A Wearable Restraint

Field

The present invention relates to a wearable restraint configured to secure a passenger to a load carrying compartment of a vehicle.

Background

In a lot of countries, it is illegal to have passengers seated in a rear load carrying compartment of a vehicle such as a lorry, truck, or pick-up trucks. However, in some countries such as Singapore, there are no regulations against this and passengers may be seated in the rear load carrying compartment.

The passengers may be workers working for companies (e.g. construction companies) and staying in dormitories. Some of these companies adopts a cost-effective measure for transporting the workers from the dormitories to work sites by having the workers seated in the rear load carrying compartment of a lorry or truck used by the companies for carrying loads.

There is a concern over the workers' safety when they are seated in the rear load carrying compartment of a lorry or truck. The workers are at risk of serious injuries if the lorry or truck gets involved in an accident.

Summary

The invention is defined in the independent claims. Some optional features of the invention are defined in the dependent claims.

Brief Description of the Drawings

Examples in the present disclosure will be better understood and readily apparent to one skilled in the art from the following written description, by way of example only and in conjunction with the drawings, in which:

Fig. 1 shows a front view of a wearable restraint according to one example of the present disclosure.

Fig. 2 shows a front view of a passenger wearing the wearable restraint of Fig. 1.

Fig. 3 shows a rear view of a passenger wearing the wearable restraint of Fig. 1.

Fig. 4 shows a top view of a passenger wearing the wearable restraint of Fig. 1 to be secured to connectors mounted in a load carrying compartment of a vehicle.

Fig. 5 shows a top view of a vehicle comprising a plurality of passengers wearing the wearable restraint of Fig. 1 and arranged to be seated in a load carrying compartment of the vehicle.

Fig. 6 shows a top view of a slide buckle that may be used in a strap or belt of the wearable restraint of Fig. 1.

Fig. 7 shows a top view of a latching mechanism that may be comprised in a restraint connector of the wearable restraint of Fig. 1.

Fig. 8 shows a perspective view of a catch for receiving a clip of a restraint connector of the wearable restraint of Fig. 1.

Figs. 9A and 9B show perspective views of a concealable ring that may be used as a vehicle mounted connector to be connected to a restraint connector of the wearable restraint of Fig. 1.

Figs. 10A and 10B show perspective views of a movable ring in an anchor point that may be used as a vehicle mounted connector to be connected to a restraint connector of the wearable restraint of Fig. 1.

Fig. 11 shows a perspective view of a fixed ring that may be used as a vehicle mounted connector to be connected to a restraint connector of the wearable restraint of Fig. 1.

Detailed Description

An example of the present disclosure is a detachable and wearable restraint that is designed to secure one or more passengers in a load carrying compartment of a vehicle such as a lorry, van, or truck, and allow safe transportation of the one or more passengers between different locations. The wearable restraint described in the present disclosure can be a wearable vest or wearable webbing. The load carrying compartment is typically located in a rear of the vehicle, designed for carrying load and not for passenger seating, and is separated from a passenger compartment of the vehicle. The passenger compartment typically comprises at least two front seats, one of which is a vehicle driver seat, and the passenger compartment may further comprise a rear seat behind the two front seats for seating more passengers. The one or more passengers secured in the load carrying compartment may be standing or sitting. However, it is recommended that the one or more passengers should be sitting especially when the vehicle is moving. Padding can be provided in the restraint to provide comfort to the one or more passengers secured in the load carrying compartment and to provide cushioning to the body of each passenger in the case of sudden passenger movement, for instance, during a vehicle accident. An advantage of the wearable restraint is to provide a means to safely secure a passenger to the load carrying compartment of a vehicle. The restraint can help to prevent passenger injuries that may arise due to such sudden passenger movements and/or from a passenger being pushed or flung out of the load carrying compartment.

During the invention process, a study was conducted on the feasibility of installing a shoulder seat belt system commonly used in the passenger compartment of a vehicle, and a lap seat belt system commonly used in passenger aeroplanes, in the load carrying compartment of the vehicle. However, it was discovered that these systems have the following issues.

With regard to the shoulder seat belt system, a three-point seat belt system commonly found in vehicles that can transport passengers requires a safety belt clip installed above shoulder height. This safety belt clip is attached to a strap that extends across the passenger's shoulder and the front of the passenger's body when in use. There is present a male clip on the strap for buckling to a female connector mounted at a point close to a passenger's hip. The main issue with the shoulder seat belt system is the requirement for the safety belt clip to be located above shoulder height of a seated passenger. However, in many vehicles with a rear load carrying compartment, the side walls of the load carrying compartment has an average height of only about 70cm. This height is too low and is not suitable for a shoulder seat belt system to be installed.

With regard to lap seat belt system, a two-point lap belt system commonly used in a passenger aeroplane has a strap that goes over the waist of a passenger and there is a male clip on the strap for buckling to a female connector mounted at a point located across the waist of the passenger. However, such lap belt system is designed to protect passengers in the case of forward movements during a collision. It is not sufficiently safe to protect passengers seated in the load carrying compartment as the passengers may also have movements in all directions other than the forward movements, depending on where and how they are seated in the load carrying compartment.

Furthermore, the shoulder seat belt system and the lap seat belt system require passengers to be fastened to a seat with minimum allowance for passenger movement. More injuries may result during a collision when there is little allowance for movement in the load carrying compartment of a vehicle.

The feasibility of installing seats and seat belt systems for the seats in the load carrying compartment is also considered. If permanent seats are mounted, the load carrying compartment will reduce or lose its capacity for carrying load such as equipment/materials,

and the use for the vehicle will be limited. Furthermore, it is not cost effective to install detachable seats.

Safety body harness equipment used for various purposes, for instance, at a building construction site, for parachuting, or for rock climbing, are also considered. There are four major types of safety body harness equipment as following:

1) Vest-type harness.
2) Parachute or full-body harness.
3) Single-strap harness.
4) Chest harness.

With regard to existing Vest-type harness and Parachute or full-body harness, it is observed that the design of such harnesses are mainly focused on securing a wearer in an upright position in the event of a fall from height. It is not designed for securing a passenger seated in a load carrying compartment of a vehicle and for protecting against sudden passenger movements that may be in various directions, which can cause injuries such as back injury in the case of a vehicle accident.

With regard to single-strap harness, they are mainly used for carrying pets or for carrying equipment (e.g. Cameras/ Tools). Single-strap harness typically has only one strap running diagonally across a wearer's body like a sling bag strap. Such harness does not provide good support and locking capability to provide secure protection against sudden passenger movements that may be in various directions for a passenger seated in a load carrying compartment of a vehicle.

With regard to chest harness, such harness only goes across a wearer's chest area. Chest harnesses are mainly used by wheelchair bounded individuals and are generally used for providing better seating posture. They typically provide a rearward pull to the shoulders of a wearer to prevent a slumped forward posture. They are focused on providing support only to the chest area of a wearer and are not suited for protection against sudden passenger movements that may be in various directions for a passenger seated in a load carrying compartment of a vehicle.

With reference to Fig. 1, there is provided a detachable and wearable seat restraint 100 according to an example of the present disclosure to secure a passenger in a load carrying compartment of a vehicle such as a lorry, van, or truck and allow safe transportation of the passenger between different locations. Notably, such vehicles have been around for a long time and yet there is no safe product in the market to achieve this purpose. Each passenger in the load carrying compartment would be provided with such restraint so that there may be a plurality of restraints matching the number of passengers in the load carrying compartment.

The restraint 100 comprises 4 pieces of straps, numbered 1, 2, 3 and 4, that are attached or woven together to form the restraint 100. The straps 1 to 4 may be made of a material such as polyester, nylon, cotton, a mixture of different fabric materials, and the like. Indication of "right" in the description below is with respect to the right hand side of the passenger. Indication of "left" in the description below is with respect to the left hand side of the passenger.

Straps 1 and 2 are for strapping over each shoulder of a passenger to be secured to a load carrying compartment of a vehicle (e.g. lorry, van, truck, pick-up truck and the like), wherein the load carrying compartment of the vehicle is separated from a passenger compartment of the vehicle. The load carrying compartment of the vehicle excludes a car boot and rear seats in the passenger compartment of the vehicle. Straps 1 and 2 form shoulder straps 106 of the restraint 100. Specifically, when the passenger wears the restraint 100, each of the straps 1 and 2 extends from each shoulder to the back of the passenger and down to the waist area of

the passenger, and also to the front of the passenger and down to the waist area of the passenger. Points marked out as B1 and B2 on the right and left shoulder straps 106 can be set as adjustable points for adjusting length of the right and left shoulder straps 106 respectively. Points B1 and B2 are located at positions between the respective top of the right and left shoulders and the waist level of the passenger wearing the restraint 100.

Strap 3 is attached to one end of each of the straps 1 and 2 at the waist level. Strap 3 extends horizontally across the body of the passenger and has to two left and right loose ends for connecting to corresponding vehicle mounted connectors mounted in the load carrying compartment of the vehicle. The strap 3 comprises, at one loose end, a right restraint connector 108 comprising a right connector clip 108a for connecting to a corresponding vehicle mounted connector that is mounted to the load carrying compartment of the vehicle. Strap 3 comprises, at the other loose end, a left restraint connector 110 comprising a left connector clip 110a for connecting to a corresponding vehicle mounted connector that is mounted to the load carrying compartment of the vehicle. Points marked out as C1 and C2 and located at positions along the right and left loose ends of strap 3 respectively can be set as adjustable points for adjusting length of the right and left ends of strap 3 respectively.

Strap 4 is a waist belt 102 and is attached to the end of each of the straps 1 and 2 that is not attached to strap 3. Strap 4 is also attached to strap 3 in a position corresponding to the back of the waist area of the passenger when the passenger wears the restraint 100. Strap 4 comprises a buckle 112, which is a locking mechanism to secure the restraint 100 to the passenger wearing the restraint 100 by securing the strap 4 to the waist area of the passenger. The buckle 112 comprises a female connector 112a located at one end of strap 4 and a male connector 112b located at another end of strap 4. Points marked out as A1 and A2 and located on the strap 4 at positions corresponding to right and left sides of the waist area of the passenger respectively can be set as adjustable points for adjusting length on the right and left sides of the waist area of the passenger respectively.

An optional strap (not shown in Fig. 1) may be provided as a chest strap to be strapped around the chest area of the passenger, one or more locking mechanisms (e.g. side release buckles) may be provided for securing the chest strap to the chest area of the passenger.

An example of the buckle 112 can be a metal buckle commonly used to strap passengers to their seats on board passenger aeroplanes. Such metal buckle is durable and secure. Other types of buckles like side release buckles, typically made of plastic, and economically priced, can also be used.

An example of an adjustment mechanism to be placed at points A1, A2, B1, B2, C1 and/or C2 can be a slide buckle 600 illustrated in Fig. 6, a Tri-Glide buckle, or the like.

Allowing the adjustment of the length of the shoulder straps 106 at points A1 and/or A2 enables the restraint 100 to be adjusted to fit different body sizes and/or lengths. They can also be tightened to better fit over the shoulders and/or body of the passenger or loosened to reduce strain exerted by the shoulder straps 106 on the shoulders and/or body of the passenger.

Allowing the adjustment of the length of the waist belt 102 at points B1 and/or B2 enables the restraint 100 to be tightened or loosened to fit different waist sizes of passengers. Tightening up the wait belt 102 can help a passenger to be more secure.

Allowing the adjustment of the length of the strap 3 at points C1 and/or C2 enables the positions to mount the corresponding vehicle mounted connector to be adjusted to preferred positions in the load carrying compartment of a vehicle. For instance, the desired mounting positions may be adjusted to suit a specific profile of a load carrying compartment of a vehicle or a layout planned for a load carrying compartment of a vehicle. Furthermore, the adjustment

of the length of the strap 3 at points C1 and/or C2 can also adjust the movement space allowance of each passenger at each designated seating spot in the load carrying compartment. For instance, tightening the strap 3 at C1 and C2 will restrict passenger movement from a designated seating spot. The strap 3 may be adjusted to a length such that the passenger is forced to sit down. If the strap 3 is loosened at C1 and/or C2, the passenger has more allowance to choose to stand, sit, and/or move further outside of the designated seating spot.

In the case that adjustment points C1 and C2 are not provided, the strap 3 may be configured to have a fixed length and a recommended distance (lesser than this fixed length) between two consecutive corresponding vehicle mounted connectors (e.g. the right and left vehicle mounted connectors for connecting to the right and left restraint connectors 108 and 110 respectively) may be determined. The recommended distance will determine the movement space allowance provided for each passenger. For instance, if the recommended distance is equal to or lesser than but close to the fixed length, the passenger will be forced to sit down in order to connect the restraint connectors 108 and 110 to the two consecutive corresponding vehicle mounted connectors.

In the present example, a back padding 104 is attached to the straps 1 and 2 to support the back of the passenger. The back padding 104 can also be attached to strap 4. The back padding 104 can help to absorb impact on the back of the body of the passenger in the case of a vehicle accident. Notably, this feature is not present in any of the existing 4 major types of safety body harness equipment.

The restraint 100 may have a substantial portion coloured in a bright colour to enable passengers not wearing the restraint 100 to be easily identified. To provide better visibility of the passengers in the dark, the restraint 100 may also comprises one or more lighting elements, and/or a reflective layer for reflecting light incident on the reflective layer.

In the present example, an advantage of the restraint 100 is that the restraint 100 is detachable and will not become an obstruction when the load carrying compartment is to be used to contain and carry load.

Figs 2 and 3 show front and rear views of a passenger 200 wearing the restraint 100 of Fig. 1 respectively. The buckle 112 of the restraint 100 shown in Fig. 2 is locked to secure the waist belt 102 of the restraint 100 to the passenger 200. The shoulder straps 106 are also strapped to the passenger 200. Specifically, in Fig. 3, the rear view of the back padding 104 attached to the strap 3, which comprises the right restraint connector 108 and the left restraint connector 110, is shown. In Figs. 2 and 3, side paddings may be provided in the locations 202 in the front and back of the passenger 200 to provide cushioning to the left and/or right side of the body of the passenger 200. Specifically, in one example, left and right side paddings can be provided in the locations 202 below the left and right arm pits of the passenger 200 and extending to the waist area of the passenger 200. These side paddings can help to absorb impact on the sides of the body of the passenger in the case of a vehicle accident.

The straps 1 to 4, the back padding 104, and/or the side paddings described above with reference to Figs. 1 to 3, can be installed with safety pads made of, for instance, high-density rubber foam, plastic-based foam, and the like, to provide cushioning against impact. In particular, having pads on the shoulder straps 106 would also reduce exertion and/or frictional strain acting on the body of the passenger compared to shoulder straps without pads.

Fig. 4 shows a passenger 400 wearing an example of the restraint 100 of Fig. 1 and is seated at a designated spot in a load carrying compartment of a vehicle. Fig. 4 illustrates an example of the configuration of the strap 3 of Fig. 1, the right and left restraint connectors 108 and 110 of Fig. 1, and the right and left connector clips 108a and 110a of Fig. 1. The right and left

restraint connector clips 108a and 110a are each connectable to catches 402 and 404 respectively. The catches 402 and 404 are the corresponding vehicle mounted connectors described earlier with reference to Fig. 1.

Although in Fig. 4, right and left connector clips 108a and 110a are used, it could be that in another example, the configuration is reversed. That is, these right and left connector clips 108a and 110a may be configured as catches, and the one or more corresponding vehicle mounted connectors 402 and 404 may be configured as clips for insertion and securing into said catches respectively.

In the current example, the right and left restraint connector clips 108a and 110a, and the catches 402 and 404 are configured to be similar to the clips and catches of vehicle passenger seat belt buckles. With reference to Fig. 8, the catches 402 and 404 of Fig. 4 are bolted or fastened via a fastener 802 to predetermined locations in the load carrying compartment.

The vehicle mounted connectors to be mounted in the load carrying compartment, such as the catches 402 and 404, may be ruggedized to be more resistant to environmental conditions, more durable and/or more resistant to breakage.

In another example, another way of connection may be used to connect the right and left restraint connectors 108 and 110 to the corresponding vehicle mounted connectors. With reference to Fig. 7, each of the right and left restraint connector clips 108a and 110a shown in Figs. 1 and 4 may be replaced by a latching mechanism such as a shackle, which can include a specific type of shackle called a carabiner 700 that is illustrated in Fig. 7. The carabiner 700 is typically a metal loop 702 with a spring-loaded gate 704. The spring-loaded gate 704 can open to allow the metal loop 702 to hook on to an anchor point (not shown in Fig. 7) present in the corresponding vehicle mounted connector. The anchor point may comprise a loop member that can be fixed or movable in the anchor point. Specifically, the metal loop 702 is hooked and latched to the loop member to secure the restraint connector to the corresponding vehicle mounted connector. After the metal loop 702 is hooked on to the loop member and the spring-loaded gate 704 is closed, the metal loop 702 is locked to the loop member. In the present example, there is provided a twist lock 706 sleeved over the gate 704 to lock the gate 704 after the gate 704 is closed to provide a more secured connection to the loop member. Such twist lock 706 is optional. The loop member may be described by different names like a handle, a ring, a catch, an eye, an eyelet, or a hoop. The loop member may be circular, elliptical, oval, triangular, squarish, rectangular or any other suitable shape. However, regardless of how the loop member is named and shaped, the main purpose of the loop member is to allow the latching mechanism, such as the carabiner 700, to hook and latch on. More details of the anchor point is provided below.

Figs. 9A and 9B show an example of a corresponding vehicle mounted connector 900 that can be connected to the latching mechanism of Fig. 7. The vehicle mounted connector 900 in the present example is an anchor point mounted to the load carrying compartment and can be called a heavy duty hidden or concealable handle. Heavy duty versions are preferred as they are more durable. The vehicle mounted connector 900 comprises a loop member, which is a handle 902 movable between an extended configuration illustrated in Fig. 9A for the shackle to connect to the handle 902, and a stowed configuration illustrated in Fig. 9B in which the handle 902 does not project into a space that the handle 902 moves into when the handle 902 is moving between the extended configuration and the stowed configuration. The vehicle mounted connector 900 comprises holes 904 for a fastener (e.g. nut and bolt set, screw, and the like) to insert through to fasten the vehicle mounted connector 900 to a wall or floor surface of a load carrying compartment of a vehicle. In the present example, specifically, the handle 902 is pivotable about a hinge 906 between the extended configuration and the stowed configuration. In the present example, in combination, the handle 902 and the hinge 906 has a rectangular shape. The vehicle mounted connector 900 comprises a housing 908 for

receiving the handle 902 in the stowed configuration. When the handle 902 is stowed, the handle 902 does not project outside of the housing 908, which comprises the space that the handle 902 will move into when the handle 902 s moved between the extended configuration and the stowed configuration. Specifically, in the present example, a side of the handle 902 flushes with a planar surface of the housing 908 when the handle 902 is stowed. An advantage of such concealable handle feature is that the handle 902 will not obstruct any object that may be moved into the space that the handle 902 will move into when the handle 902 is moved between the extended configuration and the stowed configuration. Therefore, the load carrying compartment of the vehicle can be filled with load without concern that the handle 902 of the vehicle mounted connector 900 will obstruct the load or be damaged by the load.

The handle 902 does not have to be an enclosed loop or hoop. The handle 902 may have a broken section (not shown in Figures) residing in the hinge 906. In the present example, the handle 902 has two opposite ends for slotting into corresponding apertures 910 of the housing 908 to form the hinge 906 so as to enable the handle 902 to pivot about the hinge 906.

Figs. 10A and 10B show another example of a corresponding vehicle mounted connector 1000 that can be connected to the latching mechanism of Fig. 7. The vehicle mounted connector 1000 in the present example is an anchor point mounted to the load carrying compartment and can be called a heavy duty folding pad eye or a surface mount foldable D-ring. Heavy duty versions are preferred as they are more durable. The vehicle mounted connector 1000 comprises a loop member, which is a ring 1002 (specifically, a D-ring in the present example) movable between an extended configuration illustrated in Fig. 10A for the shackle to connect to the ring 1002, and a stowed configuration illustrated in Fig. 10B in which the ring 1002 does not project into a space that the ring 1002 moves into when the ring 1002 is moving between the extended configuration and the stowed configuration. The vehicle mounted connector 1000 comprises holes 1004 for a fastener (e.g. nut and bolt set, screw, and the like) to insert through to fasten the vehicle mounted connector 1000 to a wall or floor surface of a load carrying compartment of a vehicle. In the present example, specifically, the ring 1002 is D-shaped and is pivotable about a hinge 1006 between the extended configuration and the stowed configuration. The vehicle mounted connector 1000 comprises a surface mount member 1008 comprising the hinge 1006. The present example differs from the example of the heavy duty hidden or concealable ring of Figs. 9A and 9B in that the ring 1002 is not concealed in the housing 908 of Fig. 9A and is exposed when it is stowed. To have the ring 902 of Figs. 9A and 9B concealed in the housing 908 provides least obstruction to load to be placed in the load carrying compartment and least chance of ring damage. However, in the present example, there is still an advantage that the stowed ring 1002 will cause minimum obstruction to any object that may be moved into the space that the ring 1002 will move into when the ring 1002 is moved between extended configuration and the stowed configuration. Therefore, the load carrying compartment of the vehicle can still be filled with load without much concern that the ring 1002 of the vehicle mounted connector 1000 will cause serious obstruction to the load or be badly damaged by the load. Generally, the present example is relatively easy to mount and generally priced lower compared to the example of Figs. 9A and 9B.

The ring 1002 does not have to be an enclosed loop or hoop. The ring 1002 may have a broken section (not shown in Figures) residing in the hinge 1006. In the present example, the ring 1002 has two opposite ends for slotting into apertures 1010 of the housing 1008 to form the hinge 1006 to enable the ring 1002 to pivot about the hinge 1006.

Fig. 11 shows yet another example of a corresponding vehicle mounted connector 1100 that can be connected to the latching mechanism of Fig. 7. The vehicle mounted connector 1100 is an anchor point mounted to the load carrying compartment and can be called a heavy duty pad eye and it comprises a plate 1108 with holes 1104 for a fastener (e.g. nut and bolt set, screw, and the like) to insert through to fasten the vehicle mounted connector 1100 in a load

carrying compartment of a vehicle. The vehicle mounted connector 1100 comprises an eye 1102 that is fixed to the plate 1108 and cannot be moved or pivoted. This example is relatively easy to mount and generally priced lower compared to the examples of Figs. 9A and 9B, and Figs. 10A and 10B. However, a trade-off is the eye 1102 is unable to move.

Fig. 5 shows a top view of an example of a vehicle 500 having a passenger compartment 502 designed for passenger seating and a load carrying compartment 504 not designed for passenger seating. A plurality of passengers 510, each wearing the wearable restraint 100 illustrated by the examples of the present disclosure such as the restraint 100 in Fig. 1, are to be seated in the load carrying compartment. The load carrying compartment 504 comprises a platform 506 (or bed or floor) on which the plurality of passengers 510 may be seated. A plurality of a pair of vehicle mounted connectors 512 and 514 are mounted in the load carrying compartment 504 at designated or predetermined locations in the load carrying compartment 504. Each pair of the vehicle mounted connectors 512 and 514 are configured to connect to a pair of restraint connectors present in each wearable restraint.

In the present example, the load carrying compartment 504 is substantially rectangular in shape. The plurality of the pair of vehicle mounted connectors 512 and 514 may be mounted to or along

- a left side wall 504a (“left” with respect to the vehicle 500) of the load carrying compartment 504,
- a right side wall 504b (“left” with respect to the vehicle 500) of the load carrying compartment 504,
- a wall 508b closest to the passenger compartment 502, and/or
- a wall 508a located at a rear side of the vehicle 500.

Mounting the plurality of the pair of vehicle mounted connectors 512 and 514 on the abovementioned wall or walls via fasteners would be considered as mounting them to said wall or walls. Mounting the plurality of the pair of vehicle mounted connectors 512 and 514 on the platform 506 close to the foot of the abovementioned wall or walls via fasteners can be considered as mounting them along said wall or walls. Furthermore, sometimes a canopy for providing shelter is installed in the load carrying compartment, and the canopy may have poles, fixtures or rails located close to the abovementioned wall or walls. Mounting the plurality of the pair of vehicle mounted connectors 512 and 514 on the poles, fixtures or rails of the canopies located close to the abovementioned wall or walls via fasteners can also be considered as mounting them along said wall or walls.

In addition, the plurality of the pair of vehicle mounted connectors 512 and 514 may be mounted on the platform 506. The platform 506 may be flat. In Fig. 5, there is present a space 506a marked out in dashed lines in the platform 506 that is surrounded by passengers seated against the walls 504a, 504b, 508b and 508a. Passengers such as one of the passengers 510a may also be seated in the space 506a. A pair of vehicle mounted connectors 512 and 514 is mounted in the space 506a to enable the passenger 510a to secure to the seating spot in the space 506a. For passengers seated against the walls 504a, 504b, 508b and 508a, they can make use of the walls 504a, 504b, 508b and 508a as back rest. However, for passengers seated in the space 506a, there is no back rest.

In Fig. 5, the pairs of vehicle mounted connectors 512 and 514 are evenly spaced apart to provide sufficient seating space for each passenger.

In summary, examples of the present disclosure may include the following features. Reference numerals in the figures of the present disclosure that are examples of the following features are indicated.

A wearable restraint (e.g. 100) configured to secure a passenger (e.g. 200, 400, 510, and 510a) to a load carrying compartment (e.g. 504) of a vehicle (e.g. 500), wherein the wearable restraint comprises:
one or more straps (e.g. straps 1 to 4);
one or more locking mechanisms (e.g. 112) for securing the one or more straps to the body of a passenger; and
one or more restraint connectors (e.g. 108, 110, and 700) for securing to one or more corresponding vehicle mounted connectors (e.g. 402, 404, 800, 900, 1000, and 1100) in a load carrying compartment of a vehicle,
wherein the load carrying compartment is separated from a passenger compartment (e.g. 502) of the vehicle. The wearable restraint may be detachable from the load carrying compartment.

One of the one or more vehicle mounted connectors may comprise a loop member (e.g. 902, 1002, and 1102) for one of the one or more restraint connectors to engage the loop member.

The loop member (e.g. 902 and 1002) may be movable between an extended configuration for said restraint connector to connect to the loop member, and a stowed configuration in which the loop member does not project into a space that the loop member moves into when the loop member is moving between the extended configuration and the stowed configuration.

Said vehicle mounted connector may comprise a housing (e.g. 908) for receiving the loop member (e.g. 902) in the stowed configuration.

One of the one or more restraint connectors may be a clip (e.g. 108a and 110a) or a catch (e.g. 402, 404, and 800), and one of the one or more corresponding vehicle mounted connectors is a catch for receiving said restraint connector in the form of the clip, or a clip for inserting into said restraint connector in the form of the catch respectively.

The one or more straps may be adjustable to fit the body of the passenger.

The one or more straps may comprise a waist belt (e.g. 102), and the one or more locking mechanisms comprises a waist locking mechanism (e.g. 112) with parts disposed at two ends of the waist belt for securing the waist belt to the waist area of the passenger.

The one or more straps may comprise a chest strap to be strapped around the chest area of the passenger, and the one or more locking mechanisms comprises a chest strap locking mechanism for securing the chest strap to the chest area of the passenger.

The restraint may comprise a back padding (e.g. 104) for cushioning the back of the passenger.

The restraint may comprise side padding for cushioning the left and/or right side of the body of the passenger.

The restraint may comprise one or more padded shoulder straps (e.g. 106).

The one or more vehicle mounted connectors may be mounted to or along a side wall (e.g. 504a and 504b) of the load carrying compartment at a left or right side of the vehicle.

The one or more vehicle mounted connectors may be mounted to or along a wall (e.g. 508b) of the load carrying compartment closest to the passenger compartment.

The one or more vehicle mounted connectors may be mounted to or along a wall (e.g. 508a) of the load carrying compartment located at a rear side of the vehicle.

The one or more vehicle mounted connectors may be mounted on a platform (e.g. 506) of the load carrying compartment.

The restraint may comprise a substantial portion in a bright colour, comprise one or more lighting elements, and/or a reflective layer for reflecting light incident on the reflective layer.

The one or more straps may comprise:

a strap (e.g. strap 3) attached to the one or more restraint connectors, wherein the strap has a length that determines allowance for movement of a passenger wearing the wearable restraint when the wearable restraint is secured to the one or more corresponding vehicle mounted connectors.

The strap attached to the one or more restraint connectors may be adjustable in length to adjust the allowance for movement of the passenger wearing the wearable restraint when the wearable restraint is secured to the one or more corresponding vehicle mounted connectors.

The strap attached to the one or more restraint connectors may have a length that will force a passenger wearing the wearable restraint with the one or more restraint connectors secured to the one or more corresponding vehicle mounted connectors to sit down in the load carrying compartment.

The restraint may comprise only two restraint connectors (e.g. 108 and 110), wherein the two restraint connectors are disposed at loose ends of one of the one or more straps (e.g. strap 3) and said loose ends extends out from left and right sides of the passenger respectively when the passenger is wearing the restraint.

A passenger securing kit to secure a passenger to a load carrying compartment of a vehicle, wherein the kit comprises the wearable restraint; and the one or more vehicle mounted connectors to be mounted to the load carrying compartment. This kit provides a complete set of the restraint and the one or more vehicle mounted connectors for installation in a load carrying compartment.

In the specification and claims, unless the context clearly indicates otherwise, the term “comprising” has the non-exclusive meaning of the word, in the sense of “including at least” rather than the exclusive meaning in the sense of “consisting only of”. The same applies with corresponding grammatical changes to other forms of the word such as “comprise”, “comprises” and so on.

While the invention has been described in the present disclosure in connection with a number of embodiments and implementations, the invention is not so limited but covers various obvious modifications and equivalent arrangements, which fall within the purview of the appended claims. Although features of the invention are expressed in certain combinations among the claims, it is contemplated that these features can be arranged in any combination and order.

Claims

1. A wearable restraint configured to secure a passenger to a load carrying compartment of a vehicle, wherein the wearable restraint comprises:
one or more straps;
one or more locking mechanisms for securing the one or more straps to the body of a passenger; and
one or more restraint connectors for securing to one or more corresponding vehicle mounted connectors in a load carrying compartment of a vehicle,
wherein the load carrying compartment is separated from a passenger compartment of the vehicle.

2. The wearable restraint of claim 1, wherein one of the one or more vehicle mounted connectors comprises a loop member for one of the one or more restraint connectors to engage the loop member.

3. The wearable restraint of claim 2, wherein the loop member is movable between an extended configuration for said restraint connector to connect to the loop member, and a stowed configuration in which the loop member does not project into a space that the loop member moves into when the loop member is moving between the extended configuration and the stowed configuration.

4. The wearable restraint of claim 3, wherein said vehicle mounted connector comprises a housing for receiving the loop member in the stowed configuration.

5. The wearable restraint of any one of the preceding claims, wherein one of the one or more restraint connectors is a clip or a catch, and one of the one or more corresponding vehicle mounted connectors is a catch for receiving said restraint connector in the form of the clip, or a clip for inserting into said restraint connector in the form of the catch respectively.

6. The wearable restraint of any one of the preceding claims, wherein the one or more straps is adjustable to fit the body of the passenger.

7. The wearable restraint of any one of the preceding claims, wherein the one or more straps comprises a waist belt, and the one or more locking mechanisms comprises a waist locking mechanism with parts disposed at two ends of the waist belt for securing the waist belt to the waist area of the passenger.

8. The wearable restraint of any one of the preceding claims, wherein the one or more straps comprises a chest strap to be strapped around the chest area of the passenger, and the one or more locking mechanisms comprises a chest strap locking mechanism for securing the chest strap to the chest area of the passenger.

9. The wearable restraint of any one of the preceding claims, wherein the restraint comprises a back padding for cushioning the back of the passenger.

10. The wearable restraint of any one of the preceding claims, wherein the restraint comprises side padding for cushioning the left and/or right side of the body of the passenger.

11. The wearable restraint of any one of the preceding claims, wherein the restraint comprises one or more padded shoulder straps.

12. The wearable restraint of any one of the preceding claims, wherein the one or more vehicle mounted connectors are mounted to or along a side wall of the load carrying compartment at a left or right side of the vehicle.

13. The wearable restraint of any one of the preceding claims, wherein the one or more vehicle mounted connectors are mounted to or along a wall of the load carrying compartment closest to the passenger compartment.

14. The wearable restraint of any one of the preceding claims, wherein the one or more vehicle mounted connectors are mounted to or along a wall of the load carrying compartment located at a rear side of the vehicle.

15. The wearable restraint of any one of the preceding claims, wherein the one or more vehicle mounted connectors are mounted on a platform of the load carrying compartment.

16. The wearable restraint of any one of the preceding claims, wherein the restraint comprises a substantial portion in a bright colour, comprises one or more lighting elements, and/or a reflective layer for reflecting light incident on the reflective layer.

17. The wearable restraint of any one of the preceding claims, wherein the one or more straps comprises:

a strap attached to the one or more restraint connectors, wherein the strap has a length that determines allowance for movement of a passenger wearing the wearable restraint when the wearable restraint is secured to the one or more corresponding vehicle mounted connectors.

18. The wearable restraint of claim 17, wherein the strap attached to the one or more restraint connectors is adjustable in length to adjust the allowance for movement of the passenger wearing the wearable restraint when the wearable restraint is secured to the one or more corresponding vehicle mounted connectors.

19. The wearable restraint of claim 17 or 18, wherein the strap attached to the one or more restraint connectors has a length that will force a passenger wearing the wearable restraint with the one or more restraint connectors secured to the one or more corresponding vehicle mounted connectors to sit down in the load carrying compartment.

20. The wearable restraint of any one of the preceding claims, wherein the restraint comprises only two restraint connectors, wherein the two restraint connectors are disposed at loose ends of one of the one or more straps and said loose ends extends out from left and right sides of the passenger respectively when the passenger is wearing the restraint.

21. A passenger securing kit to secure a passenger to a load carrying compartment of a vehicle, wherein the kit comprises the wearable restraint of any one of the preceding claims; and the one or more vehicle mounted connectors to be mounted to the load carrying compartment.