

(19)



(11)

EP 1 493 644 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
31.01.2007 Bulletin 2007/05

(51) Int Cl.:
B61F 5/34 (2006.01)

(21) Application number: **04253105.3**

(22) Date of filing: **26.05.2004**

(54) **Resilient damping friction wedge**

Reibungskeil zum Dämpfen mit elastischen Elementen

Coin amortisseur à frottement comportant des parties élastiques

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GR HU
IE IT LI LU MC NL PL PT RO SE SI SK TR**

(30) Priority: **29.05.2003 GB 0312276**

(43) Date of publication of application:
05.01.2005 Bulletin 2005/01

(73) Proprietor: **English Welsh & Scottish Railway
Holdings Limited
London
WC1V 7LW (GB)**

(72) Inventor: **Hewitt, Paul,
C/o Powell Duffryn Rail Limited
Cardiff CF15 7QZ (GB)**

(74) Representative: **Lamb, Richard Andrew
Urquhart-Dykes & Lord LLP
New Priestgate House,
57 Priestgate
Peterborough,
Cambs. PE1 1JX (GB)**

(56) References cited:
**US-A- 2 207 848 US-A- 3 517 620
US-A- 3 835 789 US-A- 4 953 471**

EP 1 493 644 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The invention relates to a friction wedge for use on a railway vehicle.

[0002] A number of vehicle designs include a pair of spaced apart side frames and a bolster that extends transversely between the side frames. Each side frame includes a pair of pedestals, each of which is supported, through suspension springs, upon an associated saddle. Friction wedges are used to dampen movement of each pedestal with respect to the associated saddle. Friction wedges are often generally triangular-shaped such that the friction wedge can act as a wedge between an inclined surface of the pedestal and a generally vertical wear plate on a column of the saddle. The friction wedge is wedged into engagement between the pedestal and the column of the saddle by a suspension spring. Resistance to sliding movement of the friction wedge with respect to the pedestal and the saddle, which in turn provides dampening of movement, is provided by the frictional forces generated between the friction wedge and the pedestal and saddle.

[0003] An example of such a vehicle design with a friction wedge damping arrangement is described in US-A-3,517,620.

[0004] It is thought that, for example under certain weather or atmospheric conditions, variations may occur in the frictional forces between the friction wedge and the associated surface of the pedestal giving rise to variations in the operation of the friction wedge to damp movement. Such variations are undesirable and it is an object of the invention to provide a friction wedge whereby such variations can be reduced or avoided.

[0005] According to the present invention there is provided a friction damping arrangement for a railway vehicle as described in accompanying claim 1, and further described in claims 2 to 11.

[0006] Where the railway vehicle is of the type comprising a pedestal supported by a saddle through suspension springs, the pedestal may form the first vehicle component and the saddle may form the second vehicle component.

[0007] The resiliently deformable component is secured to the first vehicle component. The resiliently deformable component is arranged such that all relative movement of the friction wedge requires deformation of the resiliently deformable component, or alternatively a limited amount of movement of the friction wedge may be permitted before such deformation occurs.

[0008] The provision of the resiliently deformable component ensures that, regardless as to weather or atmospheric conditions, the resistance to relative movement between the friction wedge and the first vehicle component falls within a predetermined acceptable range, and thus acceptable predictable damping of movement between the first and second vehicle components takes place.

[0009] The invention will further be described, by way

of example, with reference to the accompanying drawings in which:

Figure 1 is a partial cross-sectional view illustrating part of a railway vehicle incorporating a constant friction damping wedge; and

Figure 2 is an enlargement of the friction damping wedge of Figure 1.

[0010] Part of a railway truck 12 incorporating a friction wedge 18 of the present invention is shown in Figure 1. The truck 12 includes two side frames 14 (only part of one of which is shown) which are spaced apart and generally parallel to one another. Each side frame 14 includes a pair of pedestals 15, each pedestal 15 including a pair of inclined surfaces 24 defining therebetween a cavity into which part of a saddle 16 extends. Suspension springs 22 are carried by the saddle 16 and support the pedestal 15. Each saddle 16 co-operates with a wheelset of the vehicle, for example through appropriate rocker assemblies.

[0011] A friction wedge 18 is associated with each inclined surface 24, the friction wedge 18 being urged towards the associated surface 24 by at least some of the suspension springs 22.

[0012] The motion wedge 18 includes a body 30. As best shown in Figure 2, the body 30 is generally triangular or wedge-shaped. The body 30 includes a base 34 having a generally horizontal bottom wall 36. The bottom wall 36 is adapted to engage the top end of one of the suspension springs 22. The body 30 also includes a generally vertical front wall 37 including a front face 38, upon which a wear pad 39 is mounted. The body 30 also includes an inclined wall 40 that extends at an inclined angle of approximately 30° between the wall 36 of the base 34 and the front wall 37. The inclined wall 40 includes a generally planar surface 42. The body 30 includes a hollow chamber 44 and an aperture 46 in each side wall 47 of the body 30 that is in communication with the chamber 44.

[0013] Secured to the inclined surface 24 of the pedestal 15 is a resiliently deformable component 48. The component 48 comprises a metallic, for example steel, mounting plate 50 to which is bonded a layer 52 of a resiliently deformable, rubber-like material. A reinforcing layer 54 is bonded to the layer 52, and a further layer 56 of resiliently deformable material is bonded to the reinforcing layer 54. The layer 56 is further bonded to a second mounting plate 58 to which is secured a block 60. The block 60 projects through an opening 62 formed in the inclined wall 40 of the friction wedge 18.

[0014] In use, the friction wedge 18 is installed in a truck 12 as shown in Figure 1 such that a suspension spring 22 engages the wall 36 of the base 34, and such that the component 48 is located between the inclined surface 24 of the pedestal 15 and the surface 42 of the inclined wall 40 of the body 30. The spring 22 and the inclined surface 24 of the pedestal 15 thereby force the

wear pad 39 into abutting engagement with a wear plate 17 mounted upon the saddle 16. The wear pad 39 of the friction wedge 18 slides generally upwardly and downwardly in engagement with the wear plate 17 conjointly with and in response to upward and/or downward movement of the pedestal 15 relative to the saddle 16. The frictional force generated between the wear pad 39 and the wear plate 17 dampens the movement of the pedestal 15 relative to the saddle 16.

[0015] In use, in order to allow the movement of the axle which occurs, for example, when the vehicle passes around a curve, the saddle 16 is permitted to move longitudinally relative to the pedestal 15. Such movement requires the friction wedges 18 associated with the saddle 16 to move laterally, such movement requiring deformation of the associated components 48 and hence is damped in a reliable, predictable manner.

[0016] It will be appreciated that the resilient layers 52, 56 will apply a predictable biasing force to the friction wedge 18 against which such movement occurs. In the prior art arrangements in which the component 48 is not provided and the friction wedge bears directly against the pedestal, there is a risk of ice crystals forming on the pedestal which may reduce the friction between the components, or in other contaminants achieving a similar effect, which may impair the damping operation of the friction wedge.

[0017] Although in the arrangement described hereinbefore all movement of the friction wedge requires deformation of the component 48, this need not be the case and arrangements are possible in which a degree of movement of the friction wedge is permitted before deformation of the component 48 occurs. This may be achieved by making the opening 62 in the friction wedge larger than the block 60 so that the component 48 is deformed only after sufficient longitudinal movement of the friction wedge has occurred to bring the edge of the opening 62 into contact with the block 60.

[0018] In either case, the component 48 is preferably designed to be of high stiffness in the vertical direction.

[0019] Although the description hereinbefore is of the use of the invention in connection with a specific design of railway vehicle, it will be appreciated that the invention may be used in other applications and this application covers the use of the invention in such applications.

Claims

1. A friction damping arrangement for a railway vehicle (12) comprising first (15) and second (16) relatively moveable vehicle components, the arrangement comprising:-

a friction wedge (18) having a first surface (38) arranged to co-operate with a surface (17) of the second vehicle component (16), and a second inclined surface (40) resiliently urged towards

an inclined surface (24) of the first vehicle component (15); and

a resiliently deformable component (48) located between the inclined surface (24) of the first vehicle component (15) and the inclined surface (40) of the friction wedge (18),

characterised in that the resiliently deformable component (48) is secured to one of the first vehicle component (15) or friction wedge (18) and engaged with the other of the friction wedge (18) or first vehicle component (15) to restrict relative movement between the resiliently deformable component (48) and the friction wedge (18) and the first vehicle component (15) in a direction parallel to the inclined surfaces (40,24) of the friction wedge (48) and first vehicle component (15) and such that relative movement of the friction wedge (18) and first vehicle component (15) parallel to the inclined surfaces (40,24) of the friction wedge (18) and first vehicle component (15) requires deformation of the resiliently deformable component (48).

2. An arrangement according to claim 1, wherein the railway vehicle (12) comprises a pedestal (15) supported by a saddle (16) through suspension springs (22), the pedestal (15) forming the first vehicle component (15) and the saddle (16) forming the second vehicle component (16).
3. An arrangement according to claim 2, wherein the saddle (16) supports a wheel set of the vehicle (12).
4. An arrangement according to claim 2 or 3, wherein the friction wedge (18) further includes a base surface (34,36), and the friction wedge (18) is resiliently urged towards the inclined surface (24) of the first vehicle component (15) by engagement of one of the suspension springs (22) with the base surface (34,36) of the friction wedge (18).
5. An arrangement according to any of the preceding claims, wherein the first surface (38) of the friction wedge (18) comprises a vertical surface which co-operates with a vertical surface (17) of the second vehicle component (16).
6. An arrangement according to any of the preceding claims, wherein a limited amount of movement of the friction wedge (18) relative to the first vehicle component (15) in a direction parallel to the inclined surfaces (40,24) of the friction wedge (18) and first vehicle component (15) is permitted before deformation of the resiliently deformable component (48) is required.
7. An arrangement according to any of the preceding claims, wherein the resiliently deformable compo-

ment (48) comprises a pair of layers (52,56) of a rubber or rubber-like material with a reinforcing layer (54) located therebetween.

8. An arrangement according to any one of the preceding claims, wherein the resiliently deformable component (48) includes a projection (60) arranged to extend into an opening (62) formed in one of the friction wedge (18) and the first vehicle component (15).
9. An arrangement according to claim 8, wherein the opening (62) and projection (60) are of substantially the same dimensions.
10. An arrangement according to claim 8, wherein the opening (62) is larger than the projection (60).
11. An arrangement according to any one of the preceding claims, wherein the resiliently deformable component (48) has a high stiffness in a direction perpendicular to the inclined surface (40) of the friction wedge (18) facing the first component (15).

Patentansprüche

1. Reibungsdämpfanordnung für ein Eisenbahnfahrzeug (12), das eine erste (15) und eine zweite (16) Fahrzeugkomponente umfasst, die relativ zueinander bewegt werden können, wobei die Anordnung umfasst:

einen Reibkeil (18) mit einer ersten Fläche (38), die zum Zusammenwirken mit einer Fläche (17) der zweiten Fahrzeugkomponente (16) eingerichtet ist, sowie einer zweiten, geneigten Fläche (40), die federnd auf eine geneigte Fläche (24) der ersten Fahrzeugkomponente (15) zu gedrückt wird; und
eine elastisch verformbare Komponente (48), die sich zwischen der geneigten Fläche (24) der ersten Fahrzeugkomponente (15) und der geneigten Fläche (40) des Reibkeils (18) befindet, **dadurch gekennzeichnet, dass** die elastisch verformbare Komponente (48) an der ersten Fahrzeugkomponente (15) oder dem Reibkeil (18) befestigt und mit dem Reibkeil (18) bzw. der ersten Fahrzeugkomponente (15) in Eingriff ist, um relative Bewegung der elastisch verformbaren Komponente (48) und des Reibkeils (18) sowie der ersten Fahrzeugkomponente (15) zueinander in einer Richtung parallel zu den geneigten Flächen (40, 24) des Reibkeils (18) und der ersten Fahrzeugkomponente (15) einzuschränken, so dass relative Bewegung des Reibkeils (18) und der ersten Fahrzeugkomponente (15) parallel zu den geneigten Flächen

(40, 24) des Reibkeils (18) und der ersten Fahrzeugkomponente (15) Verformung der elastisch verformbaren Komponente (48) erfordert.

2. Anordnung nach Anspruch 1, wobei das Eisenbahnfahrzeug (12) einen Untersatz (15) umfasst, der von einem Sattel (16) über Aufhängungsfedern (22) getragen wird, wobei der Untersatz (15) die erste Fahrzeugkomponente (15) bildet und der Sattel (16) die zweite Fahrzeugkomponente (16) bildet.
3. Anordnung nach Anspruch 2, wobei der Sattel (16) einen Radsatz des Fahrzeugs (12) trägt.
4. Anordnung nach Anspruch 2 oder 3, wobei der Reibkeil (18) des Weiteren eine Grundfläche (34, 36) enthält und der Reibkeil (18) durch Eingriff einer der Aufhängungsfedern (22) mit der Grundfläche (34, 36) des Reibkeils (18) elastisch auf die geneigte Fläche (24) der ersten Fahrzeugkomponente (15) zu gedrückt wird.
5. Anordnung nach einem der vorangehenden Ansprüche, wobei die erste Fläche (38) des Reibkeils (18) eine vertikale Fläche umfasst, die mit einer vertikalen Fläche (17) der zweiten Fahrzeugkomponente (16) zusammenwirkt.
6. Anordnung nach einem der vorangehenden Ansprüche, wobei ein begrenztes Maß an Bewegung des Reibkeils (18) relativ zu der ersten Fahrzeugkomponente (15) in einer Richtung parallel zu den geneigten Flächen (40, 24) des Reibkeils (16) und der ersten Fahrzeugkomponente (15) zugelassen wird, ehe Verformung der elastisch verformbaren Komponente (48) erforderlich ist.
7. Anordnung nach einem der vorangehenden Ansprüche, wobei die elastisch verformbare Komponente (48) ein Paar Schichten (52, 56) aus Gummi oder gummiartigem Material mit einer dazwischen befindlichen verstärkenden Schicht (54) umfasst.
8. Anordnung nach einem der vorangehenden Ansprüche, wobei die elastisch verformbare Komponente (48) einen Vorsprung (60) enthält, der so angeordnet ist, dass er sich in eine Öffnung (62) hinein erstreckt, die in dem Reibkeil (18) oder der ersten Fahrzeugkomponente (15) ausgebildet ist.
9. Anordnung nach Anspruch 8, wobei die Öffnung (62) und der Vorsprung (60) im Wesentlichen die gleichen Abmessungen haben.
10. Anordnung nach Anspruch 6, wobei die Öffnung (62) größer ist als der Vorsprung (60).
11. Anordnung nach einem der vorangehenden Ansprüche

che, wobei die elastisch verformbare Komponente (48) eine hohe Steifigkeit in einer Richtung senkrecht zu der geneigten Fläche (40) des Reibkeils (18) hat, die der ersten Komponente (15) zugewandt ist.

Revendications

1. Arrangement amortisseur à frottement pour un véhicule ferroviaire (12) comprenant des premier (15) et second (16) composants de véhicule relativement mobiles, l'arrangement comprenant :

un coin à frottement (18) ayant une première surface (38) disposée pour coopérer avec une surface (17) du second composant de véhicule (16), et une seconde surface inclinée (40) poussée élastiquement vers une surface inclinée (24) du premier composant de véhicule (15) ; et un composant déformable élastiquement (48) situé entre la surface inclinée (24) du premier composant de véhicule (15) et la surface inclinée (40) du coin à frottement (18),

caractérisé en ce que le composant déformable élastiquement (48) est fixé à l'un des premier composant de véhicule (15) ou du coin à frottement (18) et entre en prise avec l'autre du coin à frottement (18) ou du premier composant de véhicule (15) pour restreindre la mouvement relatif entre le composant déformable élastiquement (48) et le coin à frottement (18) et le premier composant de véhicule (15) dans une direction parallèle aux surfaces inclinées (40, 24) du coin à frottement (48) et du premier composant de véhicule (15) et de manière à ce que le mouvement relatif du coin à frottement (18) et du premier composant de véhicule (15) parallèle aux surfaces inclinées (40, 24) du coin à frottement (18) et du premier composant de véhicule (15) requiert la déformation du composant déformable élastiquement (48).

2. Dispositif selon la revendication 1, dans lequel le véhicule ferroviaire (12) comprend un piédestal (15) supporté par un chariot (16) via des ressorts de suspension (22), le piédestal (15) formant le premier composant de véhicule (15) et le chariot (16) formant le second composant de véhicule (16).
3. Dispositif selon la revendication 2, dans lequel le chariot (16) supporte un ensemble de roue du véhicule (12).
4. Dispositif selon la revendication 2 ou 3, dans lequel le coin à frottement (18) comprend en outre une surface de base (34, 36), et le coin à frottement (18) est poussé élastiquement vers la surface inclinée (24) du premier composant de véhicule (15) par l'entrée

en prise de l'un des ressorts de suspension (22) avec la surface de base (34, 36) du coin à frottement (18).

5. Dispositif selon l'une quelconque des revendications précédentes, dans lequel la première surface (38) du coin à frottement (18) comprend une surface verticale qui coopère avec une surface verticale (17) du second composant de véhicule (16).
6. Dispositif selon l'une quelconque des revendications précédentes, dans lequel une quantité limitée de mouvement du coin à frottement (18) par rapport au premier composant de véhicule (15) dans une direction parallèle aux surfaces inclinées (40, 24) du coin à frottement (18) et du premier composant de véhicule (15) est autorisée avant que la déformation du composant déformable élastiquement (48) soit nécessaire.
7. Dispositif selon l'une quelconque des revendications précédentes, dans lequel le composant déformable élastiquement (48) comprend une paire de couches (52, 56) d'un matériau caoutchouc ou similaire au caoutchouc avec une couche de renfort (54) entre les deux.
8. Dispositif selon l'une quelconque des revendications précédentes, dans lequel le composant déformable élastiquement (48) comprend une saillie (60) disposée pour s'étendre dans une ouverture (62) formée dans l'un des coins à frottement (18) et premier composant de véhicule (15).
9. Dispositif selon la revendication 8, dans lequel l'ouverture (62) et la saillie (60) ont sensiblement les mêmes dimensions.
10. Dispositif selon la revendication 8, dans lequel l'ouverture (62) est plus grande que la saillie (60).
11. Dispositif selon l'une quelconque des revendications précédentes, dans lequel le composant déformable élastiquement (48) a une grande rigidité dans une direction perpendiculaire à la surface inclinée (40) du coin à frottement (18) faisant face au premier composant (15).

