapled thereto. Even though the ends of the straps are shown stapled to the boards 7 and 10, other fastening means such as nails can be used instead. The flexible sheet 17 is composed of resilient material which is capable of a small amount of stretching and, as especially shown in Fig. 4, may be composed of a back layer 17*a* of loosely knit burlap, a middle layer 17*b* of adhesive material such as asphalt which is preferably waterproof, and a top layer 17*c* which is a sheet of crinkled or creped paper, the crinkling maintaining an elasticity or resilience to the sheet. Even though the folds of the crinkles may be formed to run predominantly along parallel paths in one direction, the crinkling is preferably such that the paper can be stretched in all directions even though more in one than another. The burlap strands provide resilience and ripping and tensile strength to the sheet and because the burlap strands on the under layer 17*a* are loosely woven, they can yield as the entire sheet 17 is stretched over its entirety. This resilient character of the sheet 17 is referred to in more detail hereinafter.

In the assembly of the door, the upper margin of this rectangular shaped sheet 17 is folded around three surfaces of the board 7 in a manner similar to how the upper ends of the straps 11, 12, 13 and 14 are wrapped and this upper margin can be stapled in place to the board 7. The lower portion of this sheet 17 extends vertically downwardly and has a portion 17*d* which extends around the front, the bottom and the rear surfaces of the board 10 and connects to an end portion 17*e* which folds back underneath the portion 17*d* and extends for a distance horizontally in front of the door. The portion of the door consisting of the two boards 7 and 10, the straps 11, 12, 13 and 14 and the sheet 17 is secured across the doorway 1 by nailing the ends of the board 7 with horizontally placed nails 18 to opposite car posts 4 and 5 and the bottom board 10 to the car floor 3 by means of vertically placed nails 19. The nails 18 pass through

two layers of the sheet 17 as well as the board 7 while some of the nails 19 pass through lower ends of straps 11, 12, 13 and 14 as well as the board 10, the two sheet portions 17*d* and 17*e* of the sheet 17, while still other nails 19 pass only through the board 10 and the two sheet portions 17*d* and 17*e*. After this portion of the door is in place, the sheet portion 17*e* extending inwardly of the doorway is nailed to the car floor 3 by means of nails 20. Also, batten strips 15 and 16 are nailed along the marginal edges of the sheet 17 by means of nails 21. The particular folding arrangement of the sheet 17 around the board 10 as well as the battens 15 and 16 provide grain tightness around marginal portions of the doorway. Another advantage of this folding arrangement of the sheet portions 17 around the board 10 is the clamping action of the board 10 against the sheet portions 17*d* and 17*e*. In addition to this, there is another advantage of better holding of the lower strap ends which are wrapped around four sides of this board 10. The board 10 also can be used by a worker to apply a crow bar against it to pry open the outside car weather door without ripping the sheet and causing a grain leak.

Before the door portion just mentioned is positioned across the car doorway, the principal load bearing members 8 and 9 which are preferably square cross-sectioned tubular metal pieces having flattened ends 21, as best shown in Fig. 3, are bridged between and fastened to the car posts 4 and 5 by means of nails 22 which pass through nails holes 23 provided in these flattened ends 21. Only sufficient nailing to support these members 8 and 9 is required and, so, either one or two nails may be used on each end of these members. Notice that these members 8 and 9 are in no manner attached to the remainder of the door. The fact that these load members 8 and 9 are extremely rigid, but capable of some variable deflection under load and impact, make them ideally suited for withstanding the bulk of the grain load within the car. To eliminate lateral pull of the door posts 4 and 5 by the members 8 and 9 while deflecting, the nail holes 23 are made larger than the shanks of the nails 22 to permit a small amount of sliding of the ends of the members 8 and 9 over the door posts 4 and 5.

The reason for providing a resilient sheet 17 as a grain barrier is to permit a pillowing or bulging condition, as shown by phantom lines 24 in Fig. 2, so that the load of the grain is transmitted from the sheet 17 to the load members 8 and 9. It has been found that when a rather inelastic sheet is used that the sheet either bursts or tears before the load is fully transmitted to the load members 8 and 9, especially under shock conditions obtained with a railway car in transit. The principal reasons for the vertical straps 11, 12, 13 and 14 are, first of all, to carry some of the grain load and, secondly, to help transmit this grain load from the sheet 17 to the load members 8 and 9. It has also been discovered that the use of a resilient sheet 17 minimizes the tendency for the boards 7 and 10 to be pulled from their fastenings to the car posts 4 and 5. It seems that in all cases the resilient sheet 17 absorbs energy during shock load conditions so that all of the members forming the door are never subjected to as severe sudden stresses as would occur if the sheet 17 is realtively inelastic. The crisscrossing of the vertical straps with the horizontal beams 8 and 9 has an additional advantage in that the sheet area is broken up into smaller sections such as the area bounded by straps 12 and 13 and beams 8 and 9. By breaking the larger sheet area into the smaller areas, the load is more evenly distributed to the members 8 and 9.

Because the load bearing members 8 and 9 are not fastened to the rest of the door, any relative shifting of these members with the sheet 17 will not cause ripping of the sheet but, instead, slippage will occur between the parts.

During assemblying the car door 6 across the doorway

1, the boards 7 and 10 can be preassembled to the straps 11, 12, 13 and 14 and the sheet 17. This assembly can be positioned by first nailing the board 10 and the lower sheet portions 17*d* and 17*e* in place and then nailing the board 7 and the upper end of the sheet 17 in place after drawing out slack in the sheet and the straps. But, before securing the board 7 in place, the load members 8 and 9 must be first nailed in place. After all of these parts are positioned, the batten strips 15 and 16 can be nailed in place along the lateral marginal portions of the sheet 17.

While a preferred embodiment of the invention has been shown and described, it should be understood that the invention is not limited thereto, but may embody various other constructions without departing from the scope of the following claims.

I claim:

1. A grain barrier for a doorway comprising an upper horizontal beam abridging the lateral margins of said doorway, vertical flexible straps fastened to said upper beam at their upper ends and at their lower ends to the lower margin of said doorway, a lower horizontal beam abridging said doorway between the said upper beam and the said lower margin of said doorway, a resilient flexible sheet fastened to said upper beam, said lower margin of said doorway and the side margins of said doorway, and said sheet slidably resting against said lower horizontal beam.

2. A grain barrier for a doorway comprising an upper horizontal beam abridging the lateral margins of said doorway, vertical flexible straps fastened to said upper beam at their upper ends and at their lower ends to the lower margin of said doorway, a lower horizontal beam abridging said doorway between the said upper beam and the said lower margin of said doorway, a resilient flexible sheet fastened to said upper beam, said lower margin of said doorway and the side margins of said doorway, and said sheet slidably resting against said lower horizontal beam, said lower horizontal beam being slidably mounted at its ends to said side margins of the doorway to permit deflection of said lower beam to minimize lateral stress of said side margins.

3. A grain barrier for a doorway comprising an upper and a lower horizontal beam abridging lateral margins of said dorway, flexible straps fastened to said beams to lie vertically of said doorway, another horizontal beam abridging said dorway between said upper and lower beams, said beams and straps being covered with a resilient flexible sheet, the bottom of said sheet extending beneath the lower beam from behind the beam forward and then folded back beneath itself to provide a double thickness sheet portion, said portion and the lower ends of said straps being clamped in place to the bottom margin of said doorway by means of said lower horizontal beam.

4. A grain barrier for a doorway comprising rigid supports placed horizontally across and fastened to said doorway, flexible straps placed vertically over said rigid supports and fastened to span the doorway opening between one of said rigid supports and the bottom of said doorway, the area bounded by said supports and straps being covered with a yielding flexible sheet which is fastened to at least the side and bottom margins of the doorway and the uppermost rigid support but detached from the remaining rigid supports.

5. A grain barrier for a doorway comprising rigid supports placed horizontally between marginal portions of the doorway, flexible straps placed vertically to span the door opening where connected only to the uppermost rigid support and the bottom of said doorway, said straps and supports being backed with a resilient flexible sheet which is fastened to at least the side and lower margins of the doorway and the uppermost rigid support, said sheet being detached from the remaining rigid supports

and the lengths of strap intermediate the uppermost rigid support and the lower margin of the doorway.

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