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(54) **Railway vehicle buffer and high-speed railway vehicle provided with such buffer**

Schienenfahrzeugpuffer und Hochgeschwindigkeits-Eisenbahnfahrzeug mit einem solchen Puffer

Tampon pour véhicule ferroviaire et véhicule ferroviaire à grande vitesse muni d'un tel tampon

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## Description

The present invention is related to railway vehicle buffers, of the type comprising a buffer casting intended to be fixed to one headstock of the vehicle and a hollow buffer stem slidably supported by the buffer casting and carrying a buffer end plate.

In railway vehicles the buffer end plate is traditionally fixed rigidly to the buffer hollow stem and projects from the vehicle headstock permanently, i.e. even in the case the vehicle is not to be coupled with other railway carriages and the presence of the buffer is not strictly necessary.

In the case of buffers applied to the front headstock of a high-speed train, this constitutes a disturbing element both in connection to the travelling aerodynamic performances of the train, and as far as the aesthetical profile thereof is concerned.

A solution for overcoming the above drawback consists in connecting the buffer end plate to the buffer stem detachably, so as to allow removal thereof whenever its presence is not necessary. Disassembly must be carried out manually and therefore, considering the weight and size of the buffer plate, this operation is uncomfortable and fatiguing, requires a long working time and involves the need of providing for a suitable store onboard the vehicle for containing the removed buffer plates.

Another known solution, particularly suitable for the vehicle front headstock, consists of employing an auxiliary fairing releasably applied so as to cover the buffers. Even this solution is however unpractical and has the same drawbacks, as far as the applications and removal operations of the auxiliary fairing are concerned, previously mentioned in connection with the detachable buffer plates.

It has also been proposed to connect the whole buffer to the vehicle structure in a swingable way, i.e. such to allow complete rotation thereof into a position substantially parallel to the vehicle headstock. This solution involves problems of encumbrance of the buffers in the rotated condition, and above all completely suppresses the protective action of elastic absorption thereof in case of accidental collision of the vehicle.

The object of the present invention is to provide a buffer of the type defined at the beginning, which is adapted to take, in a constructively simple and functional way, starting from the normal working position, a rest position in which it does not negatively affect the aerodynamic characteristics of the vehicle on which it is applied, in the same time safeguarding its elastic absorption effectiveness in the case of accidental collision.

According to the invention, this object is achieved by virtue of a railway vehicle buffer of the above-specified type, the main feature of which resides in that the buffer end plate is rotatably connected to the buffer stem so as to be displaceable between an extended working position and a retracted rest position.

According to a preferred embodiment of the invention, the connection between the buffer plate and the buffer stem comprises a pair of studs of which one defines the axis of rotation of the buffer plate between the said extended and retracted position, and the other is constituted by a releasable latch.

Preferably but not necessarily, the axis of rotation of the buffer plate is vertical, whereby in the retracted position the buffer end plate is positioned aside the buffer casting-stem assembly.

Displacement of the buffer end plate from the extended working position to the retracted rest position, and viceversa, can be comfortably operated manually, or alternatively a suitable servomechanism can be provided.

The advantages deriving from the configuration of the buffer according to the invention are essentially as follows:

- adaptation of the railway vehicle headstocks (and in particular the front headstock) to the aerodynamic needs of travel of the vehicle alone;
- easy convertibility from the working position to the rest position, and viceversa, without any need of transferring by hand the buffer end plate;
- absence of large fairings to be removed from the headstock fairing of the vehicle in case of coupling with other railway carriages;
- buffer always ready to protect the vehicle in case of any accidental collision.

The invention is further related to a high-speed railway vehicle provided with a pair of buffers according to the above, attached in spaced correspondence to at least one headstock thereof, which may also be provided with an aerodynamic fairing. The vehicle according to the invention is mainly characterized in that the said fairing is provided, in frontal correspondence of each buffer, with movable sections adapted to be removed so as to allow projection of the buffer plate outwardly in the extended working position, and to be re-applied when the buffer plate is returned in the retracted position within the fairing.

The invention will now be described in detail with reference to the annexed drawings, provided purely by way of non limiting example, wherein:

figure 1 is a diagrammatic perspective view of a portion of a railway vehicle provided with a pair of buffers according to the invention, shown in the extended working position,  
figure 2 is a horizontally sectioned view in an enlarged scale along line II-II of figure 1,  
figure 3 is a vertical sectioned view in an enlarged scale along line III-III of figure 2, and  
figure 4 is a view similar to figure 1, with the buffers shown in the retracted rest position.

Referring initially to figure 1, reference T designates the front headstock of a high-speed railway vehicle, provided with an aerodynamic fairing C with two openings A formed in an inferior portion, through each of which a buffer end plate of a respective buffer 2 projects outwardly.

As it is shown in better detail in figure 2, each buffer 2 comprises, in a way generally known per se, a buffer casting 3 provided with a connecting flange 4 for the rigid fixing to the structure of the headstock T, and a hollow buffer stem 5 carrying the buffer end plate 1 and slidably supported by the buffer casting 3. Axial backing of the buffer stem 5 (and thus of the buffer end plate 1) relative to the buffer casting 3 enables, as is known, absorption of frontal impacts possibly transmitted during travelling by a railway carriage coupled ahead of the headstock T, or during manoeuvres of the vehicle. To such extent a conventional elastic dissipator system, not shown in the drawings, is interposed between the buffer stem 5 and the buffer casting 3, within the latter.

According to the invention, the buffer end plate 1 is not connected rigidly to the free end of the buffer stem 5, but rotatably between an extended working position, shown in figure 1 and in continuous lines in figure 2, and a retracted or folded rest position, shown in dotted lines in figure 2 and in figure 4.

As it can be better seen in figure 3, the structure of the buffer end plate 1 incorporates internally an upper plate 6 and a lower plate 7 between which a support body 8, mounted in the terminal portion 9 of the buffer stem 5, is inserted.

The connection between the two plates 6, 7 of the buffer plate 1 and the support body 8 of the buffer stem 5 is performed, in the case of the shown example, by means of a pair of vertical studs 10, 11 placed side by side and inserted through corresponding holes 6a, 7a, 8a and 6b, 7b and 8b of the plates 6, 7 and of the body 8, respectively.

The stud 10 is fixed, and the axis X thereof defines the pivot axis of the buffer plate 1 between the extended and the retracted positions.

The stud 11 defines on the other hand a releasable latch, and to this purpose it is provided at its upper end with a grip eye 12 and at its lower end with a radial stop pin 13, which can be pulled out in order to allow extraction upwardly of said stud 11.

In the extended working position the buffer plate 1 is placed on the prolongation of the buffer stem 5, with the stud 11 inserted through the holes 6b, 7b of the two plates 6 and through the hole 8b of the support body 8, and is projecting in front of the fairing C of the headstock T through the corresponding opening A. In such a position the buffer plate is able to receive and transmit to the buffer 2 any possible front impact.

In order to shift the buffer plate 1 into the retracted rest position it is sufficient to remove the stop pin 13 and withdraw the stud 11, acting on the grip eye 12, and then push the said buffer plate 1 inwardly with respect to the fairing C, rotating same around the axis X of the stud

10, so as to position it aside the buffer 2, such as shown in figure 2. This operation can be carried out manually, in an extremely easy way and with a minimum effort, or alternatively with the aid of servomechanisms (not shown since within the knowledge of the man skilled in the art), constituted for instance by electric or fluid pressure actuators.

In the retracted position the buffer plate 1 is fully housed within the fairing C and the relative opening A can be advantageously closed by applying a movable section S which completes the aerodynamic profile of the fairing C and is detachably secured thereto by any suitable means, such as screw locking members or the like.

In order to position again the buffer end plate 1 in the extended working condition it is simply necessary, after removing the movable section S, rotating same towards the starting position around the axis X and then inserting and locking the stud 11. Also this operation can evidently be carried out either by hand or by means of a servomechanism.

It is to be pointed out that, also in the retracted rest position of the buffer plate 1, the buffer 2 is in any case able to protect the railway vehicle from possible accidental collisions, through the push applied through the fairing C to the end 9 of the buffer stem 5.

Naturally the details of construction and the embodiments can be widely varied with respect to what has been disclosed and illustrated, without thereby departing from the scope of the present invention as claimed.

Thus for instance, the axis of rotation X of the buffer plate 1 could be placed differently from the vertical direction, i.e. could be oriented horizontally or even obliquely.

## Claims

1. Buffer (2) for railway vehicles, comprising a buffer casting (3) adapted to be fixed to one headstock (T) of the vehicle and a buffer hollow stem (5) slidably supported by the buffer casting (3) and carrying a buffer end plate (1), characterized in that the buffer end plate (1) is rotatably connected to the buffer stem (5) of the buffer (2) so as to be displaceable between an extended working position and a retracted rest position.
2. Buffer according to claim 1, characterized in that the connection between the buffer end plate (1) and the buffer stem (5) comprises a pair of studs (10, 11) one of which defines the axis of rotation (X) of the buffer plate (1) between the said extended and retracted positions, and the other is constituted by a releasable latch (11).
3. Buffer according to claim 2, characterized in that the said axis of rotation (X) of the buffer end plate (1) is oriented vertically.

4. Buffer according to any of the preceding claims, characterized in that it is provided with servomechanisms for operating the buffer end plate (1) between the said extended and retracted positions.
5. Railway vehicle, particularly a high-speed railway vehicle, characterized in that it is provided with a pair of buffers (2) according to any of the preceding claims attached in spaced correspondence to at least one headstock (T) thereof.
6. Railway vehicle according to claim 5, wherein the headstock (T) is provided with an aerodynamic fairing (C), characterized in that the said fairing (C) is provided, in frontal correspondence of each buffer (2), with a movable section (S) adapted to be removed so as to allow projecting outwardly of the buffer end plate (1) of the buffer (2) in the extended working position, and to be again applied when the buffer plate (1) is shifted into the retracted position within the said fairing (C).

#### Patentansprüche

1. Puffer (2) für Schienenfahrzeuge, wobei der Puffer ein Puffergehäuse (3), das an einem Fahrwerksrahmen (T) des Fahrzeugs befestigt werden kann, sowie einen hohlen Pufferstempel (5) besitzt, der vom Puffergehäuse (3) verschiebbar aufgenommen wird und eine Pufferendplatte (1) trägt, dadurch gekennzeichnet, daß die Pufferendplatte (1) mit dem Pufferstempel (5) des Puffers (2) drehbar verbunden ist, so daß sie zwischen einer ausgefahrenen Arbeitsstellung und einer eingefahrenen Ruhestellung auslenkbar ist.
2. Puffer gemäß Anspruch 1, dadurch gekennzeichnet, daß die Verbindung zwischen der Pufferendplatte (1) und dem Pufferstempel (5) ein Paar von Bolzen (10, 11) enthält, von denen einer die Drehachse (X) der Pufferplatte (1) zwischen der ausgefahrenen und der eingefahrenen Stellung bildet, und von denen der andere von einer freigebbaren Verriegelung (11) gebildet wird.
3. Puffer gemäß Anspruch 2, dadurch gekennzeichnet, daß die Drehachse (X) der Pufferendplatte (1) vertikal ausgerichtet ist.
4. Puffer gemäß irgendeinem der bisherigen Ansprüche, dadurch gekennzeichnet, daß der Puffer mit einer Servoeinrichtung versehen ist, um die Pufferendplatte (1) zwischen der ausgefahrenen und der eingefahrenen Stellung zu betätigen.
5. Schienenfahrzeug, im besonderen ein Hochgeschwindigkeits-Schienenfahrzeug, dadurch gekennzeichnet, daß das Schienenfahrzeug mit einem Paar von Puffern (2) gemäß irgendeinem der

bisherigen Ansprüche versehen ist, wobei die Puffer (2) an zumindest einem Fahrwerksrahmen (T) des Schienenfahrzeugs beabstandet befestigt sind.

6. Schienenfahrzeug gemäß Anspruch 5, wobei der Fahrwerksrahmen (T) mit einer aerodynamischen Verkleidung (C) versehen ist, dadurch gekennzeichnet, daß die Verkleidung (C) vor jedem Puffer (2) mit einem bewegbaren Teil (S) ausgestattet ist, der so aufgebaut ist, daß er entfernt werden kann, so daß die Pufferendplatte (1) des Puffers (2) in der ausgefahrenen Arbeitsstellung nach außen vorspringen kann, und daß er wieder angebracht werden kann, wenn die Pufferplatte (1) in die eingefahrene Stellung innerhalb der Verkleidung (C) geschoben ist.

#### Revendications

1. Heurtoir (2) pour véhicules ferroviaires, comprenant une gaine moulée (3) du heurtoir, créée pour être fixée à une tête du châssis (T) du véhicule et une tige creuse (5) du heurtoir soutenue, de manière coulissante, par la gaine moulée (3) du heurtoir et laquelle transporte une plaque terminale (1) du heurtoir, caractérisé par le fait que la plaque terminale (1) du heurtoir est reliée, en mode tournant, à la tige (5) du heurtoir (2) de manière à pouvoir se déplacer entre une position opérationnelle étendue et une position de repos reculée.
2. Heurtoir selon la revendication 1, caractérisé par le fait que la connexion entre la plaque terminale (1) du heurtoir et la tige (5) du heurtoir comprenant un ensemble de deux pivots (10, 11) dont l'un des deux définit l'axe de rotation (X) de la plaque (1) du heurtoir entre lesdites positions étendue et reculée, et l'autre est constitué d'un dispositif de fermeture (11) décrochable.
3. Heurtoir selon la revendication 2, caractérisé par le fait que ledit axe de rotation (X) de la plaque terminale (1) du heurtoir est orienté dans le sens vertical.
4. Heurtoir selon une revendication quelconque des revendications précédentes, caractérisé par le fait qu'il est doté de servo-mécanismes pour actionner la plaque terminale (1) du heurtoir entre lesdites positions étendue et reculée.
5. Véhicule ferroviaire, en particulier, un véhicule ferroviaire à grande vitesse, caractérisé par le fait qu'il est doté d'un ensemble de deux heurtoirs (2) selon une revendication quelconque des revendications précédentes, attachés en correspondance à une distance d'au moins une des ses têtes du châssis (T).

6. Véhicule ferroviaire selon la revendication 5, dans lequel la tête du châssis (T) est dotée d'un carénage aérodynamique (C), caractérisé par le fait que ledit carénage (C) est doté , en correspondance frontale avec chaque heurtoir (2), d'une section mobile (S), créée pour être retirée de manière à permettre à la plaque terminale (1) du heurtoir (2) de sortir vers l'extérieur dans la position opérationnelle étendue, et créée pour être appliquée de nouveau quand la plaque (1) du heurtoir se déplace, dans la position reculée, à l'intérieur dudit carénage (C).

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FIG. 1

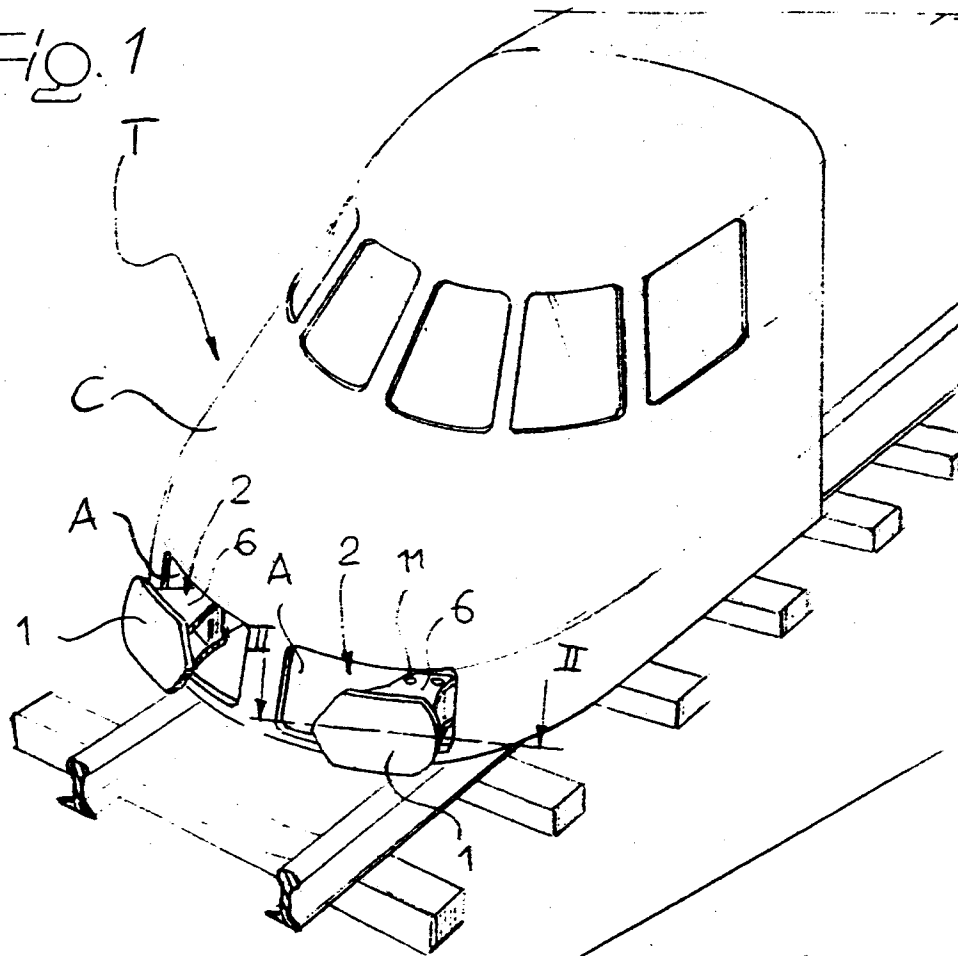


FIG. 4

