HINGE AND DOOR APPARATUS

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1 Claim

ABSTRACT OF THE DISCLOSURE

Hinge and door apparatus for the streamlined end of a railroad car in which doors swing out on an inclined axis from the vestibule of the car. Springs associated with hinge arms are effective initially to rotate the doors relative to the hinge arms in one direction to clear the door frame of the car. Upon bodily swinging movement of the doors and arms to an open position, springs rotate the doors in a counter direction relative to the arms to enable engagement of doors with a latching device.

It has been proposed to provide a railroad having a streamlined nose portion having bi-parting flush doors. In one mode of operation, the streamlined end of the car functions in an uncoupled state and the doors are in a closed flush arrangement with the end of the car. In this arrangement the outer surfaces of the door form a portion of the nose skin which accounts for the streamlined effect of the car. In another mode of operation the streamlined end of the car is coupled to the flat end of another car. In this latter arrangement the bi-parting vestibule doors bear against the front surfaces of the end panels of the car. With the doors so opened diaphragm apparatus contained within the vestibule may be extended out beyond the opened doors to make contact with the diaphragm of the flat ended car to which it is coupled. Due to the thickness of the doors, which are of non-planar configuration, special clearance difficulties have been encountered in positioning the doors between their closed position and their open positions.

It is an object of this invention therefore to provide improved hinge and door apparatus for the end of a railroad car which has advantages over prior art arrangements and which has greater ease of operation. For a better understanding of the present invention, together with other and further objects thereof, reference is had to the following description taken in conjunction with the accompanying drawings and its scope will be pointed out in the appended claims.

In the drawings, FIG. 1 is a three-quarter perspective view showing the streamlined or slant-nosed end of a railroad employing bi-parting doors and hinge apparatus, the latter being shown in their closed flush condition; FIG. 2 is a perspective view similar to FIG. 1 but showing the vestibule doors opened and bearing against the end panels enabling outward movement of diaphragm and face plate apparatus;

FIG. 3 is a vertical sectional view taken along the lines 3—3 of FIG. 1 and showing the non-planar configuration of the door;

FIG. 4 is a vertical sectional view taken along the lines 4—4 of FIG. 3 showing an interior view of the doors as viewed from within the vestibule;

FIG. 5A is a sectional action view taken along the lines 5A—5A showing the doors in their closed position, and with the resilient seal elements surrounding the door elements removed for clarity;

FIG. 5B is an action view similar to that shown in 5A, with one of the doors moved from its fully closed to a partial open position;

FIG. 5C is a further action view showing the door as it is moved in engagement with latching means to be secured in its open position;

FIG. 5D is an action view similar to that shown in FIG. 5C showing the door locked in place in its final open position.

Referring now to FIGS. 1 and 2 there is shown a railroad passenger car having the hinge and door apparatus of the present invention, which includes a pair of bi-parting doors 11, 12. The car is constructed with a streamlined nose end portion 13 having convergent planar panel surfaces 14, 15. In one state of operation of the car, in which the doors are closed as in FIG. 1, its streamlined or slant-nosed end functions in an uncoupled state. In another state of operation the doors of the car may be rotated to their open position, as seen in FIG. 2. This permits extension of diaphragm apparatus 17 from within the vestibule 18 into a position for working engagement with similar diaphragm apparatus of another car not shown. Certain features of the diaphragm apparatus 17 are described and claimed in the copending application for patents of Albert G. Dean and Omar E. Preholm entitled "Retractable Vestibule Enclosure," Ser. No. 701,361 filed Jan. 29, 1968, and assigned to the same assignee as the present application.

With reference now to FIGS. 3, 4 and 5 it will be noted that the two bi-parting doors 11, 12 are substantially symmetrical about the center longitudinal axis of the car. Door 11 differs from its opposite door 12 in that the former includes a window W. In all other respects the operation of the two doors are identical and accordingly the discussion hereinafter will concern itself with door 11, its being understood that the operation of door 12 is the same. As observed in FIG. 3 the door 11 is of non-planar configuration having an upper portion 11a and lower portion 11b, the upper portion 11a being contained in a plane which is convergent with respect to the lower portion 11b. When the doors are closed as seen in FIG. 1 the upper planar surfaces 11a, 12a are coplanar with planar surfaces 14 of the end of the car and similarly surfaces 11b, 12b are coplanar with panel surfaces 15. As seen in FIGS. 3, 4, 5, the doors 11, 12, are supported by upper and lower hinge assemblies 21, 22 carried by an upright shaft 23. The latter shaft is inclined slightly rearward at the top from the vertical and is journaled for rotation by means of upper and lower bearing brackets 24, 25 respectively which in turn engage the collar 26. The upper hinge assembly 21 is similar to the lower hinge assembly 22 and includes a dished hinge member 28 received within a suitable aperture 29 within the skin 30, see FIG. 5. A hinge arm 31 is pivotally secured to the recessed member 29 by means of a hinge pin 33. The other end of the bowed hinge arm 31 is suitably keyed to the upright shaft 23 so that the arm and shaft rotate in unison, as seen in FIG. 5 the door includes inner and outer vertically disposed channel members 34, 35 which serve to space the inner skin 30 from the external skin panels 11a, 11b.

As seen in FIGS. 3 and 4 the vestibule 18 of the car as defined by a ceiling panel 40 which is supported by a transverse frame 41 and a floor panel 42 having a threshold plate 43 extending between the collision posts 26. The upper inboard edge of the door includes a pin latch assembly 45 which engages the transverse frame 41 and a similar lower pin latch assembly 46 which engages the threshold plate 43. In addition upper and lower latch assemblies 47 are incorporated along the outboard edge of the door to engage the side framing. Each latch assembly 47 includes a pivotal arm 48 which engages a keeper plate 49 affixed to the central vertical flange of collision post 26. When the aforementioned pin latches 45, 46 are disengaged from the frame 41, and threshold, and the
lever arms 48 of the upper and lower side latches 47 are disengaged from their respective keeper plates 49 each door may be swung open forwardly and aside to provide a clear opening in front of the vestibule. This will enable the aforementioned dish shaped flange member 26. The other end of said spring means 51 due to its compression tends to rotate the door 11 about pivot pin 36 in a clockwise direction as shown in FIG. 5B. The free rotation of the door 11 about the axis is resisted by virtue of the lower end of the door engaging the threshold member 43. The action due to first spring 51 fulcrums the door about its inner edge 34 and as a result causes both the door 11 and the gooseneck arm 31 to rotate about the shaft 23. This action is indicated in the full line position of the door as indicated in FIG. 5B. It is seen that the door 11 rotates in a counter-clockwise direction relative to the axis of pivot 33 as indicated by the arrow B. In this position of the door the outside edge as indicated by the channel member 35 carrying seal member 57 has been swung clear of the collision post 26. Thereafter both the door 11 and the gooseneck hinge arms 31, upper and lower, may be bodily moved in rotation about the axis of shaft 23 to follow the locus B—B.

When the door 11 and gooseneck arm 31 have been rotated in bodily movement to assume the position as shown in FIG. 5C second spring means 58 causes thereupon a clockwise rotation of the door about the pivot 36. As indicated by the arrow C in this position the door 11 bears an acute angle with the front panel face 15 of the nose of the car. It will be noted that the outside skin 15 of the car carries a door support 59 having an offset tongue 60. The inside skin surface 30 of the door 11 carries a wedge support 61 which defines a groove or opening 62. As the door is rotated about the shaft 23 the tongue 60 is caused to enter the latter groove 62. Thereafter the operator upon grasping the outer edge of the door as at 54 may fulcrum the door about the pivot hinge 33 until the door assumes the full line position as indicated in FIG. 5D. In this latter position the spring 58 is completely compressed. In this last named position the door may be suitably secured or locked in its open position. For this purpose as seen in FIG. 4 upper and lower pin brackets 61, 62 each having upstanding pins 63 are provided along the inside edge of each door. In addition link members 65 having a suitable bore 66 at one end, are enabled to slide vertically on shaft 23. A second bore 67 is provided in the opposite end of the link. The link 65 may be first moved axially of shaft 23 and then rotated from its phantom line position to its full line position to cause the pin 63 to be engaged in the bore 67 of the link.

Referred again to FIG. 5A it is noted that a space exists between the side edge of the door as at 35 and the edge of the collision post 26 of the nose structure of the car. This space must be sealed from wind, rain and weather when the car is traveling at high speed. In order to prevent entry of the weather and elements a seal of suitable elastomeric material is provided as indicated by reference numeral 70 which is positioned between the side edge of the door and the collision post. This seal extends around the top and bottom edges of the door. An additional seal 70a is provided along the inner edge of the door and affixed to channel element 34.

The seal 70 per se in cross-section includes a mushroom or T shaped head 71 extending from a central web 72 affixed to the side channel 55 of the door. The T shaped head overlaps the front marginal edge 15 of the nose of the car and defines a margin of the skin 19 of the door. The seal 70 further includes at its inner end a U shaped portion as at 73. The free end of the U is indicated at 74 extends toward the head of the seal. With the door in its closed position the free arm 74 is deflected inwardly toward the central stem 72 of the seal thereby achieving a loaded marginal edges of the skin with the side of the collision post. Since the seal extends around the door similar sealing engagement is achieved at the top and also at the bottom with the aforementioned tapered threshold plates as at 45.

From the foregoing it can be appreciated that when the door 11 is in its closed position as shown in FIG. 5A the first spring means 51 enables a counter-clockwise rotation of the door about pivot pin 33 thereby providing a minimal drag on the seals. Thereafter the door 11 and hinge arms 31 may be swung completely about the axis of shaft 32 to assume the position shown in FIG. 5C. Thereafter the second spring 58 functions to permit entry of the door wedge 61 with the door support 59.

While there has been described what is present is considered the preferred embodiment of this invention it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is aimed in the appended claim to cover all such changes and modifications as fall within the scope of the invention.

What is claimed is:

1. A hinge and door apparatus for a railway car having a nose portion with a front surface and frame means set back therefrom defining a doorway vestibule opening comprising door means received in said opening, shaft means secured to said frame means, spaced hinge arm means each connected at one end to said shaft and each extending at its other end to carry said door means, pivot means connecting said other ends of said hinge arms to said door means, said pivot means being located intermediate the side edges of said door means, first and second spring means flanking said pivot means, said hinge arm means being curved and of a length to swing said door means forward of said front surface of said car from a closed to an open position, said first spring means cooperating with said hinge arm means in the closed position of the door means to rotate the said same about said pivot means in one direction, door support means secured to said front surface of said nose portion of said car, said support means defining a tongue portion offset from said front surface, said door means further including an inner skin surface, wedge support means secured to said inner skin surface and having a portion offset therefrom to define a groove, said second spring means engaging said hinge arm means in the open position of said door means and being effective to rotate the same in an opposite direction about said pivot means to facilitate reception of said tongue portion of said support means into said groove.

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