Title
STRAPPING SYSTEM AND CONNECTOR THEREFOR

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ABSTRACT

A strapping system and connector therefor, provided to strap down items to a load bed. The strapping system utilising a method for use of recycled inner tubes. The connector allows multiple tubes to be joined together without a need for the inner tubes to be radially broken. A method is also claimed for assembling the strapping system and connector therefor.
The following statement is a full description of this invention, including the best method of performing it known to us.
The present invention relates to a strapping system and connector therefor. More particularly but not exclusively it relates to a strapping system for strapping items down in a load bed, and a connector therefor.

Increased competition for resources worldwide have led to a focus on sustainability of production, and a renewed focus on products that may be produced from recycled and/or re-used materials. One example of such focus is finding uses for inner tubes from vehicles such as cars and trucks. Rubber products such as inner tubes can be relatively difficult and expensive to dispose of. It is desirable to find new applications for such items.

However, the manufacture of products using old inner tubes can prove difficult, as different size inner tubes can provide irregularly shaped source material, which is difficult to consistently produce products from.

In this specification, where reference has been made to external sources of information, including patent specifications and other documents, this is generally for the purpose of providing a context for discussing the features of the present invention. Unless stated otherwise, reference to such sources of information is not to be construed, in any jurisdiction, as an admission that such sources of information are prior art or form part of the common general knowledge in the art.

For the purposes of this specification, the term “plastic” shall be construed to mean a general term for a wide range of synthetic or semisynthetic polymerization products, and generally consisting of a hydrocarbon-based polymer.

For the purpose of this specification, where method steps are described in sequence, the sequence does not necessarily mean that the steps are to be chronologically ordered in that sequence, unless there is no other logical manner of interpreting the sequence.

It is an object of the present invention to provide a strapping system and connector therefor which overcomes or at least partially ameliorates some of the abovementioned disadvantages or which at least provides the public with a useful choice.

In a first aspect, the present invention may be said to broadly consist in a strapping system for holding an item to be held in place, said strapping system comprising:

a. at least one or more webbing straps;

b. at least one connector arrangement, said connector arrangement comprising a connector member having at least one receiving slot into which a webbing strap is receivable,

c. a closing formation in the form of a resilient O-ring configured to locate around the receiving slot to close said slot and retain the webbing strap in the connector
member, wherein the receiving slot is closable in use by stretching the closing formation until the closing formation has a cross section that is thin enough to be received into the receiving slot and releasing the stretched closing formation to engage with an edge of the receiving slot.

In some embodiments, the webbing straps are endless loops of resilient material.

In some embodiments, the connector arrangement comprises at least one or more hook formation.

In some embodiments, the endless webbing straps are composed of recycled inner tubes.

In some embodiments, the endless webbing straps of resilient material are composed of vehicle tyre inner tubes that have been cut substantially radially to form endless webbing straps.

In some embodiments, the strapping system comprises an alternating line of endless webbing straps of resilient material, and connector arrangement.

In some embodiments, the strapping system comprises a line of alternating endless webbing straps of resilient material and connector arrangement; with connector members with hook formations disposed at or towards one or both ends of said line.

In some embodiments, the strapping system comprises a plurality of parallel lines coupled to a plurality of parallel lines that extend transversely to form a net.

In some embodiments, the connector member is toroidally shaped.

In a second aspect, the present invention may be said to broadly consist in a connector arrangement for a strapping system, the connector arrangement comprising:

a. a connector member defining a receiving slot,

b. a closing formation in the form of a resilient O-ring configured to locate around the receiving slot to close said slot, wherein the receiving slot is closable in use by stretching the closing formation until the closing formation has a cross section that is thin enough to be received into the receiving slot and releasing the stretched closing formation to engage with an edge of the receiving slot.

In some embodiments, the connector member comprises a circularly or toroidally shaped bar.

In some embodiments, the bar is substantially rounded and/or circular in cross section.

In some embodiments, the connector member defines at least one or more seating formations against which webbing straps may be seated.

In some embodiments, the connector member defines seating formations against which webbing straps may be seated on in at least two directions.
In some embodiments, the connector arrangement comprises a hook formation.

In some embodiments, the present invention may be said to broadly consist in a bungee cord comprising a plurality of alternating connector arrangements as described; and webbing straps.

In some embodiments, the present invention may be said to broadly consist in a net, the net comprising:

a. a plurality of connector arrangements as described,
b. a plurality of webbing straps,
c. wherein at least one of said connectors is/are configured to seat a plurality of webbing straps to extend in at least two dimensions.

In some embodiments, the present invention may be said to broadly consist in a method of assembling the strapping system as described, said method comprising:

a. receiving one or more webbing straps within the receiving slot of the connector member, and
b. locating said closing formation around said receiving slot of the connector member to close said receiving slot.

In some embodiments, the closing formation is thicker in cross section than the width of the receiving slot; and the step of locating the closing formation within the receiving slot comprises:

a. stretching the closing formation until it has a cross section that is thin enough to be received into the receiving slot of the connector member, and
b. releasing the stretched closing formation to engage with an edge of the receiving slot to restrict ingress or egress of matter through the receiving slot.

In some embodiments, the method comprises the step of adjusting the position of the released closing formation to block the receiving slot.

Other aspects of the invention may become apparent from the following description which is given by way of example only and with reference to the accompanying drawings.

As used herein the term “and/or” means “and” or “or”, or both.

As used herein “(s)” following a noun means the plural and/or singular forms of the noun.

The term “comprising” as used in this specification means “consisting at least in part of”. When interpreting statements in this specification which include that term, the features, prefaced by that term in each statement, all need to be present but other features can also be present. Related terms such as “comprise” and “comprised” are to be interpreted in the same manner.
This invention may also be said broadly to consist in the parts, elements and features referred to or indicated in the specification of the application, individually or collectively, and any or all combinations of any two or more of said parts, elements or features, and where specific integers are mentioned herein which have known equivalents in the art to which this invention relates, such known equivalents are deemed to be incorporated herein as if individually set forth.

The invention will now be described by way of example only and with reference to the drawings in which:

**Figure 1:** shows a side view of a strapping system configured as a line with normal known hook formations at an end;

**Figure 2:** shows a cutaway view of a connector;

**Figure 3:** shows a closing formation being stretched to be received within the receiving slot of a body member;

**Figure 4A:** shows a first embodiment of a body member;

**Figure 4B:** shows a second embodiment of a body member;

**Figure 4C:** shows a third embodiment of a body member;

**Figure 5:** shows a top view of a strapping system configured as a net; and

**Figure 6:** shows a side view of a strapping system configured as a line with connectors having hook formations disposed at an end.

With reference to the above drawings, in which similar features are generally indicated by similar numerals, a connector according to an aspect of the invention is generally indicated by the numeral 100, and a strapping system that the connector is for use in is generally indicated by the numeral 1000.

In one embodiment now described, there is provided a connector 100 for a strapping system 1000. The connector 100 comprises a body member 110 that defines a receiving slot 120. In the preferred embodiment shown in the figures, the connector 100 is a C-shaped bar of circular cross section, and the distance between its ends forms the receiving slot 120. It will be appreciated that many alternate configurations of such a connector are possible, and of a variety of cross sectional shapes. Further, the connector need not be C-shaped, but can comprise a body member of any shape with a slot removed from it.

The receiving slot 120 defines a locating shoulder 122. In the preferred embodiments **shown in figures 1 and 2** the locating shoulder 122 is defined by the ends of the circular bar where they almost meet each other.
The connector 100 is preferably composed of a rigid material such as steel, aluminium or a rigid plastic. It is envisaged that the connector will be coated or dipped to provide a weatherproof skin or covering.

The connector 100 further comprises a closing formation 130. The locating shoulder 122 is configured for locating the closing formation 130 in a manner as will be described below.

In a preferred embodiment, the closing formation 130 comprises a resilient endless formation, such as an O-ring. The normal unstretched width of the O-ring is thicker than the width of the receiving slot 120. The function of the closing formation 130 is to close the receiving slot 120, so that nothing can move through the receiving slot 120.

The closing formation 130 is applied to the body member 110 by stretching the closing formation 130 to expand its length, thereby reducing its thickness. As an example, and as shown in figure 3, an O-ring may be stretched by inserting a pair of movable members 600 (preferably as part of a hand held tool 610 or similar) into the aperture in the centre of the O-ring, and moving the movable members 600 apart to stretch the O-ring into two straight legs 130a and two connecting legs 130b, thereby reducing the thickness of at least the straight legs 130a of the closing formation 130.

In this stretched state, one of the straight legs 130a of the closing formation 130 is moved through the receiving slot 120, while the other straight leg 130a remains outside of the receiving slot 120.

The closing formation 130 is then released from being stretched, allowing it to return to its natural state, or at least close to it. As the closing formation 130 is released, it becomes thicker again, and cannot move through the receiving slot 120. The closing formation 130 thus tends to locate itself around the receiving slot 120, on the locating shoulder 122. In the preferred embodiment shown in figure 1 and 2, the O-ring will locate itself around the circular periphery of the circular cross section of the C-shaped body member. In this way, the O-ring acts as a barrier to ingress or egress of matter through the receiving slot 120.

In one embodiment shown in figure 6, the connector 100 can include a hook formation 150. The use of such connectors 100 with hook formations 150 will be explained below in the context of the strapping system 1000.

The strapping system 1000 further comprises webbing straps 200 which are linked together by the connectors 100. In a preferred embodiment, it is envisaged that the webbing straps 200 will be composed of endless loops of resilient material.

In one preferred embodiment, the endless loops can be made from recycled toroidally shaped inner tubes that have been cut up in a radial direction. In such
preferred embodiment, it is envisaged that this strapping system 1000 can provide a use for recycled inner tubes, which may allow for a reduced materials cost.

Inside of the body member 110 from the locating shoulder 122, the body member 110 provides seating formations 140 against which the webbing straps 200 can be seated. The C-shaped body member 110 shown in figures 1 and 2 provides a full rounded perimeter against which webbing straps 200 can be seated, although it is envisaged that in other embodiments, for example as shown in figures 4A, 4B and 4C, seating formations 140 can be provided to seat the webbing straps for extension in opposed directions, at 90 degrees to each other (i.e. in four directions), or in any plurality of directions. It is further envisaged that in one embodiment (not shown) body members 110 can be configured with seating formations 140 to seat the webbing straps 200 for extension in three dimensions.

A strapping system 1000 may be made up in a wide variety of configurations using connectors 100 as described, together with webbing straps 200. For example, in one embodiment as shown in figure 1, a single line 300 of alternating webbing straps 200 and connectors 100 can be assembled, with known hook formations 500 coupled to the ends of the line 300. In an alternative embodiment shown in figure 6, connectors 100 having hook formations 150 are used instead of normal hook formations 500 be used. In this format, as in the embodiment shown in figure 1 which uses known hook formations 500 at or towards each end of the line 300, the line 300 is the equivalent of a single bungee cord. However, such a line has the benefit that it is adjustable for length.

In another embodiment shown in figure 5, a plurality of parallel lines 300 can be assembled, and connected to a plurality of lines 300 that extend in a transverse direction, to form the equivalent of a net 400. In such a configuration, it is envisaged that a plurality of connectors 100 will each seat a plurality of webbing straps 200 to extend in at least two dimensions. In another embodiment (not shown), a three dimensional net structure may be formed by a having a connector seat three or more webbing straps 200 to extend in three dimensions.

In order to assemble such a strapping system 1000, it is envisaged that a loop of one or more webbing straps 200 will be threaded through the receiving slot 120 of a body member 110. A closing formation 130 is then applied to the body member 110 as described above, to close the receiving slot 130 and prevent the webbing straps 200 decoupling from the body member during further assembly of the strapping system 1000.
More body members 110 can then be added to the ends of the line 300 so formed, and closing formations 130 similarly applied to each of the body members 110 so that a longer line of alternating connectors 100 and webbing straps 200 is formed.

Lines 300 can be extended in this way in two or even three dimensions to form a net 400.

Where in the foregoing description reference has been made to elements or integers having known equivalents, then such equivalents are included as if they were individually set forth.

Although the invention has been described by way of example and with reference to particular embodiments, it is to be understood that modifications and/or improvements may be made without departing from the scope or spirit of the invention.

In addition, where features or aspects of the invention are described in terms of Markush groups, those skilled in the art will recognise that the invention is also thereby described in terms of any individual member or subgroup of members of the Markush group.
CLAIMS

1. A strapping system for holding an item to be held in place, said strapping system comprising:
   a. at least one or more webbing straps;
   b. at least one connector arrangement, said connector arrangement comprising a connector member having at least one receiving slot into which a webbing strap is receivable,
   c. a closing formation in the form of a resilient O-ring configured to locate around the receiving slot to close said slot and retain the webbing strap in the connector member,
wherein the receiving slot is closable in use by stretching the closing formation until the closing formation has a cross section that is thin enough to be received into the receiving slot and releasing the stretched closing formation to engage with an edge of the receiving slot.

2. A strapping system as claimed in claim 1, wherein the webbing straps are endless loops of resilient material.

3. A strapping system as claimed in any one of claims 1 or 2, wherein the connector arrangement comprises at least one or more hook formation.

4. A strapping system as claimed in claim 2 or 3, wherein the endless webbing straps are composed of recycled inner tubes.

5. A strapping system as claimed in claim 4, wherein the endless webbing straps of resilient material are composed of vehicle tyre inner tubes that have been cut substantially radially to form endless webbing straps.

6. A strapping system as claimed in any one of claims 2 to 5, wherein the strapping system comprises an alternating line of endless webbing straps of resilient material, and connector arrangement.

7. A strapping system as claimed in claim 6, wherein the strapping system comprises a line of alternating endless webbing straps of resilient material and connector arrangement; with connector members with hook formations disposed at or towards one or both ends of said line.

8. A strapping system as claimed in any one of the preceding claims, wherein the strapping system comprises a plurality of parallel lines coupled to a plurality of parallel lines that extend transversely to form a net.

9. A strapping system as claimed in any one of the preceding claims, wherein the connector member is toroidally shaped.
10. A connector arrangement for a strapping system, the connector arrangement comprising:
   a. a connector member defining a receiving slot,
   b. a closing formation in the form of a resilient O-ring configured to locate around the receiving slot to close said slot,
   wherein the receiving slot is closable in use by stretching the closing formation until the closing formation has a cross section that is thin enough to be received into the receiving slot and releasing the stretched closing formation to engage with an edge of the receiving slot.

11. A connector arrangement as claimed in claim 10, wherein the connector member comprises a circularly or toroidally shaped bar.

12. A connector arrangement as claimed in claim 11, wherein the bar is substantially rounded and/or circular in cross section.

13. A connector arrangement as claimed in any one of claims 10 to 12, wherein the connector member defines at least one or more seating formations against which webbing straps may be seated.

14. A connector arrangement as claimed in any one of claims 10 to 13, wherein the connector member defines seating formations against which webbing straps may be seated on in at least two directions.

15. A connector arrangement as claimed in any one of claims 10 to 14, wherein the connector arrangement comprises a hook formation.

16. A bungee cord comprising a plurality of alternating connector arrangements as claimed in any one of claims 10 to 15; and webbing straps.

17. A net, the net comprising
   a. a plurality of connector arrangements as claimed in any one of claims 10 to 15,
   b. a plurality of webbing straps,
   c. wherein at least one of said connectors is/are configured to seat a plurality of webbing straps to extend in at least two dimensions.

18. A method of assembling the strapping system of any one of claims 1 to 9, said method comprising
   a. receiving one or more webbing straps within the receiving slot of the connector member, and
   b. locating said closing formation around said receiving slot of the connector member to close said receiving slot.
19. A method as claimed in claim 18, wherein the closing formation is thicker in cross section than the width of the receiving slot; and the step of locating the closing formation within the receiving slot comprises:
   a. stretching the closing formation until it has a cross section that is thin enough to be received into the receiving slot of the connector member, and
   b. releasing the stretched closing formation to engage with an edge of the receiving slot to restrict ingress or egress of matter through the receiving slot.

20. A method as claimed in claim 19, wherein the method comprises the step of adjusting the position of the released closing formation to block the receiving slot.

21. A strapping system as substantially described herein with or without reference to the accompanying figures.

22. A connector arrangement as substantially described herein with or without reference to the accompanying figures.
FIGURE 2