RESILIENT PROTECTOR TO PROTECT A STRUCTURE FROM AN IMPACT

ELASTISCHE SCHUTZVORRICHTUNG ZUM SCHÜTZEN EINER STRUKTUR VOR AUFRALL

PROTECTEUR ELASTIQUE POUR LA PROTECTION D’UNE STRUCTURE CONTRE UN IMPACT

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References cited:

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Description

Field of the Invention

The invention relates to a protecting apparatus for protecting structures from impact damage.

Background of the Invention

In many warehouses, goods are stored in racking systems and are accessed by fork lifts or other vehicles. The structural supports for such racking systems often become damaged because they are repeatedly impacted against by the fork lifts. Various protective devices have been developed in an attempt to prevent or at least limit damage to such structural supports.

FR 2 788 796 discloses a protective device to be installed on guard rails on the sides of roads for protecting motorcyclist. The protective device includes a bumper and a generally C-shaped centre part. Non-flexible struts extend between the bumper and the associated C-shaped centre part. The protective device is forced about an upright so that the generally C-shaped centre part engages about the upright. The generally C-shaped centre part defines an opening for receiving the upright.

Upon impact the protective device does not flex and expand again elastically, but rather gets permanently deformed.

The present invention seeks to provide an improved protecting apparatus which can be used to protect a wide variety of different structures.

Summary of the Invention

According to the present invention there is provided a protecting apparatus for protecting a structure from an impact, said protecting apparatus including a bumper member arranged in use to receive an impact force, a structure positioning member arranged to be positioned in contact with or adjacent to a portion of the structure, a first joining member joining a first end of the structure positioning member to a first end of the bumper member and a second joining member joining a second end of the structure positioning member to a second end of the bumper member so that said structure positioning member and said first and second joining members define an opening for receiving at least said portion of the structure and at least one resiliently flexible joining portion extending between said bumper member and said structure positioning member arranged so that when an outer surface of the bumper member is impacted said impact force is dissipated at least in part by flexure of said at least one joining portion.

The impact force may also be dissipated by flexure of said bumper member and/or the structure positioning member.

Preferably, each resiliently flexible joining portion adopts a tortuous path between the bumper member and the structure positioning member. The tortuous path is preferably curved so as to minimise any points of stress concentration along said path.

Preferably, the first and second joining members join to the bumper member and the structure positioning member at respective zones of connection so as to minimise stress concentrations in the protecting apparatus.

In accordance with a preferred embodiment of the invention, the first and second joining members each adopt a tortuous path between the respective ends of the positioning member and the bumper member. Preferably, the first and second joining members are resiliently flexible. The first and second joining members and the bumper member may be arranged to resiliently deflect to enable said portion of said structure to be received in said opening.

One end of the joining portion is preferably connected to the bumper member and the other end is preferably connected to the structure positioning member. Connection preferably occurs at a zone of connection as to minimise stress concentrations in the protecting apparatus. Stress concentrations are preferably minimised by curving the zones of connection.

Preferably, at or adjacent to each of the first and second ends of the bumper member is tongue. The tongue is arranged in use to contact the structure when it is located in the opening and to facilitate retention of the protector apparatus about said structure. A tongue may also be formed on each of the first and second joining members to further facilitate retention of the protecting apparatus about said structure.

The protecting apparatus may be arranged to be retained tightly on the structure (i.e. fixed in one position) or may be retained in a manner which allows it to be slid along a length thereof.

Preferably, the tongues are resiliently flexible and arranged so that they are deflected in order to receive the portion of the structure within the opening and, once the portion is located in the opening, arranged to engage against the structure.

As an alternative to the tongues or in addition thereto, a securing member may be provided to retain the protecting apparatus about said structure. The securing member may be a threaded member arranged to be screwed through the protecting apparatus and into the structure. A groove or slot may be provided in the protecting apparatus to receive the threaded member.

The bumper member is preferably configured so as to extend about a major portion of the structure so as to protect as much of the structure as possible.

The outer surface of the bumper member is preferably smooth and continuous.

The protecting apparatus is preferably formed from a wide variety of different structures.

Preferably, the first and second joining members join to the bumper member and the structure positioning member at respective zones of connection so as to minimise stress concentrations in the protecting apparatus.

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In accordance with a preferred embodiment of the invention, the first and second joining members each adopt a tortuous path between the respective ends of the positioning member and the bumper member. Preferably, the first and second joining members are resiliently flexible. The first and second joining members and the bumper member may be arranged to resiliently deflect to enable said portion of said structure to be received in said opening.

One end of the joining portion is preferably connected to the bumper member and the other end is preferably connected to the structure positioning member. Connection preferably occurs at a zone of connection as to minimise stress concentrations in the protecting apparatus. Stress concentrations are preferably minimised by curving the zones of connection.

Preferably, at or adjacent to each of the first and second ends of the bumper member is tongue. The tongue is arranged in use to contact the structure when it is located in the opening and to facilitate retention of the protector apparatus about said structure. A tongue may also be formed on each of the first and second joining members to further facilitate retention of the protecting apparatus about said structure.

The protecting apparatus may be arranged to be retained tightly on the structure (i.e. fixed in one position) or may be retained in a manner which allows it to be slid along a length thereof.

Preferably, the tongues are resiliently flexible and arranged so that they are deflected in order to receive the portion of the structure within the opening and, once the portion is located in the opening, arranged to engage against the structure.

As an alternative to the tongues or in addition thereto, a securing member may be provided to retain the protecting apparatus about said structure. The securing member may be a threaded member arranged to be screwed through the protecting apparatus and into the structure. A groove or slot may be provided in the protecting apparatus to receive the threaded member.

The bumper member is preferably configured so as to extend about a major portion of the structure so as to protect as much of the structure as possible.

The outer surface of the bumper member is preferably smooth and continuous.

The protecting apparatus is preferably formed from a wide variety of different structures.

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In accordance with a preferred embodiment of the invention, the first and second joining members each adopt a tortuous path between the respective ends of the positioning member and the bumper member. Preferably, the first and second joining members are resiliently flexible. The first and second joining members and the bumper member may be arranged to resiliently deflect to enable said portion of said structure to be received in said opening.

One end of the joining portion is preferably connected to the bumper member and the other end is preferably connected to the structure positioning member. Connection preferably occurs at a zone of connection as to minimise stress concentrations in the protecting apparatus. Stress concentrations are preferably minimised by curving the zones of connection.

Preferably, at or adjacent to each of the first and second ends of the bumper member is tongue. The tongue is arranged in use to contact the structure when it is located in the opening and to facilitate retention of the protector apparatus about said structure. A tongue may also be formed on each of the first and second joining members to further facilitate retention of the protecting apparatus about said structure.

The protecting apparatus may be arranged to be retained tightly on the structure (i.e. fixed in one position) or may be retained in a manner which allows it to be slid along a length thereof.

Preferably, the tongues are resiliently flexible and arranged so that they are deflected in order to receive the portion of the structure within the opening and, once the portion is located in the opening, arranged to engage against the structure.

As an alternative to the tongues or in addition thereto, a securing member may be provided to retain the protecting apparatus about said structure. The securing member may be a threaded member arranged to be screwed through the protecting apparatus and into the structure. A groove or slot may be provided in the protecting apparatus to receive the threaded member.

The bumper member is preferably configured so as to extend about a major portion of the structure so as to protect as much of the structure as possible.

The outer surface of the bumper member is preferably smooth and continuous.

The protecting apparatus is preferably formed from a wide variety of different structures.

Preferably, the first and second joining members join to the bumper member and the structure positioning member at respective zones of connection so as to minimise stress concentrations in the protecting apparatus.

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The bumper member, structure positioning member, first and second joining members and said at least one joining portion are preferably integrally formed. In accordance with an embodiment of the invention, the protecting apparatus is moulded, for example by injection moulding. However, the protecting apparatus may also be extruded. The protecting apparatus may be made from any suitable thermoplastic material or from a rubber.

The material from which the protecting apparatus is made is preferably selected with consideration to the environment in which it is to be used (e.g. extreme temperature environments, high u.v. ray environments, corrosive environments).

Description of the Drawings

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

- Figure 1 is a view of a structural support on which are located five individual protector apparatus in accordance with a first embodiment of the invention;
- Figure 2 is a plan view of one of the protector apparatus shown in Figure 1;
- Figures 3 and 4 are perspective views of the protector apparatus shown in Figure 2;
- Figure 5 is a plan view of a protector apparatus according to a second embodiment of the invention;
- Figure 6 is a plan view of the protector apparatus shown in Figure 5 attached to a structure;
- Figure 7 is a plan view of a protector apparatus according to a third embodiment of the invention; and
- Figure 8 is a plan view of the protector apparatus shown in Figure 7 attached to a structure.

Detailed Description of the Preferred Embodiments

Figure 1 illustrates five different protecting apparatus 10 located about a structural support 100 for a racking system. The protecting apparatus 10 are stacked one on top of the other so as to provide protection for a substantial portion of the length of the structural support 100.

Figure 2 illustrates one of the protecting apparatus 10 shown in Figure 1. As shown, the protecting apparatus 10 includes a bumper member 12 and a structure positioning member 14. As best illustrated by Figure 1, the structure positioning member 14 has an outer surface 14a which is arranged in use to be positioned in contact with or adjacent to a portion of the structural support 100.

The bumper member 12 and the structure positioning member 14 are joined by resiliently flexible joining portions 16. Two joining portions 16 are illustrated. However, it will be appreciated that varying numbers of joining portions 16 may be included. The joining portions 16 are formed so as to be resiliently flexible such that when an outer surface 12a of the bumper member 12 is impacted, the impact force is dissipated at least in part by flexure of the joining portions 16. The impact force may also be dissipated by flexure of the bumper member 12 and/or the structure positioning member 14.

When the impact force is very high, some or all of the joining portions 16 may be caused to fracture sacrificially in order to prevent damage to the structural support 100. Similarly, the bumper member 12 and/or the structure positioning member 14 may also be caused to fracture. In such an event, it would be advisable to replace the damaged protecting apparatus 10 with a new one so as to ensure continued protection of the structural support 100.

As best illustrated in Figure 2, each joining portion 16 adopts a tortuous path between the bumper member 12 and the structure positioning member 14. The tortuous path is preferably curved so as to minimise any points of stress concentration along the path. A tortuous path is adopted so as to better enable the joining portion 16 to accommodate impact forces. It will be appreciated that each resiliently flexible joining portion 16 acts like a spring between the bumper member 12 and the structure positioning member 14 when an impact force is applied.

One end of each joining portion 16 is connected to the bumper member 12 and the other end is connected to the structure positioning member 14. These respective connections preferably occur at a "zone" of connection (as opposed to a "point" of connection) so as to minimise stress concentration in these zones of the protecting apparatus 10. The zones of connection are preferably formed as smooth curves so as to thereby minimise stress concentrations.

The bumper member 12 has a first end 12b and a second end 12c. The ends 12b, 12c of the bumper member 12 are connected to the structure positioning member 14 by respective first and second resiliently flexible joining members 16a, 16b. As shown in Figure 2, the first and second joining members 18a, 18b and the structure positioning member 14 define an opening 20 in which the structural support 100 can be received.

Adjacent each end 12b, 12c of the bumper member 12 is a tongue 22. The tongues 22 are arranged in use to contact the structural support 100 when it is located in the opening 20 and to facilitate retention of the protecting apparatus 10 about the structural support 100. In accordance with a preferred embodiment, the tongues 22 are resiliently flexible. This enables the protecting ap-
port 100.

of the protecting apparatus 10 about the structural support 100. This engagement facilitates retention of orientation, resulting in them engaging against the structural support 100. This engagement facilitates retention of the protecting apparatus 10 about the structural support 100.

[0028] Additional tongues 24 may be provided on the first and the second joining members 18a, 18b to further facilitate retention of the protecting apparatus 10 about the structural support 100.

[0029] In addition to the tongues 22, 24 or in place thereof, a securing member (not shown) may be provided to retain the protecting apparatus 10 about the structural support 100. The securing member may be a threaded member arranged to be screwed through the protecting apparatus 10 and into the structural support 100. A groove or slot may be provided in the protecting apparatus 10 to receive the threaded member.

[0030] In accordance with the illustrated embodiment, the outer surface 12a of the bumper member 12 is shown as being smooth and continuous. However, other finishes on the outer surface 12a may be adopted.

[0031] The bumper member 12, structure positioning member 14, joining portions 16 and joining members 18a, 18b are integrally formed. The protecting apparatus 10 is preferably moulded as one piece in a plastics material. The protecting apparatus 10 is preferably injection moulded or may be extruded as a continuous form.

[0032] As will be appreciated from Figure 1, each protecting apparatus 10 is arranged to wrap about a major portion of the periphery of the structural support 100 to provide substantial coverage and therefore protection thereof. A plurality of protecting apparatus 10 can be located on the structural support 100 so as to provide protection to the entire length of the structural support 100 if desired. The protecting apparatus 10 may be spaced from one another or stacked one on top of the other.

[0033] The length of the protecting apparatus 10 (i.e. the dimension of the apparatus 10 in a direction parallel to the length of the structural support 100) may be varied to suit different needs. However, it is recognised that it may be advantageous to use a plurality of smaller protective apparatus 10 to protect a structural support 100 rather than a very large apparatus 10. This is because in a situation where a fracture occurs in the protecting apparatus 10, it may be more cost effective to replace a number of smaller protective apparatus 10 as opposed to a single large protecting apparatus 10.

[0034] Figures 5 and 6 illustrate a protector apparatus 200 in accordance with a second embodiment of the invention. The protector apparatus 200 adopts a slightly different shape to the protector apparatus 10. Addition-
scope of the invention are envisaged.

[0043] The discussion of the background to the invention herein is included to explain the context of the invention. This is not to be taken as an admission that any of the material referred to was published, known or part of the common general knowledge as at the priority date of any of the claims.

Claims

1. A protecting apparatus (10; 200; 300) for protecting a structure (100) from an impact, said protecting apparatus (10; 200; 300) including:
   a bumper member (12) arranged in use to receive an impact force;
   a structure positioning member (14) arranged to be positioned in contact with or adjacent to a portion of the structure (100);
   at least one joining portion (16) extending between said bumper member (12) and said structure positioning member (14); and
   a first joining member (18a) joining a first end of the structure positioning member (14) to a first end of the bumper member (12) and a second joining member (18b) joining a second end of the structure positioning member (14) to a second end of the bumper member (12);
   characterized in that
   said structure positioning member (14) and said first and second joining members (18a, 18b) define an opening for receiving at least said portion of the structure (100) and
   said at least one joining portion (16) extending between said bumper member (12) and said structure positioning member (14) is resiliently flexible and arranged so that when an outer surface (12a) of the bumper member (12) is impact ed said impact force is dissipated at least in part by flexure of said at least one joining portion (16).

2. A protecting apparatus according to claim 1 wherein said impact force is further dissipated by flexure of said bumper member (12) and/or flexure of said structure positioning member (14) and/or fracture of said at least one joining portion (16).

3. A protecting apparatus according to claim 1 or claim 2 wherein at least one resiliently flexible joining portion (16) adopts a tortuous path between the bumper member (12) and the structure positioning member (14).

4. A protecting apparatus according to claim 3 wherein the tortuous path is curved so as to minimise any points of stress concentration along said path.

5. A protecting apparatus according to any one of the preceding claims wherein said first and second joining members (18a, 18b) join to said bumper member (12) and said structure positioning member (14) at respective zones of connection so as to minimise stress concentrations in the protecting apparatus.

6. A protecting apparatus according to any one of the preceding claims wherein the first and second joining members (18a, 18b) each adopt a tortuous path between the respective ends of the positioning member (14) and the bumper member (12).

7. A protecting apparatus according to claim 6 wherein the first and second joining members (18a, 18b) are resiliently flexible.

8. A protecting apparatus according to claim 7 wherein the first and second joining members (18a, 18b) and the bumper member (12) are arranged to resiliently deflect to enable said portion of said structure (100) to be received in said opening.

9. A protecting apparatus according to any one of the preceding claims wherein said at least one joining portion (16) joins to the respective bumper member (12) and structure positioning member (14) at respective zones of connection so as to minimise stress concentrations in the protecting apparatus.

10. A protecting apparatus according to any one of the preceding claims wherein said stress concentrations are minimised by curving the zones of connection.

11. A protecting apparatus according to claim 11 wherein a tongue (22) is located at or adjacent to each of the first and second ends of the bumper member (12), said tongues being arranged in use to contact the structure (100) when it is received in said opening and to facilitate retention of the protecting apparatus about said structure.

12. A protecting apparatus according to claim 11 wherein a further tongue (24) is provided on each of the first and second joining members (18a, 18b) to further facilitate retention of the protecting apparatus about said structure.

13. A protecting apparatus according to claim 11 or claim 12 wherein the tongues (22, 24) are resiliently flexible and arranged so that they are deflected in order to receive the portion of the structure (100) within the opening and, once the portion of the structure is located in the opening, arranged to engage against the structure.

14. A protecting apparatus according to any one of the preceding claims further including a securing mem-
15. A protecting apparatus according to any one of the preceding claims arranged to be retained tightly on the structure (100) or to be retained in a manner which allows it to be slid along a length thereof.

16. A protecting apparatus according to any one of the preceding claims wherein the bumper member (12) is configured so as to extend about a major portion of the structure (100) so as to protect as much of the structure as possible.

17. A protecting apparatus according to any one of the preceding claims wherein the outer surface of the bumper member (12) is smooth and continuous.

18. A protecting apparatus according to any one of the preceding claims wherein the bumper member (12), structure positioning member (14), first and second joining members (18a, 18b) and said at least one joining portion (16) are integrally formed.

19. A protecting apparatus according to claim 18 wherein the protecting apparatus in moulded as a single piece in a plastics material.

20. A protecting apparatus according to any one of the preceding claims arranged so that a plurality of such protecting apparatus can be stacked one on top of the other along a length of the structure (100).

Patentansprüche

1. Schutzvorrichtung (10; 200; 300) zum Schutz einer Struktur (100) vor einem Stoß, wobei die Schutzvorrichtung (10; 200; 300) umfasst:

   - ein Stoßelement (12), das angeordnet ist, um im Gebrauch eine Stoßkraft aufzunehmen;
   - ein Strukturpositionierungselement (14), das angeordnet ist, um in Berührung mit oder angrenzend einem Abschnitt der Struktur (100) positioniert zu werden;
   - wenigstens einen Verbindungsabschnitt (16), der sich zwischen dem Stoßelement (12) und dem Strukturpositionierungselement (14) erstreckt; und
   - ein erstes Verbindungselement (18a), das ein erstes Ende des Strukturpositionierungselement (14) mit einem ersten Ende des Stoßelement (12) verbindet, sowie ein zweites Verbindungselement (18b), das ein zweites Ende des Strukturpositionierungselements (14) mit einem zweiten Ende des Stoßelements (12) verbindet;

   dadurch gekennzeichnet,

10. Schutzvorrichtung nach Anspruch 9, wobei die Spannungskonzentrationen auf ein Mindestmaß beschränkt werden, indem die Verbindungszonen gekrümmt sind.

11. Schutzvorrichtung nach einem der vorhergehenden Ansprüche, wobei eine Zunge (22) jeweils an oder angrenzend an dem ersten und zweiten Ende des Stoßelements (12) angeordnet ist, wobei die Zungen im Gebrauch angeordnet sind, um die Struktur (100) zu berühren, wenn diese in der Öffnung aufgenommen ist, und um das Zurückhalten der Schutzvorrichtung um die Struktur zu erleichtern.

12. Schutzvorrichtung nach Anspruch 11, wobei eine weitere Zunge (24) auf dem ersten und dem zweiten Verbindungselement (18a, 18b) bereitgestellt ist, um das Zurückhalten der Schutzvorrichtung um die Struktur (100) weiter zu erleichtern.

13. Schutzvorrichtung nach Anspruch 11 oder Anspruch 12, wobei die Zungen (22, 24) elastisch biegsam sind und derart angeordnet sind, dass diese verbogen werden, um den Abschnitt der Struktur (100) innerhalb der Öffnung aufzunehmen und derart angeordnet sind, sobald der Abschnitt der Struktur in der Öffnung angeordnet ist, die Struktur in Eingriff zu nehmen.

14. Schutzvorrichtung nach einem der vorhergehenden Ansprüche, ferner ein Befestigungselement umfassend, das angeordnet ist, die Schutzvorrichtung um die Struktur (100) zurückzuhalten.

15. Schutzvorrichtung nach einem der vorhergehenden Ansprüche, die angeordnet ist, um fest auf der Struktur (100) zu ruhen und derart angeordnet sind, um fest auf der Struktur (100) zu ruhen und derart angeordnet sind, um fest auf der Struktur (100) zu ruhen und derart angeordnet sind, um fest auf der Struktur (100) zu ruhen.

16. Schutzvorrichtung nach einem der vorhergehenden Ansprüche, wobei das Stoßelement (12) derart ausgestaltet ist, dass dieses sich um einen Hauptabschnitt der Struktur (100) erstreckt, um so viel wie möglich der Struktur zu schützen.

17. Schutzvorrichtung nach einem der vorhergehenden Ansprüche, wobei die Außenseite des Stoßelements (12) glatt und kontinuierlich ist.

18. Schutzvorrichtung nach einem der vorhergehenden Ansprüche, wobei das Stoßelement (12), das Strukturpositionierungselement (14), das erste und das zweite Verbindungselement (18a, 18b) integral ausgebildet sind.

19. Schutzvorrichtung nach Anspruch 18, wobei die Schutzvorrichtung als ein einzelnes Stück aus einem Kunststoffmaterial formgepresst ist.

20. Schutzvorrichtung nach einem der vorhergehenden Ansprüche, die derart angeordnet ist, dass eine Vielzahl derartiger Schutzvorrichtungen entlang einer Länge der Struktur (100) übereinander gestapelt werden können.

Reventications

1. Dispositif de protection (10 ; 200 ; 300) pour protéger une structure (100) d’un impact, ledit dispositif de protection (10 ; 200 ; 300) incluant:

- un élément amortisseur (12) agencé en utilisa-
tion pour recevoir une force d’impact,
- un élément de positionnement de structure (14) agencé pour être positionné en contact avec une partie de la structure (100) ou à proximité adja-
- cente de celle-ci,
- au moins une partie de jonction (16) s’étendant entre ledit élément amortisseur (12) et ledit élé-
- ment de positionnement de structure (14), et un premier élément de jonction (18a) joignant une première extrémité de l’élément de position-
- nement de structure (14) à une première extré-
- mité de l’élément amortisseur (12) et un second élément de jonction (18b) joignant une seconde extrémité de l’élément de positionnement de structure (14) à une seconde extrémité de l’élé-
- ment amortisseur (12),
- caractérisé en ce que ledit élément amortisseur (12) agencé en utilisa-
tion pour recevoir une force d’impact,
- un élément de positionnement de structure (14) agencé pour être positionné en contact avec une partie de la structure (100) ou à proximité adja-
- cente de celle-ci,
- au moins une partie de jonction (16) s’étendant entre ledit élément amortisseur (12) et ledit élé-
- ment de positionnement de structure (14), et un premier élément de jonction (18a) joignant une première extrémité de l’élément de position-
- nement de structure (14) à une première extré-
- mité de l’élément amortisseur (12) et un second élément de jonction (18b) joignant une seconde extrémité de l’élément de positionnement de structure (14) à une seconde extrémité de l’élé-
- ment amortisseur (12),

2. Schutzvorrichtung nach einem der vorhergehenden Ansprüche, wobei der wenigstens eine Verbindungsschnitt (16) mit dem jeweiligen Stoßelement (12) und dem Strukturpositionierungselement (14) an jeweiligen Verbindungszonen verbunden ist, um Spannungskonzentrationen in der Schutzvorrichtung auf ein Mindestmaß zu beschränken.


4. Schutzvorrichtung nach einem der vorhergehenden Ansprüche, wobei der wenigstens eine Verbindungsschnitt (16) mit dem jeweiligen Stoßelement (12) und dem Strukturpositionierungselement (14) an jeweiligen Verbindungszonen verbunden ist, um Spannungskonzentrationen in der Schutzvorrichtung auf ein Mindestmaß zu beschränken.

5. Schutzvorrichtung nach einem der vorhergehenden Ansprüche, wobei der wenigstens eine Verbindungsschnitt (16) mit dem jeweiligen Stoßelement (12) und dem Strukturpositionierungselement (14) an jeweiligen Verbindungszonen verbunden ist, um Spannungskonzentrationen in der Schutzvorrichtung auf ein Mindestmaß zu beschränken.
en partie par flexion de ladite au moins une partie de jonction (16).

2. Dispositif de protection selon la revendication 1, dans lequel ladite force d’impact est en outre dissipée par flexion dudit élément amortisseur (12) et/ou flexion dudit élément de positionnement de structure (14) et/ou fracture de ladite au moins une partie de jonction (16).

3. Dispositif de protection selon la revendication 1 ou la revendication 2, dans lequel ladite force d’impact est en outre dissipée par flexion dudit élément amortisseur (12) et/ou flexion dudit élément de positionnement de structure (14) et/ou fracture de ladite au moins une partie de jonction (16).

4. Dispositif de protection selon la revendication 3, dans lequel le trajet sinuex est courbe de manière à minimiser des points quelconques de concentrations de contraintes le long dudit trajet.

5. Dispositif de protection selon l’une quelconque de revendications précédentes, dans lequel lesdits premiers et seconds éléments de jonction (18a, 18b) reçoivent ledit élément amortisseur (12) et ledit élément de positionnement de structure (14) au niveau de zones de connexion respectives de manière à minimiser des concentrations de contraintes dans le dispositif de protection.

6. Dispositif de protection selon l’une quelconque de revendications précédentes, dans lequel lesdits premiers et seconds éléments de jonction (18a, 18b) adopte tous les deux un trajet sinuex entre les extrémités respectives de l’élément de positionnement (14) et de l’élément amortisseur (12).

7. Dispositif de protection selon la revendication 6, dans lequel lesdits premiers et seconds éléments de jonction (18a, 18b) sont flexibles de manière élastique.

8. Dispositif de protection selon la revendication 7, dans lequel lesdits premiers et seconds éléments de jonction (18a, 18b) et l’élément amortisseur (12) sont agencés pour dévier de manière élastique afin de permettre que ladite partie de ladite structure (100) soit reçue dans ladite ouverture.

9. Dispositif de protection selon l’une quelconque de revendications précédentes, dans lequel ladite au moins une partie de jonction (16) rejoint l’élément amortisseur respectif (12) et élément de positionnement de structure (14) au niveau de zones de connexion respectives de manière à minimiser des concentrations de contraintes dans le dispositif de protection.

10. Dispositif de protection selon la revendication 9, dans lequel lesdites concentrations de contraintes sont minimisées en courbant les zones de connexion.

11. Dispositif de protection selon l’une quelconque de revendications précédentes, dans lequel une languette (22) est positionnée dans chacune des premières et seconds extrémités de l’élément amortisseur (12) ou à proximité adjacente de celles-ci, ladite languette étant agencée en utilisation pour entrer en contact avec la structure (100) lorsqu’elle est reçue dans ladite ouverture et pour faciliter le maintien du dispositif de protection autour de ladite structure (100).

12. Dispositif de protection selon la revendication 11, dans lequel une languette supplémentaire (4) est agencée sur chacun des premiers et seconds éléments de jonction (18a, 18b) pour faciliter davantage le maintien du dispositif de protection autour de ladite structure (100).

13. Dispositif de protection selon la revendication 11 ou la revendication 12, dans lequel les languettes (22, 24) sont flexibles de manière élastique et agencées de sorte qu’elles sont déviées afin de recevoir la partie de la structure (100) dans l’ouverture et, une fois que la partie de la structure est positionnée dans l’ouverture, agencées pour être mises en prise contre la structure.

14. Dispositif de protection selon l’une quelconque de revendications précédentes, incluant en outre un élément de sécurisation agencé pour maintenir le dispositif de protection autour de ladite structure (100).

15. Dispositif de protection selon l’une quelconque de revendications précédentes agencé pour être maintenu fermement sur la structure (100) ou pour être maintenu d’une manière lui permettant de coulisser le long d’une longueur de celle-ci.

16. Dispositif de protection selon l’une quelconque des revendications précédentes, dans lequel l’élément amortisseur (12) est configuré de manière à s’étendre autour d’une partie principale de la structure (100) de manière à protéger la structure autant que possible.

17. Dispositif de protection selon l’une quelconque de revendications précédentes, dans lequel la surface extérieure de l’élément amortisseur (12) est lisse et continue.

18. Dispositif de protection selon l’une quelconque de revendications précédentes, dans lequel l’élément amortisseur (12), l’élément de positionnement de structure (14) et l’élément de positionnement (14) sont agencés pour dévier de manière élastique afin de recevoir la partie de la structure (100) dans l’ouverture et, une fois que la partie de la structure est positionnée dans l’ouverture, agencées pour être mises en prise contre la structure.
structure (14), les premier et second éléments de jonction (18a, 18b) et ladite au moins une partie de jonction (18) sont intégralement formés.

19. Dispositif de protection selon la revendication 18, dans lequel le dispositif de protection est moulé en tant que pièce unique en un matériau en matière plastique.

20. Dispositif de protection selon l’une quelconque de revendications précédentes agencé de sorte que plusieurs de ces dispositifs de protection peuvent être empilés l’un sur l’autre le long d’une longueur de la structure (100).
REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

• FR 2788796 [0003]