

June 4, 1940.

J. A. SCHMITZ

2,203,107

GRAIN DOOR FOR RAILWAY CARS

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Fig. 1.

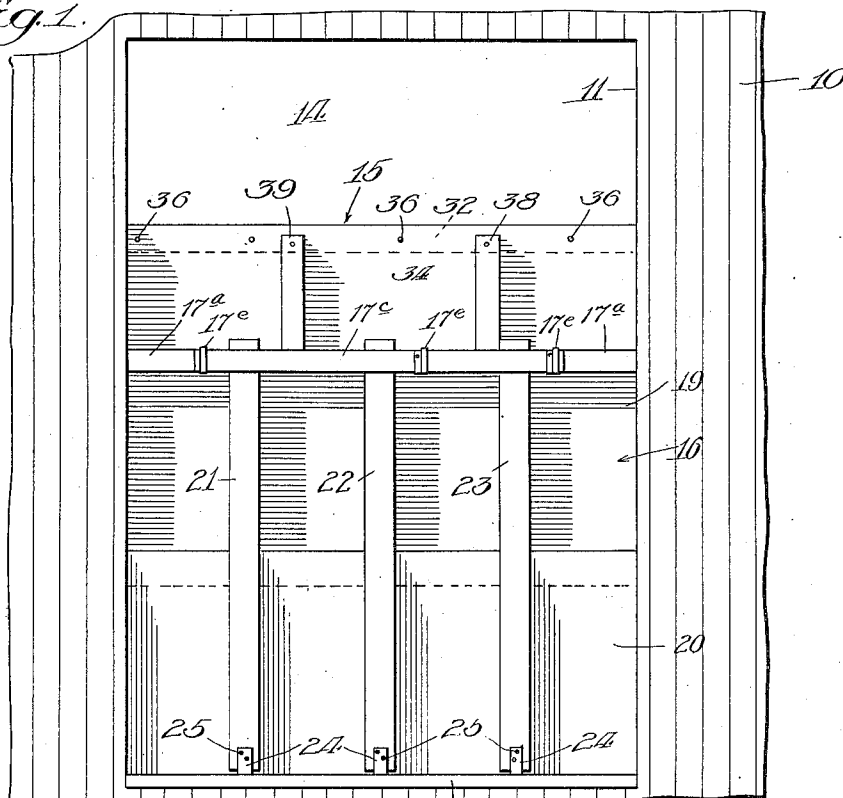
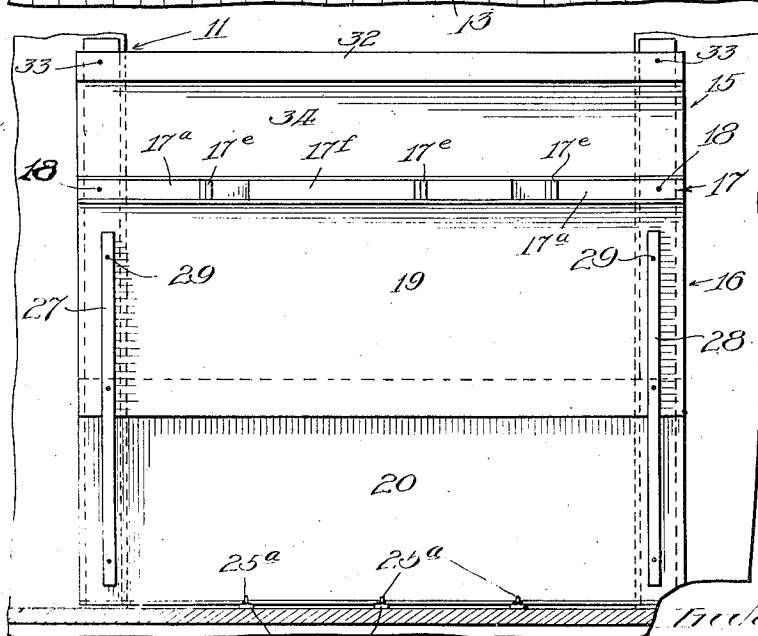


Fig. 2.



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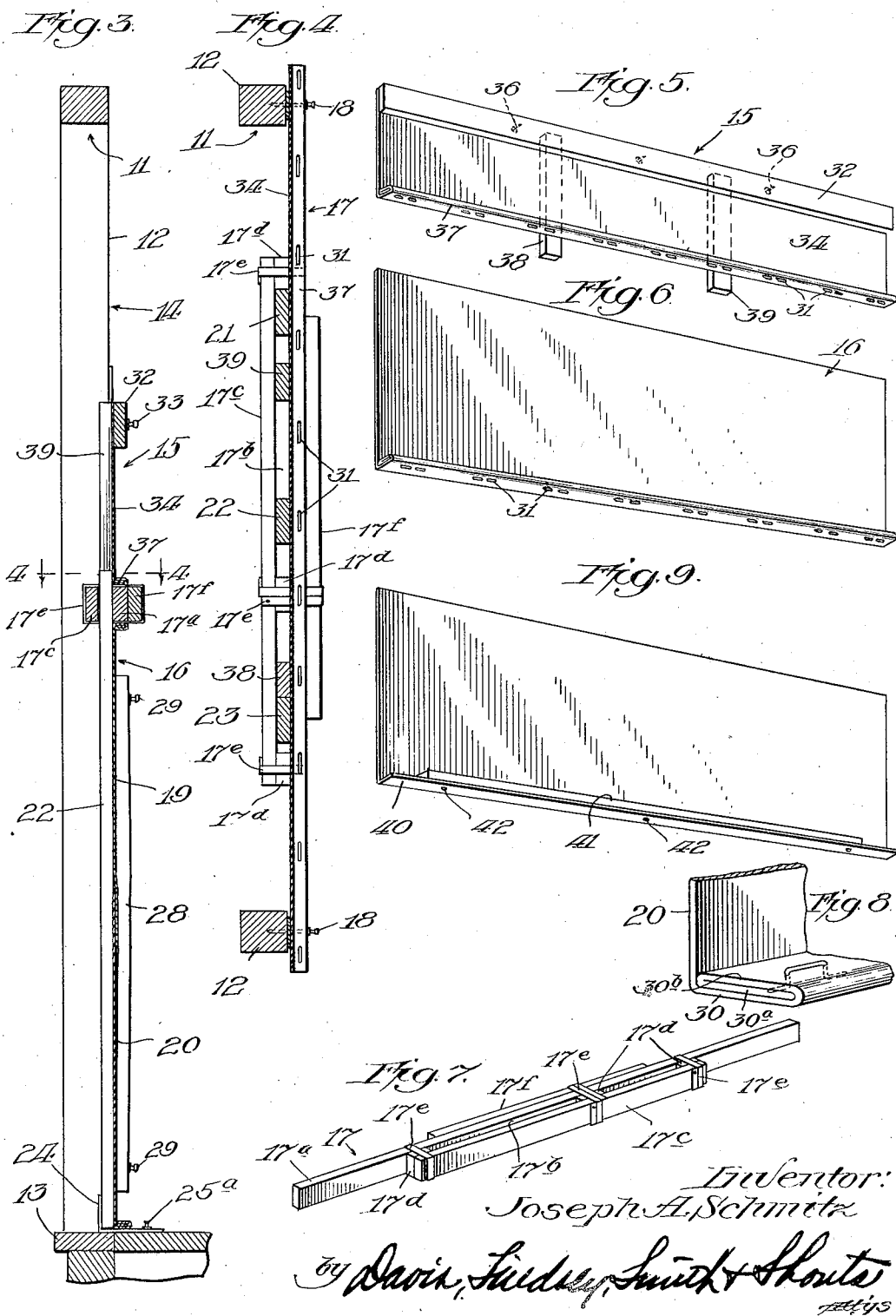
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,203,107

GRAIN DOOR FOR RAILWAY CARS

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Application June 30, 1938, Serial No. 216,676

15 Claims. (Cl. 20—27)

My invention relates to grain doors for closure of the doorways of railway box cars and the like in adapting such cars for hauling grain.

One of the objects of my invention is to provide an improved grain door which is inexpensive, may be applied and removed quickly, is of light weight yet sufficiently strong and durable to withstand maximum grain pressures, and which is adapted to serve the intended purpose in a highly efficient manner.

Another object is to provide a grain door formed of paper or the like panels that are constructed, arranged and supported by novel brace means which is of a character adapted to facilitate the ready application and removal of the door.

A further object is to provide a grain door which provides a tightly sealed leak-proof closure, and which is adapted for rapid removal of the grain at the point of destination thereby minimizing delay in the movement of cars.

Another object is to provide a grain door of the foregoing character wherein certain of the paper or like panels are interchangeable and are arranged in overlapping relation at that point where the panels are exposed to greatest grain pressure, whereby the door is capable of withstanding the greatest grain pressures under all operating conditions. The interchangeable panels are so arranged that one forms the bottom portion of the door and it may be slashed, cut or otherwise destroyed to effect an instantaneous discharge of the grain.

Still another object is to provide a door of the foregoing character wherein the paper or like panels are so constructed and arranged that their horizontal edges are reinforced and stiffened in such a way as to prevent bulging thereof when the panels are subjected to the pressure of the grain.

Additional objects are to provide a grain door which may be installed with a comparatively small amount of cooperage material and with a minimum amount of labor which need not be of skilled character; to provide a door including parts that may be easily packaged and transported from place to place for repeated installations of reclaimed parts; to provide a door that may be applied and removed without marring or injuring the car; to provide a door having component parts of such character that they may be easily handled in installation by one workman; to provide a door that requires only a very few fastening devices; and to provide a door which includes parts that may be used repeatedly by

merely supplying a new destructible bottom paper section.

Other objects and advantages will become apparent as this description progresses and by reference to the drawings wherein—

Figure 1 is a partial outside side elevational view of a railway car having a doorway closed with a grain door embodying my invention;

Fig. 2 is an inside elevational view of the structure shown in Fig. 1;

Fig. 3 is a vertical sectional view through the car doorway and door structure shown in Figs. 1 and 2;

Fig. 4 is a horizontal sectional view taken substantially on line 4—4 of Fig. 3;

Fig. 5 is a detached perspective view of the upper section of the door shown in the previous figures;

Fig. 6 is a detached perspective view of one of the paper panels of the lower door section;

Fig. 7 is a detached perspective view of a horizontal brace member shown in Figs. 1 to 4, inclusive, and employed for supporting the door sections;

Fig. 8 is an enlarged fragmental perspective view illustrating the manner of folding the edge of the paper panels for stiffening and strengthening purposes; and

Fig. 9 is a detached perspective view of a modified form of paper panel that may be employed in carrying out my invention.

In the drawings, I have shown my improved grain door applied to a railway box car 10 having a doorway 11 (Fig. 1) defined by upright door posts 12 and a bottom floor part 13. It will be understood that the car embodies two similar and opposed doorways, as is customary, and that a similar grain door embodying my invention is applied to each doorway. For the purpose of explanation of my invention, however, it will be necessary to refer only to one doorway and one grain door structure. It will also be understood that the outer part of the doorway may be closed by the usual car door (not shown) and that the grain door does not extend throughout the height of the doorway since the extent to which the car is filled with grain does not require that. In this way, an opening 14 is provided above the grain door through which grain filling devices may be projected for feeding the grain into the car.

Referring to Figs. 1 to 8, inclusive, the grain door shown includes an upper section 15 and a lower section 16 which are so arranged that the lower door section 16 may first be applied, followed by the application of the upper section 15.

The upper and lower sections are interconnected by a horizontal brace member 17 which is secured at its opposite ends by nails or other suitable fastening devices 18 to the upright car door posts 12. As will be pointed out more fully hereinafter, both the upper door section and the lower door section are interlocked with the brace member 17.

The lower door section 16 includes a pair of similar, interchangeable horizontal panels 19, 20 formed of paper or the like material. I have found that paper of substantially .045 inch thickness is of sufficient strength to serve my purpose when employed in a grain door embodying my invention; but it is to be understood that the thickness and character of the paper may be varied without departing from my invention.

Each paper panel 19, 20 (Figs. 1 to 3) is of sufficient width to span the doorway 11 with their opposite ends fully overlapping the upright car door posts 12. The panels 19, 20 are of such width that their inner ends overlap each other to a substantial extent, thereby providing a thickened grain barricade at substantially the mid point of the lower door section where, as shown by experience, the greatest grain pressures are exerted on the door. In this way, the door panels 19, 20 brace and strengthen each other so that maximum grain pressures may readily be withstood without detrimental bulging or bursting of the panels, particularly when they are associated with outer, vertical, light-weight wooden brace strips 21, 22 and 23 (Figs. 1, 3 and 4). I have found that three vertical brace strips 21, 22, 23 well serve the purpose, but it is to be understood that, if desired, the number of such strips may be varied if the conditions of use make that desirable.

The brace strips 21, 22, 23 are all of the same length and each is provided at its lower end with a thin, right-angled metal bracket 24, one leg of which is secured to the lower outer end of the brace strip by nails or other fastening devices 25 and the other leg is secured to the car floor by one or more fastening devices such as double-headed nails, or the like, 25^a. The upper ends of the vertical brace strips 21, 22, 23 are supported by the horizontal brace member 17 in a manner which will now be described.

The brace member 17 takes the form of a light-weight wooden strip 17^a extending substantially throughout the width of the doorway with its opposite ends secured to the upright door posts 12 by double-headed nails 18. The mid portion of the brace head 17 is provided with a slot 17^b formed by an intermediate light-weight wooden strip 17^c and wooden spacer blocks 17^d secured to the strip 17^a by metallic strap members 17^e. The inner face of the brace member 17 is reinforced and strengthened at its mid portion by another inner short and light-weight wooden strip 17^f, also held in place by the central strap member 17^e, and in this way the brace member 17 is made quite rigid and it is capable of affording the support necessary for the vertical brace strips 21, 22, 23 to withstand the maximum grain pressure. The vertical brace strips 21, 22, 23 are secured or interlocked with the brace member 17 by passing their upper ends into the slot 17^b where they are retained freely and without the aid of fastening means. With the brace strips 21, 22, 23 and panels 19, 20 and the horizontal brace member 17 assembled as shown in Fig. 1, the paper panels lie flush against the vertical brace strips and these strips, coupled with

the strength of the paper and the overlapped relation of the paper panels, provides a structure which will readily withstand maximum grain pressures even where the car is hauled for long distances under extreme operating conditions.

The paper panels 19, 20 are not secured to either the car floor, the vertical braces 21, 22 or 23, or the horizontal brace member 17. However, when the paper panels and brace members are assembled as shown in Figs. 1 and 2, the lower section of the door is completed and the paper panels are supported in position by wooden strips 27 and 28 which overlie the opposite ends of the paper panels and are secured to the inner surface of the upright door posts 12 by double-headed nails or other suitable fastening devices 29. It will thus be seen that the several parts of the lower door section, including the horizontal brace member 17, may be completely installed in assembled relation by the use of only eleven fastening devices.

Since the upper edge of the upper panel 19 and the lower edge of the lower panel 20 are free and unattached, these edge surfaces, unless otherwise provided for, will tend to bulge under the pressure of the grain and thereby permit leakage of the grain. To avoid this condition, I form the edges of the panels in such a way that they are self-strengthened and stiffened. Specifically, the upper edge of the upper panel 19 and the lower edge of the bottom panel 20 are folded at right angles to the plane of the panels as shown in Figs. 3 and 8. At each of these edges, a sufficient amount of material is turned over to permit it to be folded upon itself in a three-ply manner, providing plies 30, 30^a and 30^b, all of substantially the same width with the uppermost plies 30^a and 30^b abutting the body of the panel. By folding the edge of the panel in this manner, the outermost free edge forming the ply 30^a is enclosed between the plies 30 and 30^b so that no free edges are left exposed. After the edges of the panels are thus folded, the plies are secured or stitched together by means of staples, or the like, 31, thereby providing a stiff, right-angled flange along the edge of the panel, which resists bulging action at that point which, if it should occur, would result in leakage of the grain.

The upper door section 15 includes a horizontal, light-weight wooden strip 32 secured at its ends to the inner surface of the upright door sills 12 by any suitable fastening devices such as double-headed nails, 33 or the like. This section 15 further includes a narrow panel 34 formed of paper, or the like material, similar to the panels 19 and 20, except that this panel is of less width than the panels of the lower door section. The upper edge of the paper panel 34 is secured by nails 36, or the like, to the strip 32. The lower edge of the panel 34 is formed with a right-angled stiffening flange 37 similar to the flanges on the lower section panels 19 and 20. The mid portion of the upper section panel 34 is braced by a pair of short, outer, vertical, wooden strips 38, 39, the upper ends of which are secured in any suitable manner to the horizontal strip 32. The vertical brace strips 38, 39 are of slightly greater length than the width of the panel 34 so that their lower ends project therebeneath as clearly shown in Fig. 5. In applying the upper door section 15, the lower ends of the strips 38 and 39 are adapted to enter the slot 17^b of the brace member 17 where they are retained without the use of fastening devices. In view of the narrow-

ness of the panel 34, and due to the fact that the upper opposite end portions of the panel 34 are disposed beneath the cross brace 32 so that the panels are secured to the door posts 12 when the cross panel 32 is secured in place, no means is required for securing the opposite ends of the upper section panel 34. It will be seen from the foregoing that only two fastening devices are required to secure the upper door section 15 in place, and that the door as a whole may be completely secured in assembled relation by the use of only thirteen fastening members. The number of fastening devices required in applying my door is considerably less than those required to fasten any other grain door of this general character, of which I am aware. Also, I preferably employ so-called double-headed nails such as the nail 29 shown in Fig. 4, so that when the nails are driven fully inward, a distinct head portion will project from the surface to which the nail is applied so that a claw or other like nail-removing device may be readily applied to the raised head of the nail for ready removal of the same. This not only facilitates removal of the nail but it insures the removal in such a way as to avoid any material injury to the car surface. It also insures that all of the fastening devices will be removed and that this may be accomplished even without the use of skilled labor.

In some instances, the edges of the paper panels may be strengthened and stiffened by wooden strips, such, for example, as shown in Fig. 9. In that case, the edge of the panel to be stiffened is turned over at right angles to the body of the panel, providing a right-angled flange 40. To this flange, I secure a slightly shorter wooden strip 41 by means of nails 42, or the like. The right-angled flange tends to add stiffness to the edge of the panel, which stiffness is materially added to by the wooden strip 41, thereby positively preventing any bulging action of the panel edge under normal conditions of use.

I believe that the operation and advantages of my invention will be obvious from the foregoing description. The door structure is of very simple form and it is of a character that may be readily and quickly applied and removed without any special or unusual labor. It may be applied more quickly than other grain doors heretofore devised and, in fact, a car may be completely coopered with doors embodying my invention in approximately five minutes, which is less time than that customarily required to fill the car at the grain elevator. My invention further insures the emptying of the grain car in a very short time, this being accomplished by merely destroying the bottom panel 20 of the lower door section. The door is of such character that it may be applied properly even by unskilled labor, and this, together with its inexpensive character, greatly reduces the cost of grain car cooperage work. The smaller size panels that are employed facilitate handling of the door parts. Although the door is of light weight and is secured at a minimum number of points, it is still of such character that it will withstand the normal grain pressures under normal haul conditions without detrimental bulging of the paper panels and without leakage. By providing a pair of interchangeable panels for the lower door, it is not necessary to destroy the entire door panel structure in order to empty the grain car, thereby providing an arrangement wherein all of the parts except the bottom panel 20 may be reclaimed. The inter-

changeable nature of the lower door panels further facilitates the cooperage work necessary in adapting a car for hauling grain, and since the panels are formed of paper and all of the brace members are formed of wood, the entire door assembly is of very light weight and it can be readily transported as a unit by the workman. This is important from the transportation cost standpoint, particularly where transportation is necessary with respect to reclaimed doors. The flanges 30 and 37 on the panel of the upper door section and the bottom panel of the lower door section cooperate with the grain to effect a tight seal at those points. The grain, in covering these flanges, presses the same downwardly and seals the same against the adjacent surfaces. Furthermore, it is to be understood that my grain doors are suitable for any box car or the like that may be employed for hauling grain.

I claim:

1. A grain door adapted for use with car structure having a floor and a doorway defined by upright post members, which comprises a pair of horizontal paper or the like panels having their adjacent edges disposed in overlapping relation, a horizontal brace member adjacent the upper edge of the uppermost of said panels with its ends adapted to be secured to the car door posts, a plurality of vertical brace members disposed along the outer surfaces of said panels and having their lower ends adapted to be secured to the floor of the car and their upper ends interlocked with said horizontal brace member, and fastening strips disposed along the opposite ends of said panels and adapted to be secured to the car door posts.

2. A grain door adapted for use with car structure having a floor and a doorway defined by upright door posts, which comprises a door section having a horizontal brace member having its ends adapted to be secured to the car door posts, a plurality of vertical brace members having their lower ends adapted to be secured to the floor of the car and their upper ends interlocked with said horizontal brace member, a pair of horizontal paper or the like panels disposed between said horizontal brace member and the floor of the car, and means disposed along the opposite ends of said panels and adapted to be secured to the door posts for securing said panels in assembled relation with said brace members.

3. A grain door adapted for use with car structure having a floor and a doorway defined by upright door posts, which comprises a door section having a horizontal brace member with ends adapted to be secured to the car door posts, a plurality of vertical brace members having their lower ends adapted to be secured to the floor of the car and their upper ends interlocked with said horizontal brace member, a pair of horizontal paper or the like panels disposed between said horizontal brace member and the floor of the car with their adjacent horizontal edges disposed in overlapping relation, and means disposed along the opposite ends of said panels and adapted to be secured to the door posts for securing said panels in assembled relation with said brace members, said means constituting the sole securing means for said panels.

4. A grain door adapted for use with car structure having a floor and a doorway defined by upright door posts, which comprises a door section including a horizontal brace member having a horizontal slot therein and having its ends adapted to be secured to the car door posts, a plurality of vertical brace members having their

upper ends freely received in the slot of said horizontal brace member, means on the lower ends of said vertical brace members for securing the same to the floor of the car, a plurality of horizontal panels formed of paper or the like material mounted inwardly of and against said vertical brace members and of a total width adapted to cover the space between said horizontal brace member and the floor of the car, and strip members disposed along the opposite ends of said panels and adapted to be secured to the car door posts for securing said panels in place.

5. A grain door adapted for use with car structure having a floor and a doorway defined by upright door posts, which comprises a door section including a horizontal brace member having a horizontal slot therein and having its ends adapted to be secured to the car door posts, a plurality of vertical brace members having their upper ends freely received in the slot of said horizontal brace member, means on the lower ends of said vertical brace members for securing the same to the floor of the car, a plurality of horizontal panels formed of paper or the like material mounted inwardly of and against said vertical brace members, said panels being so relatively arranged that their adjacent horizontal edges overlap each other with the overlapped edge of whichever panel is uppermost disposed inwardly of the upper edge of whichever panel is lowermost, and strip members disposed along the opposite ends of said panels and adapted to be secured to the car door posts for securing said panels in place.

6. A grain door adapted for use with car structure having a floor and a doorway defined by upright door posts, which comprises a horizontal brace member having its opposite ends adapted to be secured to the car door posts, vertical brace members having their upper ends interlocked with said horizontal brace member, means on the lower ends of said vertical brace members for securing them to the car floor, horizontal paper panels mounted beneath said horizontal brace member inwardly of and against said vertical brace members and covering the space between said horizontal brace member and the floor of the car, means adapted for securing the ends of said panels to the car door posts, and a door section above said horizontal brace member including a horizontal strip member adapted to be secured at its ends to the car door posts, a paper or the like horizontal panel carried by said strip member, and vertical brace members having their upper ends secured to said strip member and their lower ends interlocked with said horizontal brace member.

7. A grain door adapted for use with car structure having a floor and a doorway defined by upright door posts, which comprises an upper and a lower door section, a horizontal brace member between said door sections, said upper door section including a horizontal paper or the like panel, a supporting member secured to the uppermost edge of said panel and adapted to be secured at its opposite ends to the car door posts, brace strips secured at one end to said supporting member and extending along the outer surface of said panel, means by which the lower ends of said brace strips are interlocked with said horizontal brace member, and said lower section including a plurality of horizontal paper or the like panels, a plurality of vertical brace strips extending along the outer surface of said lower section panels with their upper ends engaged

with said horizontal brace member through said interlock means, means carried by the lower ends of said lower section vertical brace strips for securing them to the floor of the car, and means disposed along the end edges of said lower section panels and adapted to be secured to the car door posts for securing said lower section panels in place.

8. A grain door adapted for use with car structure having a floor and a doorway defined by upright door posts, which comprises a horizontal brace member provided with a longitudinal slot and having its opposite ends adapted to be secured to the car door posts, a plurality of horizontal paper or the like panels disposed side by side below said horizontal brace member and adapted to close the space between it and the car floor, vertical brace strips along the outer surface of said panels and having their lower ends adapted to be secured to the car floor and their upper ends fitting freely in the slot of said brace member, means by which the opposite ends of said panels are adapted to be secured to the car door posts, a horizontal strip member above said brace member and having its ends adapted to be secured to the car door posts, vertical brace strips secured at their upper ends to said horizontal strip member and having their lower ends received in said brace member slot, and a horizontal panel formed of paper or the like secured at its upper edge to said horizontal strip member and closing the space between the latter and said brace member.

9. A grain door for a railway car having a floor and a doorway defined by upright door posts, which comprises a horizontal brace member adapted to have its opposite ends secured to the car door posts near the top of the door, which member is provided with a central, longitudinally extending slot, vertical brace strips adapted to extend from near the floor of the car to said horizontal brace member and having their upper ends freely engaged in the slot of the latter, means by which the lower ends of said vertical strips are adapted to be secured to the floor of the car; and a pair of horizontal panels formed of paper or the like material filling the space between said horizontal brace member and the floor of the car, said panels being of substantially the same width and of such width that their adjacent edges overlap to a substantial extent at substantially midway between said horizontal brace member and the floor of the car, and a strip member at each end of said panels and adapted to be secured to the car door posts with the ends of said paper panels between said strip members and the car door posts, said strip members constituting the sole means for securing said panels in assembled relation with said horizontal brace member and vertical strips.

10. A grain door adapted for use with railway cars having a floor and a doorway defined by upright door posts, which includes a horizontal brace member provided with a longitudinal slot and having its opposite ends adapted to be secured to the car door posts, a horizontal strip member disposed above said brace member in spaced relation thereto and having its opposite ends adapted to be secured to the car door posts, vertical strip members secured at one end to said horizontal strip member and their other ends projecting into the slot of said brace member where they are confined without the aid of separate fastening means, a horizontal panel formed of paper or the like secured at its upper edge to

said horizontal strip member inwardly of said vertical strips, said panel being of sufficient width to cover the space between said strip member and brace member, and a door section covering the space between said brace member and the floor of the car, said lower section including a plurality of horizontal panels formed of paper or the like and adapted to be secured at their ends to the car door posts.

11. An upper door section for a door of the character described which comprises a unit embodying a horizontal strip member having its opposite ends adapted to be secured to the opposite sides of the doorway of the car, a horizontal panel formed of paper or the like having its upper edge secured to said strip member, and vertical strip members disposed along the outer surface of said panel and having one of their ends secured to said strip member and the other of their ends projecting freely beyond the adjacent edge of said panel.

12. In a door of the class described, a lower door section comprising a horizontal brace member having a longitudinal slot therein with its ends adapted to be secured to the opposite sides of the doorway of the car, a plurality of vertical brace members adapted to be secured at one end of the floor of the car and having their other ends engaged in the slot of said horizontal brace member, a pair of paper or the like horizontal panels disposed inwardly of said vertical brace member and below said horizontal brace member, said panels having their adjacent edges disposed in overlapping relation with the lower edge of the uppermost panel disposed inwardly of the upper edge of the lowermost panel, and strip members disposed over the ends of said panels and adapted to be secured to the sides of the car doorway, said strip members constituting the sole support for said panel members.

13. A grain door adapted for use with a railway car having a floor and a doorway defined by upright door posts, which comprises an upper horizontal wooden strip member having its opposite ends adapted to be secured to the car door posts, another horizontal strip member spaced a comparatively short distance below the first strip member and having its ends adapted to be secured to the car door posts, said second strip member having a longitudinal slot, a single panel formed of paper or the like disposed between and closing the space between said horizontal strip members, said panel having its upper edge secured to said uppermost strip member, a pair of horizontal panels formed of paper or the like adapted to cover the space between said second strip member on the floor of the car, said pair of panels being of such width that their adjacent edges are disposed in overlapping rela-

tion, vertical strip members disposed along the ends of said pair of panels and adapted to be secured to the car door posts for securing said pair of panels in position in the doorway, and means disposed along the outer surfaces of all said panels for bracing the same against grain pressures, which includes a pair of vertical members secured at one end to said first horizontal strip and having their other ends engaged in the slot of said second strip member, and other vertical members having their lower ends adapted to be secured to the floor of the car and their upper ends received in the slot of said second strip member, all of said strip members being formed of a lightweight wood material and all said panels and members being free and unattached except at the points specifically stated.

14. A grain door adapted for use with a railway car having a floor and a doorway defined by upright door posts which comprises a pair of horizontal panels of less overall width than the height of the doorway formed of paper or the like material disposed side by side, said panels being arranged with their adjacent side edges disposed in substantially overlapped relation, means by which the opposite ends of said panels are adapted to be secured to the car door posts, said means constituting the sole means for fixedly attaching the panels to the car, means disposed along the outer surfaces of said panels and transversely of the overlapped edges thereof for bracing said panels against outward grain pressure, and reinforcing means formed along the uppermost edge of the upper panel and along the lowermost edge of the lower panel for preventing bulging of such edges without attachment thereof when grain pressures are applied thereto.

15. A grain door adapted for use with a railway car having a floor and a doorway defined by upright door posts which comprises a pair of horizontal panels formed of paper or the like material disposed side by side and closing a substantial part of the car doorway, said panels having their adjacent side edges disposed in overlapping relation, means by which the opposite ends only of said panels are adapted to be attached to the car door posts, means vertically disposed along the outer surfaces of said panels for bracing the same against outward grain pressure, the upper edge of the uppermost panel and the lower edge of the lowermost panel being provided with integral flanges folded upon themselves at substantially right angles to the plane of the panel providing unattached reinforced edges adapted to prevent bulging of such edges out of the plane of the panel when grain pressures are applied thereto.

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