Feb. 9, 1943. J. M. MOON 2,310,860

RAILWAY CAR GRAIN DOOR

Filed July 2, 1941

Fig. 1.

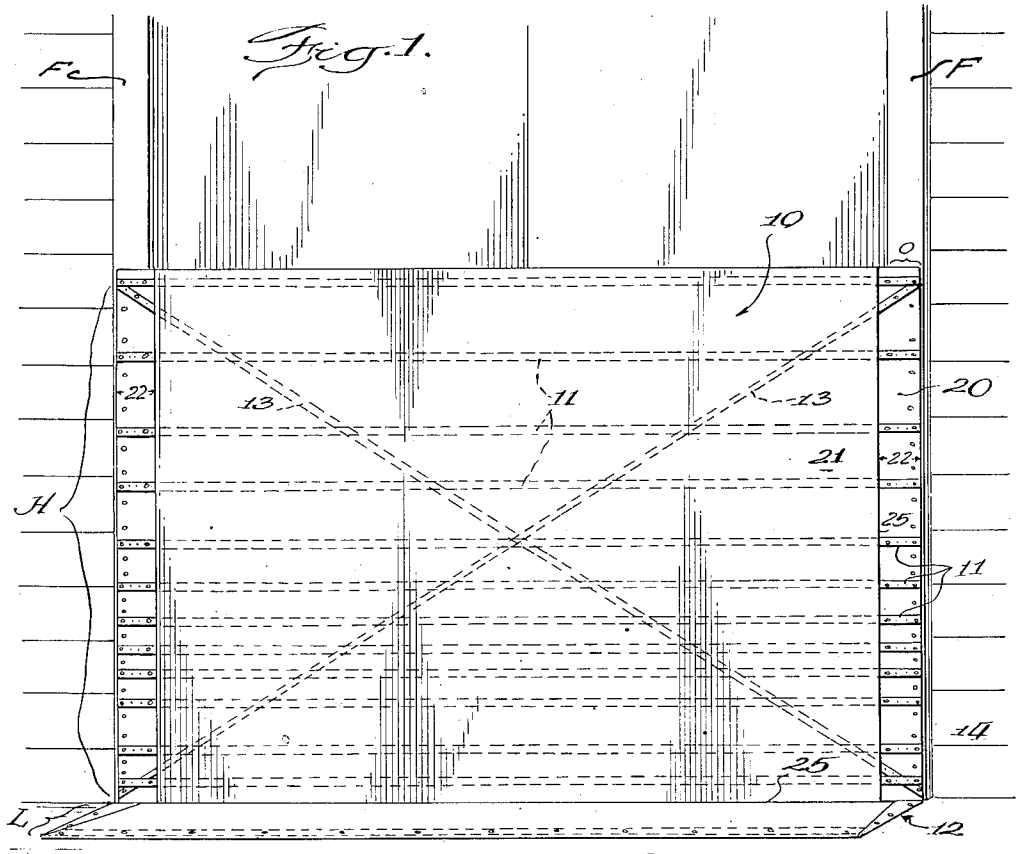


Fig. 2

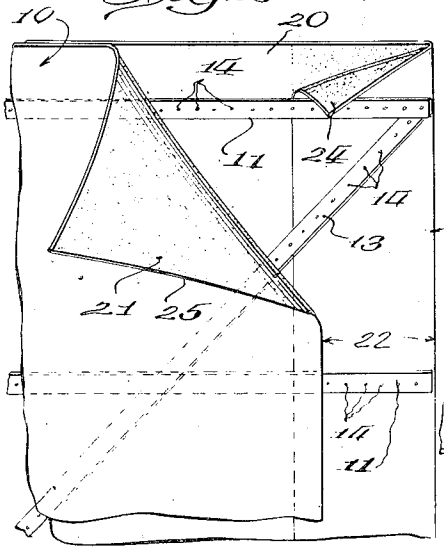
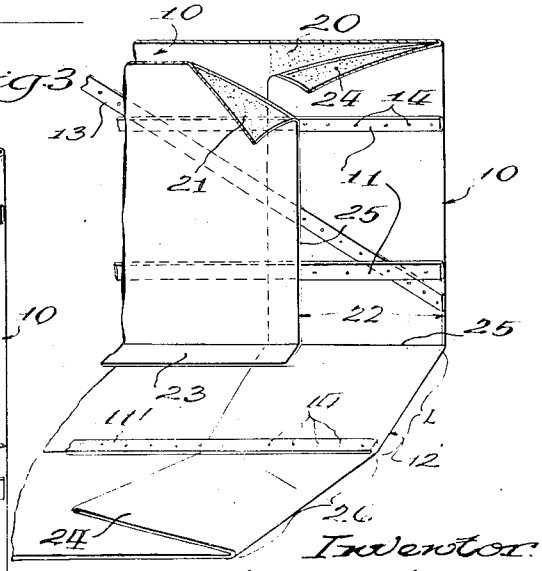


Fig. 3



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RAILWAY CAR GRAIN DOOR

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Application July 2, 1941, Serial No. 400,740

2 Claims. (Cl. 20—27)

My invention relates to what are commonly called railway car "grain doors."

Its principal objects are:

To provide a prefabricated bulkhead or "grain door" that may be quickly, reliably and easily applied in place across a car doorway to retain grain and other dry but flowable material shipped in bulk—such as salt, soda ash, cement and the like—keep it away from the car door and insure against leakage.

To provide such a door that is inexpensive to produce so that it economically may be discarded after one use.

To provide an improved grain door of the paper or fabric type.

To prevent the downward drag on paper or fabric grain doors occasioned by the formation of pockets therein—i. e., to prevent the formation of pockets in which the grain or the like can lodge and thereby exert a downward, and cumulatively increasing, drag upon the fabric of the door.

Other objects and advantages will hereinafter appear.

The invention will be shown and described as embodied in a door particularly adapted for grain.

In the accompanying drawing:

Fig. 1 is an elevation of the inside of a railway car doorway showing my improved prefabricated grain door in position;

Fig. 2 is an enlarged view of a portion of the upper right hand corner of the door showing in greater detail the arrangement of fabric and supporting straps; and

Fig. 3 is a similar view of a portion of the lower right hand corner of the door.

In general the door consists of a unitary structure including a bulkhead closure panel 10 of paper or other fabric of the desired strength and character, a plurality of transverse metal straps 11 which may be more or less tightly tensioned across the car doorway and anchored at opposite ends to the doorway frame or car side walls to retain the closure panel in place and resist the outward thrust of the bulk load, and an apron 12 which hinges along the lower edge of the closure panel so that it may overlie and be secured to the car floor. In order to attain the best results, particularly if it is desirable that the door be rather high, the unit may be fabricated to include diagonally arranged metal straps 13 which are likewise adapted to be anchored to the car doorway side frames near the top corners of the panel. Such diagonal straps serve to assist the horizontal straps in resisting the outward thrust of the load and they likewise serve to counteract the tendency of the fabric to bulge outwardly and create pockets in which the bulk material may collect and exert an objectionable downward drag upon the fabric.

Because of availability, cheapness, strength, tightness and all around desirability, I prefer to make the door panel and apron of a fairly good grade of kraft paper; 16 point 42# when employed double ply has been found to give good results for grain loads. Cold rolled steel strap ¾ inch x .020 has been found to give good results generally for the horizontal and diagonal anchoring and supporting straps. Preferably the strap material is provided with regularly spaced holes 14 along its median line—say ½ inch apart and of a size to accommodate ordinary six penny cement coated nails—to facilitate the nailing thereof to the doorway frames or side walls and, where they lie within the area of the superimposed plies, to promote more complete adhesion between the plies of fabric and to anchor the strips in place. It is to be understood, of course, that these specifications for the fabric and strapping are recommendatory only and that for some commodities and under some conditions different materials and specifications may be preferable.

The door panel and apron may be formed of two sheets or plies of fabric 20 and 21. Sheet 20, which will be termed the lower sheet, is cut to proper size to afford the desired height H, lateral overlap O beyond the sides of the doorway, and length of apron L to overlie the floor to the desired extent. This lower sheet should, preferably be cut enough larger than the finished door to enable edges to be folded back as will be later described. Upper sheet 21 is cut smaller than the lower sheet 20 so as to leave along each lateral edge of the former an uncovered margin 22 at which opposite ends of the supporting straps are exposed as clearly shown in all figures. In the vertical direction the upper ply is cut shorter than the lower ply so as to afford only a narrow flap 23 to overlie the apron. The horizontal supporting straps 11 should be cut to length to bridge the doorway from side to side and at least partially overlie the side frames F and if desired, also some of the side wall. The diagonal straps 13 should be cut to length to overlie a doorway side frame, preferably at a top corner region of the finished panel, and to extend diagonally from that upper corner region down to the region of the opposite lower corner as shown most clearly in Fig. 1. The horizontal and diagonal supporting straps are located between the plies of fabric and the plies of fabric are glued, cemented or otherwise firmly made to adhere together, preferably throughout their confronting surfaces. I have found that silicate of soda or "water glass" is a satisfactory adhesive. In this manner the plies not only reinforce each other to better advantage but also they retain the straps in the desired relation and position and afford better distribution of load therebetween. When, as preferred, the straps are perforated at frequent intervals the adhesive penetrates therethrough

to bond the plies together within the strap area and securely anchor the straps against longitudinal movement relative to the fabric.

In fabricating or assembling a door unit, the marginal edges 24 of the lower ply of fabric are folded back and secured down to the body, to form two thickness margins therealong throughout the height of the panel and the length of the apron, as shown clearly in Figs. 2 and 3. I prefer that each folded over portion 24 should be wide enough so that it may be overlaid by the corresponding marginal edge 25 of the upper ply 21. Next the horizontal supporting straps 11 may be laid in the desired position in spaced relation across the lower ply 20, the ends of the straps registering with the edges of that ply; and the diagonal straps 13 laid down to overlie the horizontal straps. The two plies 20 and 21 are now glued or cemented together face-to-face throughout. Finally the extreme edge flap 26 of the apron portion of the lower ply 20 is folded over upon the body portion 12 of the apron and over the flap 23 and cemented there throughout so as to provide a two thickness apron—both thicknesses, however, being composed of material of the lower ply 20. Preferably a horizontal strap 11' is located so as to lie closely within the line of fold between the body and flap portions 26 of the apron so as to provide a nailing strip throughout a little more than the width of the car doorway whereby the apron may be readily nailed at intervals to the car floor to prevent material leaking out under the door. Now by bending the door along the horizontal line 25 the apron may be set at an angle to the body of the door closure panel so as to overlie the car floor for ready nailing thereto and thereby provide a tight joint between the door and the car floor.

I have discovered that, in order to provide an adequately strong and effective door for grain and similar bulk material, the spacing of the horizontal straps need not be uniformly such as to withstand the maximum outward thrust of the load. Thus, particularly toward the top, the spacing between straps may safely be greater than toward the bottom of the door because the outward thrust of the load is less toward the top. I have discovered, however, that the greatest outward thrust of bulk material, such as grain, is not at the very bottom of the doorway but, depending upon the angle of repose and the friction between the lower layers of the load and the car floor, the greatest outward thrust comes some distance above the bottom of the doorway. For this reason I prefer that the smallest spacing of the horizontal straps be ordinarily from about one foot to 18 inches above the lower edge of the door for a four foot high door. For most practical purposes it may be considered that the maximum outward thrust, and consequently the smaller spacing, should occur about one third of the door height from the bottom of the door.

In applying my improved prefabricated unitary door, the unit is placed across the doorway on the inside of the car with its upper edge located somewhat above the level the load will assume and opposite ends of the upper supporting strap are nailed to the side frames of the car doorway and, if desired, also to the car side wall. If the diagonal straps are employed, the upper ends thereof should also be nailed to the side frames of the car doorway. The workman then proceeds from the top downwardly nailing each horizontal strap in the position determined by its location in the panel. When the car floor is reached, the workman bends the door along the hinge line 25, presses the apron down against the floor and secures it there by nailing along and through the apron-edge strap 11'.

The application of the door is facilitated by the fact that it is all in one unit and can be positioned and secured in place as such. The exposure of the perforated ends of the horizontal and diagonal straps renders the proper application of the attaching nails an easy matter.

The plies of the fabric panel and apron reinforce each other so that the wall formed thereby is not readily broken or perforated, the horizontal straps resist the thrust of the load by tension and, because the plies adhere to each other throughout and firmly retain the horizontal and diagonal straps in their allotted positions, the load is admirably distributed therebetween. The diagonal straps serve to resist the tendency of the fabric to bulge or pocket outward, particularly in the regions just above the horizontal straps and to resist the tendency to sag under the downward thrust or weight of the load, and thereby obviate the formation of wrinkles and pockets. Such pockets have been found in many instances to be highly disadvantageous because grain or other bulk material settling in them exert a downward pull upon the fabric of the door with the result that the pockets or wrinkles increase in size, more of the bulk material lodges in them and thus the tendency to tear the fabric is cumulative.

Having thus illustrated and described the preferred embodiment of my invention, what I claim and desire to secure by United States Letters Patent is as follows:

1. A unitary prefabricated car doorway closure bulkhead comprising a closure panel of a size transversely to bridge the doorway and overlie the side frames thereof and consisting of two superimposed and pasted together plies of fabric, and a plurality of horizontally spaced perforated metallic straps extending transversely across the panel between plies and in positions fixed by the adhesion of the plies to each other, one of the plies being transversely short of the other ply along both vertical edges of the panel so as to expose certain perforations in the opposite ends of the straps to facilitate attachment thereof to the doorway side frames.

2. A unitary prefabricated car doorway closure bulkhead comprising a closure panel of a size transversely to bridge the doorway and overlie the side frames thereof and consisting of two superposed and pasted together plies of fabric, and a plurality of horizontally spaced perforated metallic straps extending transversely across the panel between said plies and in positions fixed by the adhesion of the plies to each other, one of said plies being transversely short of the other ply along both vertical edges of the panel so as to expose certain perforations in the opposite ends of the straps to facilitate attachment thereof to the doorway side frames, and the other of said plies being folded upon itself so as to be of double thickness along the vertical edges of the panel.

JOHN M. MOON.