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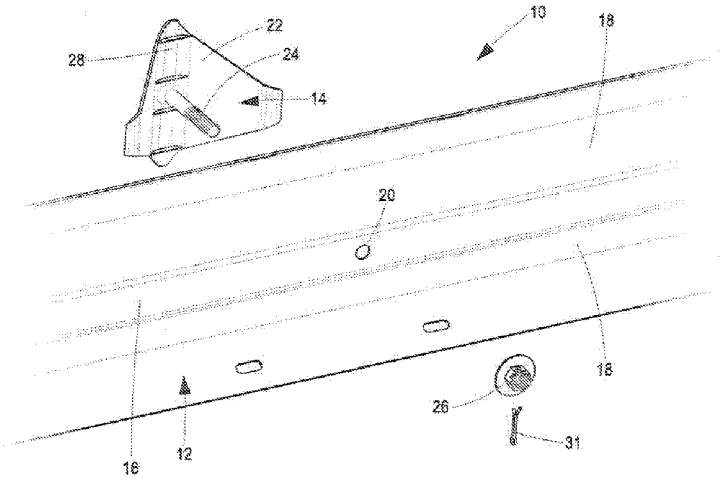

Figure 3

(57) Abstract: A roadway barrier includes: (i) a longitudinally corrugated rail defining a longitudinal trough between longitudinal ridges, which rail in the region of the trough, defines an aperture: (ii) a reflector comprising: (a) a substantially V-shaped panel with a reflective surface, the panel defining a spine and a pair of arms that diverge from the spine, and the panel arms being resiliently movable between a neutral condition and a splayed condition; (b) a shaft extending from the spine of the panel, between the panel arms, wherein each panel arm is substantially planar and tapers in height from the spine towards its free end; and (c) a connector for securing to the reflector shaft. The reflector is located within the trough defined by the rail, with the reflector shaft extending through the aperture defined by the rail and secured in place by the connector, which connector induces tension within the reflector shaft, with the panel arms bearing against the rail, in the region of the trough, and maintaining the panel arms in the splayed condition.

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ROADWAY BARRIER

BACKGROUND

The present invention relates to a roadway barrier. More particularly, the invention relates to a roadway barrier comprising a rail and reflector.

Armco™ barriers and reflectors are known. It is even known for reflectors to be secured to Armco™ barriers. For instance:

ZA1993/06881 "Guardrail reflector" to Pienaar describes a bracket bolted to a guardrail and a clipping mechanism for securing an arcuate reflector to the bracket.

US3,214,142 "Highway barrier structures" to Brown describes a reflector with a shaft extending therefrom, which shaft extends through an aperture defined by a guardrail and is secured thereto by a nut.

US7,014,389 "Articulated guardrail reflector assembly" to Siblik describes a reflector, a bolt connecting the connector to a guardrail, and a flexible joint clip securing the connector to the bolt.

Drawbacks of the system described in ZA1993/06881 are: (i) the installation process is somewhat cumbersome, requiring the bracket to be secured to the guardrail prior to securing the reflector thereto; (ii) the reflector can easily be removed from the bracket; and (iii) the reflector does not maximise the available space on the guardrail. The last drawback is common to the systems described in US3,214,142 and US7,014,389.

It is an object of the present invention to provide a barrier that at least partially addresses the above drawbacks.

SUMMARY OF THE INVENTION

According to a preferred embodiment of the present invention there is provided a roadway barrier that includes:

a longitudinally corrugated rail defining a longitudinal trough between longitudinal ridges;

the rail, in the region of the trough, defining an aperture;

a reflector comprising:

a substantially V-shaped panel with a reflective surface, the panel defining a spine and a pair of arms that diverge from the spine, and the panel arms being resiliently movable between a neutral condition and a splayed condition;

a shaft extending from the spine of the panel, between the panel arms,

wherein each panel arm is substantially planar and tapers in height from the spine towards its free end; and

a connector for securing to the reflector shaft,

the reflector being located within the trough defined by the rail, with the reflector shaft extending through the aperture defined by the rail and secured in place by the connector, which connector induces tension within the reflector shaft, with the panel arms bearing against the rail, in the region of the trough, and maintaining the panel arms in the splayed condition.

Typically, the panel arms define an angle between them in the range of 70 degrees and 90 degrees.

Generally, the connector is either a nut that is threated onto a threaded portion of the reflector shaft or a collar that is crimped on to the reflector shaft.

Preferably, the reflector shaft includes a radial projection at or near the free end of the reflector shaft, to limit movement of the connector along the reflector shaft.

Typically, the reflector shaft includes a radially projecting formation that extends longitudinally along at least a portion of the reflector shaft. And, when the connector is a collar, crimping of the collar preferably causes the longitudinally extending radially projecting formation on the reflector shaft to deform.

Generally, at least a portion of the reflector shaft is threaded.

Preferably, the reflector shaft defines a bore that extends substantially diametrically through the reflector shaft.

Typically, the roadway barrier further includes a pin that is sized and shaped to travel through the bore defined by the reflector shaft, which pin inhibits relative rotation and/or axial movement of the connector and reflector shaft.

Generally, the spine is substantially rectangular in shape and planar with minor sides at least 1cm in length.

Preferably, the free ends of the panel arms curve away from the reflector shaft.

Typically, the reflector panel is substantially rhombus-shaped, with the panel spine extending along the minor diagonal.

Generally, the roadway barrier further includes a bowed washer located over the reflector shaft and sandwiched between the rail and the connector.

Preferably, the washer is rotatable about the reflector shaft such that the connector can be secured to the reflector shaft and the washer rotated relative to the reflector shaft thereby to induce tension within the reflector shaft and cause the panel arms to splay.

A reflective sheet may be secured to the surface of the reflector panel, opposite the surface from which the reflector shaft extends.

Optionally, a secondary securing plate is secured to the reflector panel and extends between the panel arms. The secondary securing plate may define a substantially U-shaped notch at

or near the centre of the secondary securing plate, through which notch the reflector shaft extends. And, the secondary securing plate may be removably secured to the reflector panel. Preferably, the secondary securing plate extends between the free ends of the panel arms.

Typically, each panel arm is substantially frusto-triangular in shape.

BRIEF DESCRIPTION OF THE DRAWINGS

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

Figure 1 is a perspective view of a roadway barrier according to a preferred embodiment of the invention;

Figure 2 is a side view of the roadway barrier in Figure 1;

Figure 3 is an exploded view of the roadway barrier in Figure 1;

Figure 4 is a perspective view of the reflector forming part of the roadway barrier in Figure 1; and

Figure 5 is a perspective view of a reflector forming part of the roadway barrier according to an alternative embodiment of the invention.

DESCRIPTIONS OF EMBODIMENTS OF THE INVENTION

With reference to Figures 1 to 4, according to a preferred embodiment of the invention a roadway barrier 10 includes a rail 12 and a reflector 14.

The rail 12 is a standard guardrail suitable for use along roadsides. An example of such a guardrail is an Armco™ barrier. Referring specifically to Figures 2 and 3, the rail 12 is longitudinally corrugated, defining a longitudinal trough 16 between longitudinal ridges 18. Turning specifically to Figure 3, the rail 12, in the region of the longitudinal trough 16, defines an aperture 20.

Turning to Figure 4, the reflector 14 is sized and shaped to fit within the longitudinal trough 16 of the rail 12. The reflector 14 includes a panel 22, a shaft 24 and a connector 26.

The panel 22 is in shape substantially a rhombus, defining minor and major diagonals A-A and B-B, respectively (shown in Figure 4). The panel 22 is bent / curved along its minor diagonal A-A substantially into a V-shape. The panel 22 in the region of the minor diagonal A-A defines a substantially planar rectangular portion, which portion is referred to herein as the spine 28. Preferably, the minor side of the spine 28 is at least 1cm in length. Panel arms 30 extend from the major sides of the spine 28, which panel arms 30 are substantially planar and frusto-triangular in shape – the base of the frusto-triangles being proximal the major sides of the spine 28. For the purpose of this specification, we use the term "height" of the arms 30, which dimension is measured along lines parallel to the major sides of the spine 28. Using this term "height", we can alternatively describe the panel arms 30 as follows: the pair of panel arms 30 diverge from the spine 28, with each panel arm 30 tapering in height from the spine 28 to the free end of the arm 30.

The panel arms 30 are resiliently movable between a neutral condition (i.e. their relative positions when no external force is applied thereto) and a splayed condition (i.e. their relative position when an external force is applied thereto, causing the arms 30 to splay away from each other). When in the neutral condition, the panel arms 30 define an angle between them (-) in the range of 70 degrees and 90 degrees.

The shaft 24 is cylindrical, extending orthogonally from the centre of the spine 28, between the arms 30. At least a portion of the shaft 24 at or near its free end is threaded and sized to be received within the aperture 20 defined by the rail 12.

The connector 26 is a nut that is threadably securable to the threaded portion of the shaft 24. Optionally (but not shown), the reflector shaft 24 defines a bore that extends substantially diametrically through the reflector shaft 24. Preferably, the nut 26 is threaded along the reflector shaft 24, past the bore. A pin 31 may then be inserted through the bore and protrude therefrom to limit movement of the nut 26 towards the free end of the reflector shaft 24. Further optionally, the nut 26 may define a diametric bore, which can be aligned with the bore defined by the reflector shaft 24 to permit and appropriately sized and shaped pin to extend through the aligned bores defined by the nut 26 and reflector shaft 24, thereby to prevent relative rotation of the nut 26 and reflector shaft 24.

The free ends 32 of the panel arms 30 are upturned to curve away from the shaft 24. Furthermore, the reflector panel 22 preferably includes a reflective sheet (not shown separately) that is secured to the surface of the reflector panel 22, opposite the surface from which the reflector shaft 24 extends.

To install the reflector 14 to the rail 12, the reflector 14 is brought towards the rail 12 in the region of the longitudinal trough 16, with the free end of the reflector shaft 24 extending through the aperture 20 defined by the rail 12. The reflector 14 is oriented with the major diagonal B-B of the reflector panel 22 aligned substantially parallel to the longitudinal axis of the rail 12. The connector 26 is then secured to the reflector shaft 24 and tension is generated in the reflector shaft 24. This tension causes the reflector panel 22 to be pulled towards the rail 12, causing the free ends 32 of the panel arms 30 to bear against the rail 12 in the region of the longitudinal trough 16. And, as further tension is applied, the panel arms 30 are caused to splay (i.e. diverge further away from each other), with the free ends 32 of the panel arms 30 skidding along the longitudinal trough 16 of the rail 12. When the panel arms 30 are in the splayed condition, the minor sides of the reflector panel spine 28 bear against the rail 12 in the region of the longitudinal ridges 18. The connector 26 retains the panel arms 30 in the splayed condition.

According to the alternative embodiment 110 of the invention shown in Figure 5, the reflector 114 is similar to the reflector 14 shown in Figures 1 to 4. However, whereas the barrier 10 uses a connector 26 in the form of a nut, the connector 126 in the alternative embodiment 110 is a collar that is, in use, crimped about the shaft 124. Furthermore, the reflector shaft 124 is removably secured to the reflector panel 122 and 124 via an aperture defined by the reflector panel 122, and the reflector shaft 124 additionally includes: (i) a radial projection 134 at or near the free end of the reflector shaft 124, to limit movement of the connector 126 along the reflector shaft 124; and (ii) a radially projecting formation 136 that extends longitudinally along at least a portion of the reflector shaft 124. Upon crimping, the collar 126 causes a portion of the radially projecting formation 136 to deform, limiting relative longitudinal movement of the collar 126 and reflector shaft 124. A washer 138, in the shape of a bowed (i.e. arcuate) substantially rectangular plate defining an aperture 139 at or near its centre, is located over the reflector shaft 124, between the reflector panel 122 and collar 126.

The reflector 114 according to the alternate embodiment also includes a secondary securing plate 140. The secondary securing plate 140 is removably secured to the reflector panel 122, extending between the free ends 132 of the panel arms 130. The secondary securing

plate 140 is rectangular in shape and defines a notch 142 through which the reflector shaft 124 extends.

The secondary securing plate provides a user with two options to install the reflector 114 on the rail 12 (shown in Figures 1 and 2).

According to a first installation option: the secondary securing plate 140 is removed from the reflector 114, and the reflector 114 is brought towards the rail 12 in the region of the longitudinal trough 16, with the free end of the reflector shaft 124 extending through the aperture 20 defined by the rail 12. The reflector 114 is oriented with the major diagonal B-B of the reflector panel 122 aligned substantially parallel to the longitudinal axis of the rail 12. Washer 138 is located over the reflector shaft 124 with the major axis of the washer 138 oriented substantially orthogonal to the longitudinal axis of the rail 12. The collar 126 is then located over the reflector shaft 124 and crimped to secure the collar 126 to the shaft 124 and sandwich the washer 138 between the rail 12 and collar 126. The washer 138 is then rotated about the reflector shaft 124 better to align the major axis of the washer 138 with the longitudinal axis of the rail 12. Such rotation causes the bowed-shape of the washer 138 to induce tension within the reflector shaft 124, which in turn displaces the reflector panel 122 towards the rail 12. Such movement of the reflector panel 122 causing the free ends 132 of the panel arms 130 to bear against the rail 12 in the region of the longitudinal trough 16. And, as further tension is applied, the panel arms 130 are caused to splay (i.e. diverge further away from each other), with the free ends 132 of the panel arms 130 skidding along the longitudinal trough 116 of the rail 12. When the panel arms 130 are in the splayed condition, the minor sides of the reflector panel spine 128 bear against the rail 12 in the region of the longitudinal ridges 18.

According to a second installation option: the reflector shaft 124 is removed from the reflector 114 and the secondary securing plate 140 is secured to the rail 112 via a rail 112 post bolt (i.e. the bolt securing the rail 112 to a post) – the post bolt being received within the notch 142 defined by the secondary securing plate 140.

CLAIMS

1. A roadway barrier including:

a longitudinally corrugated rail defining a longitudinal trough between longitudinal ridges;

the rail, in the region of the trough, defining an aperture;

a reflector comprising:

a substantially V-shaped panel with a reflective surface, the panel defining a spine and a pair of arms that diverge from the spine, and the panel arms being resiliently movable between a neutral condition and a splayed condition;

a shaft extending from the spine of the panel, between the panel arms,

wherein each panel arm is substantially planar and tapers in height from the spine towards its free end; and

a connector for securing to the reflector shaft,

the reflector being located within the trough defined by the rail, with the reflector shaft extending through the aperture defined by the rail and secured in place by the connector, which connector induces tension within the reflector shaft, with the panel arms bearing against the rail, in the region of the trough, and maintaining the panel arms in the splayed condition.

2. A roadway barrier according to claim 1, wherein the panel arms define an angle between them in the range of 70 degrees and 90 degrees.

3. A roadway barrier according to claim 2, wherein the connector is either a nut that is threated onto a threaded portion of the reflector shaft or a collar that is crimped on to the reflector shaft.

4. A roadway barrier according to claim 3, wherein the reflector shaft includes a radial projection at or near the free end of the reflector shaft, to limit movement of the connector along the reflector shaft.

5. A roadway barrier according to claim 4, wherein the reflector shaft includes a radially projecting formation that extends longitudinally along at least a portion of the reflector shaft.

6. A roadway barrier according to claim 5, wherein, when the connector is a collar, crimping of the collar causes the longitudinally extending radially projecting formation on the reflector shaft to deform.

7. A roadway barrier according to claim 6, wherein at least a portion of the reflector shaft is threaded.

8. A roadway barrier according to claim 7, wherein the reflector shaft defines a bore that extends substantially diametrically through the reflector shaft.

9. A roadway barrier according to claim 8, further including a pin that is sized and shaped to travel through the bore defined by the reflector shaft, which pin inhibits relative rotation and/or axial movement of the connector and reflector shaft.

10. A roadway barrier according to claim 9, wherein the spine is substantially rectangular in shape and planar with minor sides at least 1cm in length.

11. A roadway barrier according to claim 10, wherein the free ends of the panel arms curve away from the reflector shaft.

12. A roadway barrier according to claim 11, wherein the reflector panel is substantially rhombus-shaped with the panel spine extending along the minor diagonal.

13. A roadway barrier according to claim 12, further including a bowed washer located over the reflector shaft and sandwiched between the rail and the connector.

14. A roadway barrier according to claim 13, wherein the washer is rotatable about the reflector shaft such that the connector can be secured to the reflector shaft and the

washer rotated relative to the reflector shaft thereby to induce tension within the reflector shaft and cause the panel arms to splay.

15. A roadway barrier according to claim 14, wherein a reflective sheet is secured to the surface of the reflector panel, opposite the surface from which the reflector shaft extends.

16. A roadway barrier according to claim 15, wherein a secondary securing plate is secured to the reflector panel and extends between the panel arms.

17. A roadway barrier according to claim 16, wherein the secondary securing plate defines a notch through which the reflector shaft extends.

18. A roadway barrier according to claim 17, wherein the secondary securing plate is removably secured to the reflector panel.

19. A roadway barrier according to claim 18, wherein the secondary securing plate extends between the free ends of the panel arms.

20. A roadway barrier according to claim 19, wherein each panel arm is substantially frusto-triangular in shape.

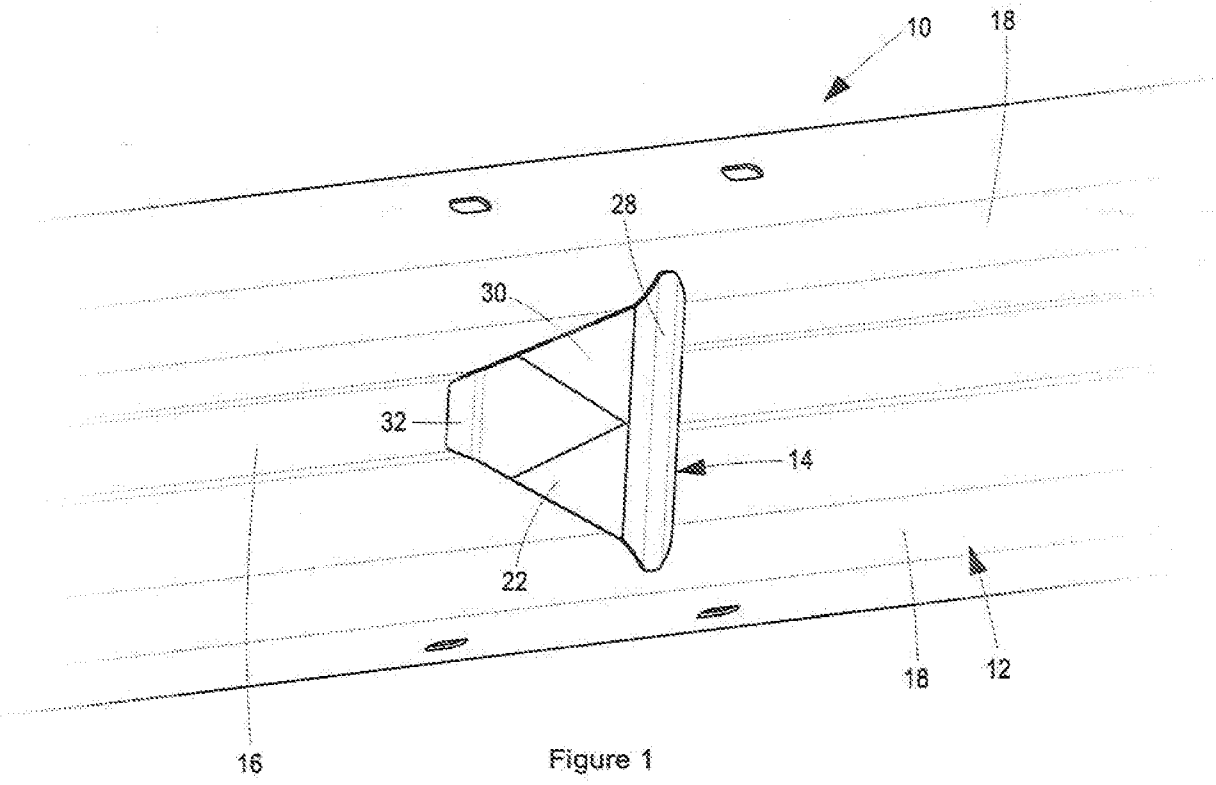

Figure 1

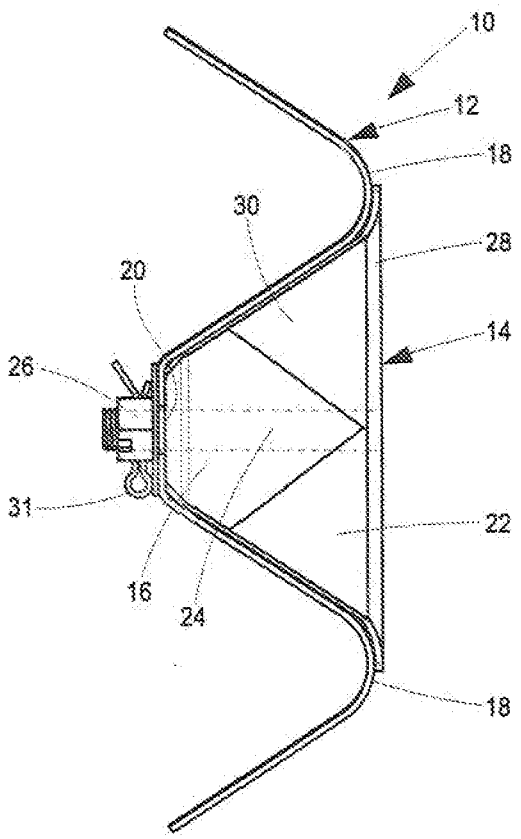

Figure 2

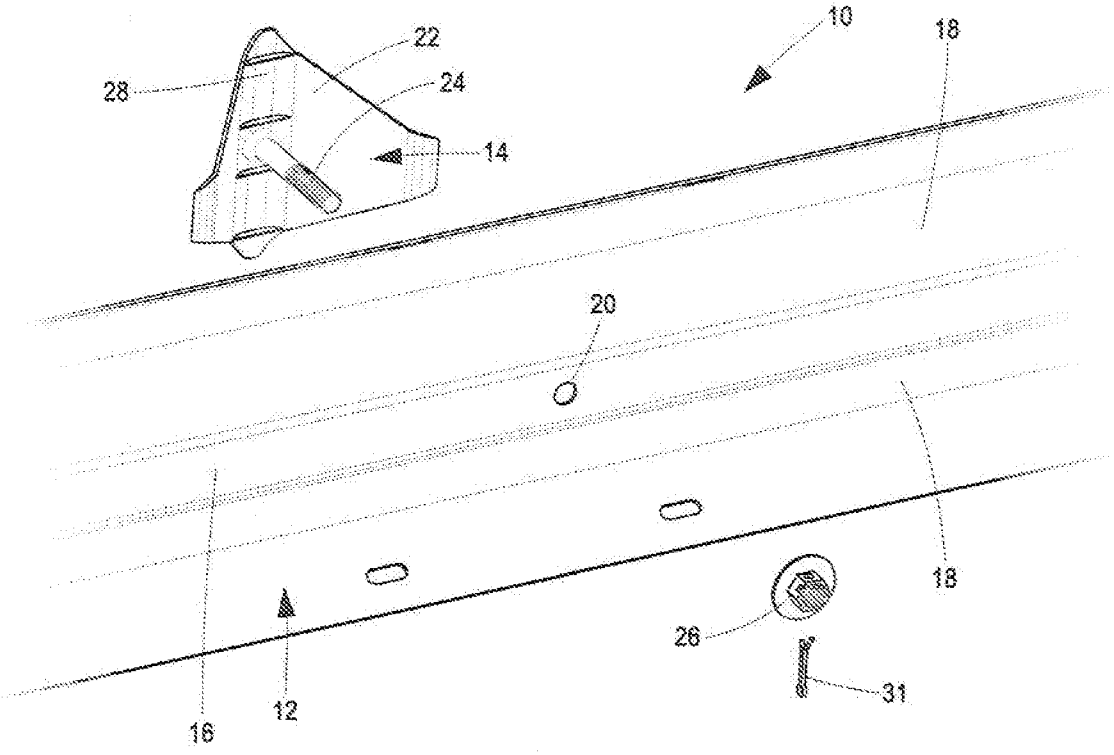

Figure 3

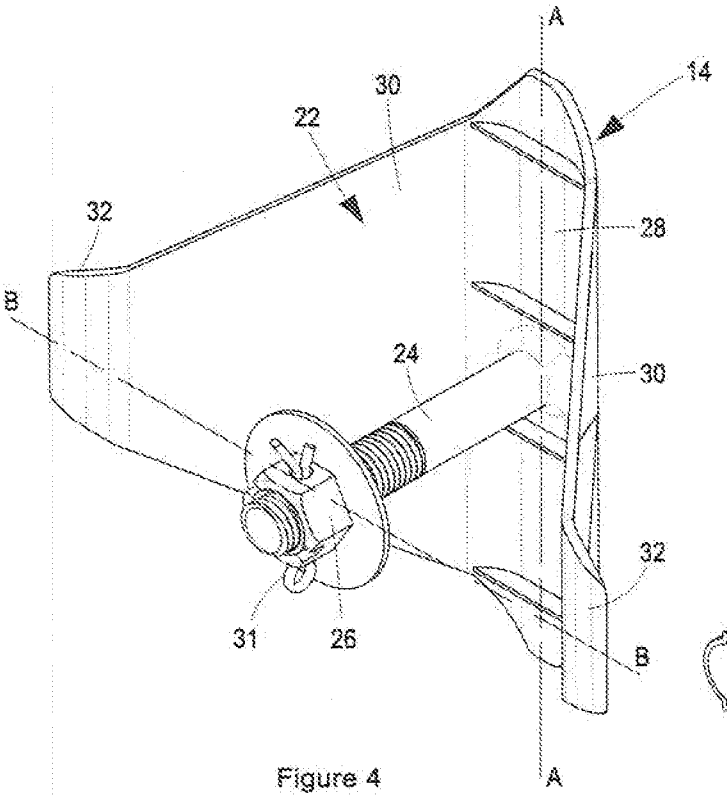

Figure 4

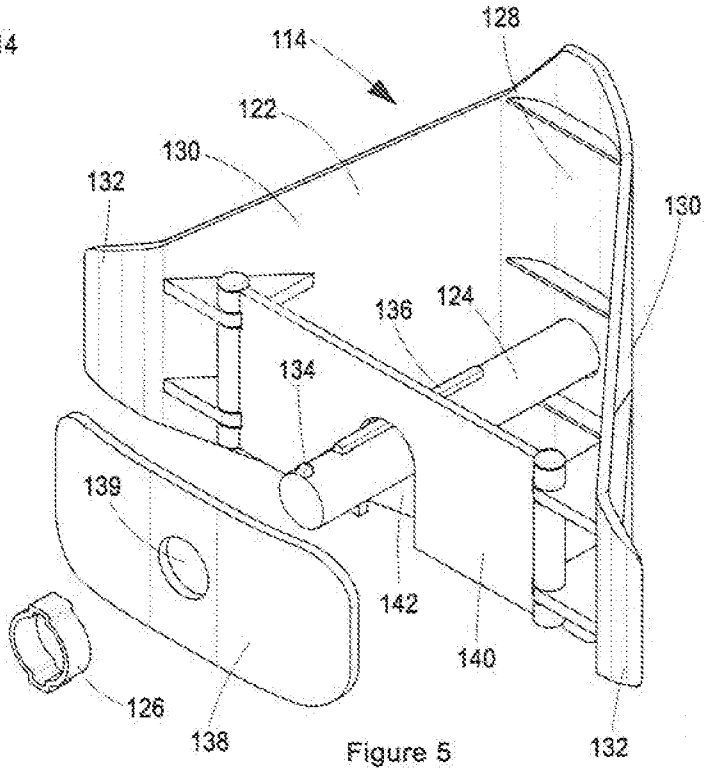

Figure 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT / ZA 2014/000032

A. CLASSIFICATION OF SUBJECT MATTER

IPC: ***E01F 9/03*** (2006.01); ***G02B 5/12*** (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E01F, G02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI, TXTG

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2005110054 A2 (WORLDWIDE SAFETY, INC) 24 November 2005 (24.11.2005) figs. 7A,8,11, claims 1-3	1-3
A		7,10,12-20
Y	DE 7438892 U (Dejoks, Klaus) 27 March 1975 (27.03.1975) fig. 1-3, page 2, line 23 - page 3, line 6	1-3
A		7,10,12-15,20
A	US 2004067105 A1 (GOESEL KEITH CHARLES) 08 April 2004 (08.04.2004) fig. 1, abstract	1,2,10,11

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 January 2015 (30.01.2015)	11 February 2015 (11.02.2015)
Name and mailing address of the ISA/AT Austrian Patent Office Dresdner Straße 87, A-1200 Vienna Facsimile No. +43 / 1 / 534 24-535	Authorized officer MEISTERLE P. Telephone No. +43 / 1 / 534 24-414

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT / ZA 2014/000032

Patent document cited in search report			Patent family member(s)			Publication date
WO	A2	2005110054	US	A1	2006082881	2006-04-20
			WO	A2	2005110054	2005-11-24
DE	U	7438892	DE	U	7438892	
US	A1	2004067105	US	A1	2004067105	2004-04-08