

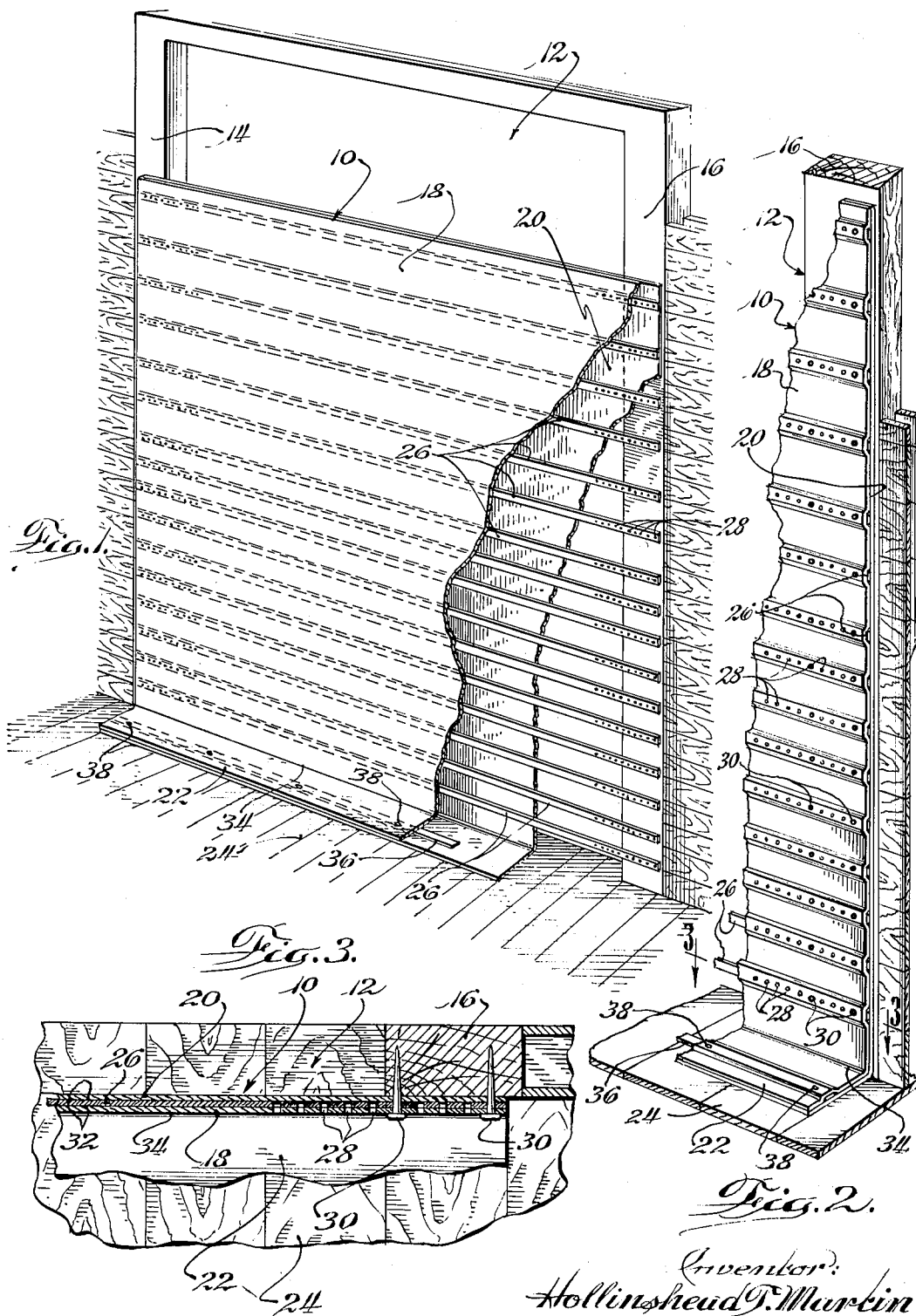
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METHOD OF MAKING GRAIN DOORS

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1

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METHOD OF MAKING GRAIN DOORS

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2 Claims. (Cl. 154—118)

This invention relates to grain doors, that is, doors which are temporarily secured across the doorway opening of a carrier, such as a railway car, to retain therein, and to prevent leakage therefrom, loads of granular material.

The class of grain doors to which the invention pertains is exemplified by the patents to Herbert Corkran, No. 2,116,260, dated May 3, 1938, and John M. Moon, No. 2,310,860, dated February 9, 1943. Such doors are intended for but a single use and are destroyed and thrown away when removed from the carrier. Consequently, it is of utmost importance that the cost of fabricating the grain doors be kept as low as possible while providing a door which may be quickly secured to the inside of the doorway frame of the carrier.

Such doors are prefabricated and usually comprise two or more plies of impervious fabric material, which may be waterproofed, with cross or transverse metallic reinforcing straps between two of the plies. The plies of fabric and the straps are permanently bonded together by a suitable adhesive, and the doors are cut to widths slightly greater than the widths of the carrier's doorway. Since these carriers are fitted with conventional—usually sliding—doors at their outer faces, the grain doors must be secured to the inner faces of the doorway frame to allow proper closing of the main car doors.

As grain and other spoilable granular material are customarily shipped in closed carriers—as, for example, box cars—the interiors of which are dark and unlighted, certain problems are encountered in nailing the grain doors to the doorway frame. It is not easy to drive the securing nails through the laminated paper reinforcing strap, and much waste of time and material accompanies nailing to the doorway frame a perfectly plain or imperforate grain door reinforced by imperforate strap. Furthermore, nails driven through the strap off the center and near the edges weaken the strap and even cause it to tear particularly when subject to a load. These difficulties can be overcome by perforating the strap, but when the perforated strap is bonded between plies of imperforate fabric of suitable weight the perforations are covered and cannot be detected. Locating them also produces an undesirable waste of time and material; also it has been found that the workmen installing the doors will not take the time to locate the hidden strap perforations. Various expedients have been suggested for indicating the location of the perforations, but none of them have proven entirely satisfactory. It is of course obvious that the strapping and enclosing plies cannot be perforated through, even adjacent the sides of the doors, because these perforations would allow the granular material to leak through the grain door and defeat its purpose.

It is a principal object of the present invention to provide a new and improved grain door which affords an excellent indicia for locating the nail holes through the metallic cross straps and which may be manufactured on conventional laminating or combining machines.

Another object is to provide a new and improved grain door which overcomes the above described disadvantages

2

of the prior doors and which may be manufactured at less cost than the prior art doors.

Another object is to provide a new and improved grain door which can be economically manufactured in a number of heights and widths to fit known standard carrier doorway sizes.

And a further object is to provide a new and improved prefabricated grain doorway which may be manufactured at low cost so that the door may be economically discarded after a single use.

Another object is to provide a new and improved prefabricated grain door which may be manufactured from webs of imperforate fabric material and from imperforate strap which during the manufacturing process are bonded together, selectively perforated, and cut to suitable doorway widths.

Still another object is to provide a novel method of prefabricating the new and improved grain door of this invention.

Other objects and advantages will become apparent from the following description taken in conjunction with the accompanying drawing in which:

Fig. 1 is a perspective view of the grain door of the present invention installed in a railway car with portions of the inner and outer fabric plies broken away to illustrate the construction of the door;

Fig. 2 is an enlarged fragmentary perspective view of one end of the grain door showing the manner in which the door is nailed to the doorway frame; and

Fig. 3 is an enlarged cross sectional detail view taken along the line 3—3 of Fig. 2, looking in the direction of the arrows.

The grain door of the present invention, indicated generally by the reference character 10, is illustrated as installed in a railway car partially to close a doorway 12 defined in part by a pair of side posts 14 and 16 to which the grain door 10 is nailed. The grain door bridges the doorway 12 to the desired load height and overlaps the side posts 14 and 16 to which it is nailed by an amount sufficient to insure an adequate number of nails through the door and into the post to retain the door against the load within the car. In some installations it is preferred to protect the top edge of the door against damage by loading and unloading machinery by means of a head strip nailed across the doorway at the top of the grain door. Also in some installations a foot strip is nailed across the doorway at the bottom of the grain door. These strips have been omitted from the illustrations for purposes of clarity, and their use is optional and well known in this art.

The grain door 10 consists of two plies of fabric material, an inner ply 18 and an outer ply 20. These plies of fabric material may be made of a suitable relatively inexpensive material such as paper. It will be observed from the drawing that the inner and outer plies are substantially coextensive. If the doors are made on a continuous combining machine the width of the plies is made the height of the grain door plus whatever may be needed for an apron 22 which is nailed to the floor 24 of the railway car. The other dimension of the plies—that is in doorway width direction—is such as to bridge the doorway and overlap the side posts 14 and 16 sufficiently to enable the grain door to be nailed thereto. Inasmuch as carriers, such as railway cars, are produced with doorways of known standard widths, the prefabrication of these grain doors in standard sizes is readily accomplished and a particular size grain door will fit all doorways of a particular size and width.

Interposed between the inner and outer fabric plies 18 and 20 are a series of vertically spaced transversely extending metallic reinforcing straps 26. These straps are substantially as long as the door panels are wide

and are spaced sufficiently to afford the necessary load resisting qualities without undue expense and weight. Usually the spacing can be increased gradually from a region at or near the bottom of the door 10 toward the top. In the door which is illustrated in the drawings 5 and which from top to bottom measures six feet, the spacings of the reinforcing straps at the bottom are about four inches, and the spacings are increased to approximately six inches at the top of the door. These spacings 10 and the door size are given merely by way of example and not limitation.

For railway car grain doors, fabric plies of kraft calendered finish paper in thickness approximately .010", having a linear strength of about 130 pounds per inch 15 of width and a cross-machine strength of about 50 to 55 pounds per inch, and reinforcing straps 26 of 3/4" by .020" cold rolled mild steel have been found in practice to give uniformly satisfactory results.

The inner and outer plies 18 and 20 and the spaced flexible metallic reinforcing straps 26 interposed there- 20 between are made to cling to each other by bonding them together into a unitary whole with a thin layer of suitable adhesive 32 such as asphalt.

As seen most clearly in Fig. 3, the inner ply 18 and each of the metallic reinforcing straps 26 are provided 25 with a series of perforations 28 adjacent the vertical edges of the grain door panel. These perforations extend through only the inner ply 18 and the straps 26 and do not extend through the outer fabric ply 20. Thus, the door as a whole is imperforate and no grain can leak 30 or sift through it. The perforations 28 are located adjacent the edges of the door panel and extend inwardly therefrom in rows along the reinforcing straps 26, a typical row containing about ten perforations spaced about 3/4" on centers. This arrangement of perforations 28 35 insures, when the door panel is held against the inside of a doorway frame, that at least a part of the perforations lie across the faces of the side posts 14 and 16. Since the perforations cut through the inner ply and the straps they are readily visible as the black asphalt adhesive contrasts sharply with the light color of the paper and of course the holes are easily found by the sense of touch. Because the perforations in the straps are un- 40 covered the installing workmen can tension nail the grain door in place with nails 30—such as 8d. nails. In tension nailing the nails are introduced into the perforations 28 and used as prys to apply a slight tension to the straps to insure that the grain door 10 is properly 45 stretched across the doorway opening 12. As both edges of the door are provided with more perforations than actually necessary for an installation, each size of grain door 10 can accommodate small variations in the width of the doorway 12.

The door 10 is provided with a flap or apron 22 which is folded upwardly along a score line 34. When the door 50 is rolled for shipping the flap may be folded flat against the face of the inner ply 18. The apron 22 is reinforced by a metallic strap 36 and is provided with a series of spaced perforations (18 to 20 inches on centers) along its entire length, the perforations extending only through 55 the inner ply 18 and the strap 36. When the door is installed in a carrier the apron 22 is laid against the floor, and nails 38, similar to the nails 30, driven through the perforations, secure the apron to the floor thereby providing a seal against under the door leakage of the granular material being transported.

The grain door of this invention may be made by first bonding the straps 26 and 36 to one face, the inner face, of the inner ply 18 and then perforating the inner 60 ply and the strapping by a suitable punch, such as a gang punch. After the straps 26 and 36 and the inner ply 18 have been perforated as shown and described, the outer ply 20 is then bonded to the inner ply and to the straps. The bonding of the outer ply 20 to the straps 26 and 36 and inner ply 18 which have been perforated 65

covers all the perforations at the outer face of the door but leaves the perforations 28 and those in the apron 22 on the inner face of the door exposed so that a work- 5 man installing the door in a railway car or other carrier can see the perforations by the contrast in color between the asphalt visible in the hole and the paper or can feel the nail holes with the nail point or his fingers, insert the nail through the nail hole and against the outer ply, stretch the door by using the nail as a pry, and then 10 drive the nail until it is seated and holds the grain door firmly against the doorway post or the car floor.

If the grain door is made on a machine which is continuous in its operation, then the plies of fabric 18 and 20 are fed in continuous webs and the imperforate strap- 15 ping 26 is fed from rolls or coils of strapping between the plies. First the strapping 26 and 36 is bonded to the inner ply 18 by the asphalt adhesive and at predetermined spaced intervals approximately twenty holes are punched through the inner ply 18 and each of the straps 26, and the inner ply 18 and strap 36 are punched with a plu- 20 rality of approximately equally spaced holes. Then the outer ply 20 is bonded to the perforated inner ply 18 and strapping 26 and 36 and the traveling web of bonded plies and perforated strapping are cut transversely across the web to form the doors 10 of proper width, the trans- 25 verse cut being through the center of the group of nail holes 28 so that each completed door is provided with a series of approximately ten holes through the inner ply 18 and strapping 26 adjacent its vertical edges.

From the foregoing description it is clear that the grain door of this invention is inexpensive to manufacture and may readily be installed in a carrier such as a railway car and its installation made even though the car interior be quite dark. In this specification the term "grain door" has been used as a matter of convenience 30 in describing the door which is adapted to retain all kinds of granular material, and no limitation of the invention or the uses of the door is intended.

While a preferred embodiment of the door constituting this invention has been shown and described, it will be apparent that modifications and variations thereof may be made without departing from the underlying principles of the invention. It is, therefore, desired by the follow- 40 ing claims to include within the scope of the invention all such variations and modifications by which substantially the result of this invention may be obtained through the use of substantially the same or equivalent means.

What is claimed as new and desired to be secured by United States Letters Patent is:

1. The method of prefabricating load retaining doors which comprises bonding together a plurality of spaced metallic reinforcing straps and a first imperforate ply of fabric material, selectively perforating the metallic 45 straps and the first ply simultaneously, and bonding a second and imperforate ply to the perforated first ply and straps so as to enclose the straps between the plies.

2. The method of prefabricating load retaining doors which comprises continuously feeding a pair of webs of imperforate fabric material and a plurality of metallic reinforcing straps therebetween, bonding the straps to one of said webs, selectively perforating said one web and the reinforcing straps simultaneously, bonding the second web to said one web and the reinforcing straps so as to enclose the straps between the webs, and cutting the bonded fabric material and strapping into doorway 50 widths.

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