

Description

Field of the invention

The present invention relates to an emergency exit apparatus for a train car which comprises a hinged door portal frame pivotally supported on a wall of the car, a hinged door pivotally supported on the portal frame on a vertical hinge axis on a side edge of the door for pivotal movement from a closed to an open position and stepping means for providing a ramp as an emergency exit from the car. At the time when an emergency occurs in an enclosed structure from which people make entrance or exit such as the rolling stock of a subway, an elevated train, etc., such an apparatus makes it possible for passengers to escape to a railroad track when it is dangerous and difficult for them to escape from the entrance and exit doors provided on the side of the cars, and which is provided at the head of the cars.

Brief description of the drawings

Fig. 1 is a cross-sectional view of a conventional emergency exit which also serves as a through passage;

Fig. 2 is a cross-sectional view of a conventional emergency exit of the outwardly-opening type;

Figs. 3 to 7, inclusive, show an embodiment of the invention, in which

Fig. 3 is a cross-sectional view of the essential parts;

Fig. 4 is an explanatory drawing of said embodiment used as a through passage;

Fig. 5 is an explanatory drawing of said embodiment used as an emergency exit apparatus;

Fig. 6 is a perspective view illustrating a specific example of the state of the through passage; and

Fig. 7 is a perspective view illustrating a specific example of the state of the emergency exit apparatus;

Figs. 8 to 10, inclusive, show an embodiment of the invention, in which

Fig. 8 is a cross-sectional view of the essential parts of the emergency exit apparatus;

Fig. 9 is an explanatory drawing of said apparatus being used as a through passage;

Fig. 10 is an explanatory drawing of the said apparatus being used as an emergency exit.

Background of the invention

As an emergency exit apparatus at the head of a car, there are generally known a type in which a hinged door 1 is opened and a ladder 2 is lowered, as is shown in Fig. 1, and a type in which a hinged door 3 falls outwardly with its lower edge being axially supported by a support 4 and the inner surface of the hinged door 3 is used as an emergency staircase, as shown in Fig. 2.

In the former case, when cars are linked together, it is possible for the opening made by the hinged door 1 to perform the function of a through passage. As an apparatus for stepping down to the track, however, it is only possible for a simple ladder or something of that sort to be installed because of the problem of space, etc.

Furthermore, in order for this type of apparatus to perform a through passage, it is necessary to constantly store the ladder at a separate place. Consequently, there is no guarantee that this type of ladder will be effectively used in the sort of panic which can occur during an emergency. Hence, this type of emergency exit apparatus has disadvantages in terms of time required for installation and safety at the time of escaping to the track.

In the latter case, on the other hand, the apparatus can be constructed with the inner surface of the hinged door as a stepping board which can be made into a rigidly constructed staircase or slope as an apparatus for stepping down to the track. However, there is a drawback in that the apparatus cannot be used as a through passage when cars are linked together.

US-A-4 216 725 discloses a combination door and emergency stairway exit which comprises a door unit being a built-up member composed of a stairway, a door frame and an inner door. In an emergency case the door frame remains in its closed position in the opening of the wall, the stairway member is pivoted outwardly to provide a ramp for the emergency exit, and the inner door is opened. According to this structure, the stairway opening in the emergency case is smaller as in case the device is used as a door which may be harmful when people rush thereto in an emergency case.

Summary of the invention

The present invention was devised in view of the aforementioned situation, and an object of the invention is to provide an apparatus that will resolve the shortcomings of the prior art by simple means which can be used as a through passage when it is placed between cars, and which will, when placed at the head of a train, serve as a gentle staircase or slope as an emergency exit, permitting the passengers to step down to the track safely and promptly. In particular, the exit opening in the emergency case should at least be equal to the opening in the normal case in which the device is used as a door. These aims are achieved by an emergency exit apparatus having the features of the patent claim.

The arrangement of this invention is as follows: A hinged door portal frame which is axially supported at its lower edge and swings open outwardly is provided on a required front wall surface of the structure from which people make entry or exit. The hinged door portal frame is provided with a hinged door which is capable of opening inwardly or outwardly. The emergency exit apparatus is adapted so that the inner surface of the hinged door will form a staircase or slope when the hinged door portal frame, together with the hinged door, is swung open. Alternatively, a hinged door portal frame which is inwardly or outwardly openable is provided on a required wall surface of the structure from which people make entry or exit, and a hinged door which swings open outwardly with its lower edge being

pivotally supported is provided on the inner side of the hinged door portal frame. The emergency exit apparatus is adapted so that its inner surface will form a staircase or slope when the hinged door is swung open outwardly.

Detailed description of the preferred embodiments

Referring next to Figs. 3 to 10, preferred embodiments of the present invention will be described in detail. Figs. 3 to 7, inclusive, show a first embodiment of the invention. Likewise, Figs. 8 to 10, inclusive, show a second preferred embodiment of the invention. First, description will be made of the first preferred embodiment of the invention with reference to Figs. 3 to 7. As shown in Fig. 3, a hinged door portal frame 13 with its lower edge pivotally supported by means of a horizontal shaft 12 is openably installed in a through passage for communication formed at the end of a car body 11, so that the hinged door portal frame 13 will swing open outwardly. Additionally, a hinged door 14 is installed on the inner side of this hinged door portal frame 13 in such a way that the hinged door 14 will open inwardly or outwardly by means of a vertically arranged hinge structure 15. Furthermore, a slope (not shown) provided with a staircase 16 or a slip-proof platform is installed on the room-side of the hinged door 14, so that people can walk safely on it. A locking device 17 locks the hinged door portal frame 13 to the car body 11.

In cases in which the car is disposed midway within the length of a train, the apparatus can be used as a through passage by leaving the hinged door frame 13 locked onto the car body 11 by means of the locking device 17 and making only the hinged door 14 openable, as shown in Fig. 4.

On the other hand, in cases in which the car is disposed at the head of a train and the apparatus is used as an emergency exit, the inner surface of the hinged door 14 serves as a staircase or slope so as to form an emergency exit passage. This is effected by releasing the lock of the locking device 17 and pushing down outwardly the hinged door portal frame 13 together with the hinged door 14. At this juncture, safety can be further improved if a lifting rope 18 is connected between the car body 11 and the hinged door portal frame 13 and is used as a railing.

The cross-sectional configuration of the hinged door portal frame 13 is made into a T shape, a sealing rubber 19 is interposed between the hinged door portal frame 13 and the hinged door 14 and between the hinged door portal frame 13 and the car body 11, respectively, so as to prevent the entry of rain water or wind. Figs. 6 and 7 show specific examples of the aforementioned preferred embodiment.

Next, a second embodiment of the invention will be described with reference to Figs. 8 to 10. In Fig. 8, a hinged door portal frame 13a is openably installed on a car body 11a by means of a hinged structure 15a. A hinged door 14a is installed on the inner side of the hinged door portal frame 13a,

so that the hinged door 14a will swing open outwardly by means of a horizontal hinge 12a. In addition, a slope (not shown) provided with a staircase 16a or a slip-proof platform is installed on the inner side of this hinged door 14, and the apparatus is arranged such that people will be able to walk on it safely when the hinged door 14a is swung open outwardly. A locking device 17a locks the hinged door portal frame 13a and the hinged door 14a.

When the car is located midway within the length of a train, the apparatus can be used as a through passage by inwardly opening the hinged door portal frame 13a together with the hinged door 14a. When the apparatus is used as an emergency exit at the head of a train, an emergency exit passage is formed as the internal surface of this hinged door 14a becomes a staircase 16a or a slope by swinging open the hinged door 14a downwardly. At this juncture, safety can be further increased if a lifting rope 18a is connected between the door portal frame 13a and the hinged door 14a and is used as a railing. In addition, a sealing rubber 19a similar to the one mentioned above may be used as a means for preventing the entry of rain water or wind.

In the cases of both the first and second preferred embodiments, the hinged door described was an inwardly-opening type, but it is also possible to employ an outwardly-opening type to the extent that it will not cause any hindrance to the coupling operation. In this case, the means of the hinged door should not be confined to that described in the preferred embodiments, since it is also possible to employ such means as splitting the door into two sections or more like French doors or using a folded-door structure.

Since the present invention has the aforementioned arrangement, it is possible to make use of the respective advantages of the emergency doors of the conventional inwardly-opening, through-passage type and the outwardly-opening type and to resolve the disadvantages thereof, as well as to render the functions of a through passage and an emergency exit apparatus compatible by means of one opening mechanism. Therefore, the apparatus according to the present invention possesses outstanding features since it can be used as a normal through passage when used midway within the length of a train as a safe emergency exit to the track when used at the head of a train.

Claim

An emergency exit apparatus for a train car, comprising a hinged door portal frame (13) pivotally supported on a wall of the car,

a hinged door (14) pivotally supported on said portal frame on a vertical hinge axis (15) on a side edge of said door for pivotal movement from a closed to an open position and stepping means (16) to provide a ramp for emergency exit from the car,

pivotally supported is provided on the inner side of the hinged door portal frame. The emergency exit apparatus is adapted so that its inner surface will form a staircase or slope when the hinged door is swung open outwardly.

Detailed description of the preferred embodiments

Referring next to Figs. 3 to 10, preferred embodiments of the present invention will be described in detail. Figs. 3 to 7, inclusive, show a first embodiment of the invention. Likewise, Figs. 8 to 10, inclusive, show a second preferred embodiment of the invention. First, description will be made of the first preferred embodiment of the invention with reference to Figs. 3 to 7. As shown in Fig. 3, a hinged door portal frame 13 with its lower edge pivotally supported by means of a horizontal shaft 12 is openably installed in a through passage for communication formed at the end of a car body 11, so that the hinged door portal frame 13 will swing open outwardly. Additionally, a hinged door 14 is installed on the inner side of this hinged door portal frame 13 in such a way that the hinged door 14 will open inwardly or outwardly by means of a vertically arranged hinge structure 15. Furthermore, a slope (not shown) provided with a staircase 16 or a slip-proof platform is installed on the room-side of the hinged door 14, so that people can walk safely on it. A locking device 17 locks the hinged door portal frame 13 to the car body 11.

In cases in which the car is disposed midway within the length of a train, the apparatus can be used as a through passage by leaving the hinged door frame 13 locked onto the car body 11 by means of the locking device 17 and making only the hinged door 14 openable, as shown in Fig. 4.

On the other hand, in cases in which the car is disposed at the head of a train and the apparatus is used as an emergency exit, the inner surface of the hinged door 14 serves as a staircase or slope so as to form an emergency exit passage. This is effected by releasing the lock of the locking device 17 and pushing down outwardly the hinged door portal frame 13 together with the hinged door 14. At this juncture, safety can be further improved if a lifting rope 18 is connected between the car body 11 and the hinged door portal frame 13 and is used as a railing.

The cross-sectional configuration of the hinged door portal frame 13 is made into a T shape, a sealing rubber 19 is interposed between the hinged door portal frame 13 and the hinged door 14 and between the hinged door portal frame 13 and the car body 11, respectively, so as to prevent the entry of rain water or wind. Figs. 6 and 7 show specific examples of the aforementioned preferred embodiment.

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When the car is located midway within the length of a train, the apparatus can be used as a through passage by inwardly opening the hinged door portal frame 13a together with the hinged door 14a. When the apparatus is used as an emergency exit at the head of a train, an emergency exit passage is formed as the internal surface of this hinged door 14a becomes a staircase 16a or a slope by swinging open the hinged door 14a downwardly. At this juncture, safety can be further increased if a lifting rope 18a is connected between the door portal frame 13a and the hinged door 14a and is used as a railing. In addition, a sealing rubber 19a similar to the one mentioned above may be used as a means for preventing the entry of rain water or wind.

In the cases of both the first and second preferred embodiments, the hinged door described was an inwardly-opening type, but it is also possible to employ an outwardly-opening type to the extent that it will not cause any hindrance to the coupling operation. In this case, the means of the hinged door should not be confined to that described in the preferred embodiments, since it is also possible to employ such means as splitting the door into two sections or more like French doors or using a folded-door structure.

Since the present invention has the aforementioned arrangement, it is possible to make use of the respective advantages of the emergency doors of the conventional inwardly-opening, through-passage type and the outwardly-opening type and to resolve the disadvantages thereof, as well as to render the functions of a through passage and an emergency exit apparatus compatible by means of one opening mechanism. Therefore, the apparatus according to the present invention possesses outstanding features since it can be used as a normal through passage when used midway within the length of a train as a safe emergency exit to the track when used at the head of a train.

Claim

An emergency exit apparatus for a train car, comprising a hinged door portal frame (13) pivotally supported on a wall of the car,

a hinged door (14) pivotally supported on said portal frame on a vertical hinge axis (15) on a side edge of said door for pivotal movement from a closed to an open position and stepping means (16) to provide a ramp for emergency exit from the car,



characterized in that
said portal frame (13) is supported on a horizontal hinge axis (12) on a lower edge of said portal frame (13) for pivoting open outwardly of the car, and

said stepping means (16) is carried on a surface of said hinged door (14) facing inwardly of the car to provide said ramp upon said portal frame (13) pivoting to an open position outwardly of the car.

Patentanspruch

Notausgangsvorrichtung für einen Wagen eines Zuges mit einem drehbaren Türrahmen (13), der schwenkbar an einer Wand des Wagens aufgehängt ist,

einer drehbaren Tür (14), die schwenkbar an dem Türrahmen mit einer vertikalen Drehachse (15) am Rand der Tür für eine Drehbewegung aus einer geschlossenen Stellung in eine offene Stellung aufgehängt ist, und mit

einer stufenförmigen Einrichtung (16), die eine Rampe für den Notausgang aus dem Wagen bereitstellt,

dadurch gekennzeichnet, daß der Türrahmen (13) an einer horizontalen Drehachse (12) am unteren Rand des Türrahmens (13) aufgehängt ist, um nach außen aus dem Wagen aufzuschwenken, und

daß die stufenförmige Einrichtung (16) auf einer Fläche der drehbaren Tür (14) gehalten ist, die zur Innenseite des Wagens zeigt und die Rampe bildet, wenn der Türrahmen (13) aus dem Wagen heraus in einer offenen Stellung geschwenkt wird.

Revendication

Dispositif d'évacuation d'urgence pour une voiture de train, comprenant un portique (13) de support d'une porte articulée, ledit portique (13) étant monté pivotant sur une paroi de la voiture, une porte articulée (14) montée pivotante sur ledit portique le long d'un axe d'articulation vertical (15) situé sur un côté de la porte pour un mouvement pivotant entre une position fermée et une position ouverte, et des moyens (16) formant marches pour constituer une rampe d'évacuation d'urgence de la voiture, caractérisé en ce que le portique (13) est supporté à sa base par un axe d'articulation horizontal (12) pour pivoter dans le sens de l'ouverture vers l'extérieur de la voiture, et en ce que les moyens (16) formant marches sont supportés sur la surface de la porte articulée (14) faisant face à la voiture pour que la rampe formée par les marches supportées par le portique (13) pivote en une position d'ouverture vers l'extérieur de la voiture.

