Title: A REVERSIBLY ATTACHABLE FALL RESTRAINT APPARATUS

Abstract: The present invention relates to a fall restraint apparatus for use with large transport and earthmoving equipment. In particular the invention relates to a fall restraint apparatus that can be reversibly attachable to a vehicle and which enables a user to work safely at a height above the ground. The fall restraint apparatus includes a first and second cable supporting members for reversible attachment to the vehicle, the first and second cable supporting members being extendable above at least a portion of the vehicle, wherein a cable is connected between upper portions of said first and second cable supporting members to thereby provide a support to which a user can be tethered. In one aspect of the invention the first and second cable supporting members are engageable with the wheels of the vehicle. In another aspect the first and second cable supporting members can be reversibly attached to the side of the vehicle.
A reversibly attachable fall restraint apparatus

FIELD OF THE INVENTION

The present invention relates to a fall restraint apparatus and use thereof. In particular the invention relates to a fall restraint apparatus that can be reversibly attachable to a vehicle and which enables a user to work safely at a height above the ground.

BACKGROUND OF THE INVENTION

Mining and bulk freight industries use large vehicles for earthmoving and transport. Semi-trailers that are used for the transportation of bulk freight between sites include a prime mover supported on three axles and a dual or tri axle trailer. A turntable on the prime mover is configured to support the front of the trailer. Other long haul transport configurations include B-doubles and road trains.

The mining industry utilises large vehicle for the mining of the materials and the transport thereof. The vehicles used within the mining industry include multiple axle vehicles and excavators mounted on an undercarriage having tracks.

The top of the load on bulk freight vehicles is typically around 4.5 metres off the ground. At times the users are required to access the top of the load to secure tarpaulins or check the load. There is therefore a risk to workers from a fall while moving around on the top of the load. On average within Australia one person is killed in a fall from a truck every year and about 150 transport drivers suffer a serious injury resulting from such falls. Similarly the upper surface of excavators are several metres off the ground and therefore a worker undertaking maintenance on the top of such vehicles are also at risk from a fall.

The cost to industry from such accidents amounts to millions of dollars. For instance between 2001-2004 the total cost from such injuries to the transport industry within Australia alone was around 6 million dollars. These figures do not take in to consideration other industries such as mining.
There are also the hidden costs relating to the rescheduling of loads, and the engagement and training of replacement drivers, which can amount to between five and nine times the direct cost of the incident.

Industry has recognised that the risk of injury to workers caused by falls from vehicles, plant and equipment is significant for the employees concerned, the employer and the industry as a whole.

The best way to reduce falls by workers from transport vehicles is to reduce the need for the worker to work on top of the vehicle or load, or a similar situations that puts them at risk.

In many situations this is not practical and the worker is required to climb onto the top of the load to secure tarpaulins, check the load or undertake maintenance. As a result restraint belts and harnesses attached to a monorail or fixed static line are often used to protect the worker. These monorails or static lines are attached to an existing structure such as the roof trusses of a building.

One of the difficulties is that the worker may need to work on top of the vehicle when it is not located in the near vicinity of such an device or when it is already in use. Such delays cost money and the potential risks to the worker from unrestrained access are significant.

It should be appreciated that any discussion of the prior art throughout the specification is included solely for the purpose of providing a context for the present invention and should in no way be considered as an admission that such prior art was widely known or formed part of the common general knowledge in the field as it existed before the priority date of the application.

SUMMARY OF THE INVENTION

In a first aspect of the invention but not necessarily the broadest or only aspect, there is proposed a fall restraint apparatus for use with a vehicle including first and second cable supporting members for reversible attachment to the vehicle, the first and second cable supporting members being extendable above at least a portion of the vehicle, wherein a cable is connected between upper portions of said first and
second cable supporting members to thereby provide a support to which a user can be tethered.

In a second aspect of the invention there is proposed a fall restraint apparatus for use with a vehicle including a first cable supporting member having an engagement means engagable with a first wheel of the vehicle and a second cable supporting member having an engagement means engagable with a second wheel of the vehicle, the first and second cable supporting members extendable above at least a portion of the vehicle, wherein a cable is connected between upper portions of said first and second cable supporting members to thereby provide a support to which a user’s safety harness can be coupled.

The use of respective engagement means inhibits movement of the first and second cable supporting members due to the weight of the vehicle holding the engagement means in position.

In preference the first and second cable supporting members are vertically extendible above the vehicle. More preferably the supporting members include respective telescopic members. The telescopic members are extendable above the vehicle when loaded. This means that when the apparatus is being used with a vehicle where the height is above four metres the apparatus is not cumbersome to move.

The cable to which the user is connected acts as a support to provide fall restraint thereby preventing the user from accidentally falling from the vehicle.

In one form the cable extending between the first and second cable supporting members is drawn taut to provide a static line to which a harness can be attached. The static cable thereby provides a fixed line that will not collapse in the event that a user falls from the vehicle.

The upper ends of the first and second cable supporting members are attached to respective positions on the vehicle by way of anchoring cables. The respective anchoring cables extend in generally opposing directions from the upper ends of the first and second telescopic member. This means that the tension applied by the respective anchoring cables counteracts the load resulting from the tightening of the static cable extending between the two telescopic members. As the reader will
appreciate this ensures that the upper ends of the two telescopic members are not drawn together, which would result in damage to the telescopic members.

Alternatively the static cable and anchoring cables may be replaced with a single cable that is attached to the vehicle at each end and adapted to engage the top of the first and second cable supporting members.

In one form the first and second cable supporting members are attached to respective bases, each base having an engagement means in the form of an outwardly extending flange and at least two wheels. The flange being adapted to rest upon the ground when the respective telescopic member is in a substantially upright position.

The flange extends outwardly from the base to a distance of between 30-40cm. This ensures that there is a sufficient surface area to which the tyre of the vehicle can engage. The reader would appreciate that if the surface area were to small then the flange could potentially cut into the tyre during use.

In one form the base includes an axle having two wheels and a jockey wheel assembly. The axle bears the significant proportion of the weight during relocation of the apparatus while the jockey wheel assists in manoeuvrability. The jockey wheel assembly is attached to a rearwardly extending frame such that the jockey wheel is located above the axle when the telescopic member is in an upright position. This means that when the apparatus is being moved it can be reclined rearwardly so that it is supported on all three wheels. The reader would appreciate that in this posture the apparatus can be easily moved, in a similar manner to a sack truck, which minimises the risk of the flange coming into contact with the ground.

A handle is attached to the outer portion of the telescopic member to assist in the relocation of the apparatus. The handle is clamped to the telescopic member and is preferable adjustable to different heights so that is can be tailored to the height requirements of the individual user.

In another form the base includes two sleeves that are of a size to accommodate the tyres of a forklift. In this way the apparatus can be moved into position manually and transported over longer distances using the forklift.
The first and second cable supporting members are preferably hydraulically operated. In one form each telescopic member includes a telescopic hoist cylinder, pivotable handle, hydraulic reservoir and directional control valve (DCV). The telescopic member is raised by pumping the handle thereby driving the hydraulic fluid into the telescopic hoist cylinder and moving it into an extended position. Adjusting the directional control valve such that the hydraulic fluid drains back into the hydraulic reservoir lowers the telescopic hoist cylinder under the action of gravity.

The telescopic hoist cylinder is preferably a three stage telescopic unit that is extendible to a height of between 4-6m and preferably 5m. The units however may be configured to be extendible to a greater height if required.

In one form a plate having a first and second eyelet is fixably attached to the upper end of the telescopic hoist cylinder. The first eyelet is adapted to engage the anchoring cable and the second eyelet is adapted to slidably engage the static cable. In preference the anchoring cable is fixably attached through the first eyelet such that the cable can be pulled taut and tied off to an anchoring point on the vehicle such as the edge of the trailer tray or other tie down point.

The static cable slidably engages the second eyelet of, at least, the first or second telescopic members. This means that the user can pull the static cable taut from the ground when the telescopic members are in the extended position. In preference the static cable is fixably attached through the second eyelet of the first telescopic member and slidably attached through the second eyelet of the second telescopic member. This means that the user can grasp the free end of the static cable and pull it taut. The free end can then be tied off onto the fall restraint apparatus or the vehicle.

In preference a line extends between the harness attached to the user and the static cable. The line includes snap lock fitting at it end, such as a carabiner with screw gate, for attachment to the static cable. This ensures that the movement of the worker along the load is not restricted whilst providing a fall restraint in the event that the worker slips off the top of the load.
In another form the apparatus includes a motor adapted to automatically operate the telescopic hoist cylinder. In such an embodiment a handle would not be required to raise the hoist by rather the apparatus would include a control switch that would activate the hoist to raise it from a retracted position into an extended position.

Alternatively the apparatus may be connected to a power source such as but not limited to a battery pack, generator or vehicle motor.

The apparatus may be adapted to be removably attached to a vehicle so that the apparatus can be transported with the vehicle. This means that the apparatus could then be used to prevent falls wherever the vehicle is located, such as the side of the road or at the loading site.

The apparatus may include more than two telescopic members that engage a static cable. For instance if the apparatus is used on a road train or similar long vehicle then a number of telescopic members could be used to provide a support for the cable.

Although the invention is discussed with particular reference to road vehicle such as semi-trailers the invention is not limited specifically to these types of vehicles. For instance the apparatus could be use on multi-axle vehicles used in mining or other vehicles such as goods trains.

In a third aspect of the invention there is proposed a method of providing fall restraint for vehicles, including the steps of:
locating a first cable supporting member adjacent to a first wheel of the vehicle;
locating a second cable supporting member adjacent a second wheel of the vehicle;
repositioning the vehicle such that said first wheel engages with said first cable supporting member and said second wheel engages with said second cable supporting member; and
attaching a cable between upper ends of the first and second cable supporting member wherein the cable acts as a support for a user to thereby inhibit a fall from the vehicle.

Preferably the first and second cable supporting members include respective flanges. The flange is positioned adjacent to a wheel of the transport vehicle. The vehicle is then moved so that the wheel is relocated onto the top of the flange thereby
securing the respective cable supporting members in position due to the weight of the vehicle. This means that when the cable supporting members are in an extended position they will not fall over when force is applied.

Once the first and second supporting members are attached to the vehicle the supporting members are adjusted so as to extend above an upper portion of the vehicle body. The ends of the cable are then connected to vehicle to provide a fixed static cable that is able to support the weight of a user.

In one form the first mounting device is attached towards the front of the vehicle and second mounting device is attached towards the rear of the vehicle. This configuration enables the user to access all areas on top of the vehicle without being restricted due to the reach of the safety cable. There may be additional support members attached to the vehicle to provide safe access to all parts of the vehicle.

In a fourth aspect of the invention there is proposed a fall restraint apparatus for use with a vehicle, including a first cable supporting member and second cable supporting member reversibly mountable to said vehicle, the first and second cable supporting members extendable above at least a portion of the vehicle, wherein a cable is connected between upper portions of said first and second cable supporting members to thereby provide a support to which a user can be tethered.

In one form the first and second support members include a depending channel that are engagable with a side of the vehicle. In such a configuration the weight of the apparatus inhibits disengagement from the vehicle unless it is lifted by a forklift or the like. The vehicle may include a slot into which a depending flange of the first and second support members engages. The slot may include an interference fit that inhibits movement of the support member once engaged.

In another form the first cable supporting member is reversibly fastenable to a first mounting device being attached to said vehicle and the second cable supporting member is reversibly fastenable to a second mounting device being attached to said vehicle.

In one form the first and second mounting devices are fixably attached to the vehicle, by way of a weld, bolts or any other form of attachment means. Individual
mounting devices can be permanently attached to multiple vehicles within a fleet to ensure the same supporting means can be used for maintenance and repair.

In an alternate form the mounting devices can be temporarily attached to a vehicle when required in a way that does not permanently alter the vehicle's body. In a further alternate form the mounting devices may also be incorporated into the bodywork of the vehicle during the manufacture process.

The first and second cable supporting members preferably include a locking means that prevents disconnection of the supporting members from the respective mounting devices. The locking means may include a cam locking device, bolt arrangement or clamp. The locking member inhibits movement of the supporting members so as to hold the cable in a fixed position when in use.

The apparatus preferably includes forklift tyne engagement means that assist in the attachment and removal of the cable supporting members from the vehicle.

The apparatus may include a base used to locate the apparatus in an upright position when not in use. Alternatively the apparatus may engage with a stand or bracket that is used to prop the apparatus upright when not in use.

In a fourth aspect of the invention there is proposed a fall restraint apparatus for use with a vehicle including first and second tether member supports for reversible attachment to the vehicle, the first and second tether member supports being extendable above at least a portion of the vehicle, wherein a tether member, to which a user can be tethered, is connected between upper portions of said first and second tether member supports.

The tether member may be a rail to which a user's safety cable can be attached. It should be appreciated by the reader that the tether member could be used in any of the embodiments of the invention in place of a cable. The rail may be of a fix length or may be telescopic.

In one form the rail is be connected to the tether member supports by way of clamps or clips adjacent an upper end of the tether member supports. Alternatively bolts may be used to attach the rail to the tether member supports.
BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate several implementations of the invention and, together with the description, serve to explain the advantages and principles of the invention.

In the drawings,

Figure 1 is a perspective view of a first embodiment of the fall restraint apparatus of the present invention attached to a prime mover and trailer;

Figure 2 is a perspective view of the fall restraint apparatus of figure 1 in a lowered position;

Figure 3 is a perspective view of a second embodiment of the fall restraint apparatus in a partially raised position;

Figure 4 is a perspective view of the hydraulic hoist reservoir and handle of the fall restraint apparatus of figure 1;

Figure 5 is a perspective view of the fall restraint apparatus of figure 1, illustrating the use of the jockey wheel used to assist in relocation of the apparatus;

Figure 6 is a perspective view of the telescopic hoist assembly and the handle of the fall restraint apparatus of figure 1;

Figure 7 is a perspective view of a third embodiment of the fall restraint apparatus that is reversibly attached to a vehicle;

Figure 8 is a perspective view of the fall restraint apparatus of figure 7 illustrating one possible embodiment of the mounting device;

Figure 9 is a perspective view of the fall restraint apparatus of figure 7 showing the position of first and second mounting devices;

Figure 10a is a front view of the fall restraint apparatus of figure 7 illustrating another possible embodiment of the mounting device; and
Figure 10b is a perspective view of the cable supporting means that is engagable with the mounting device of figure 10a.

DETAILED DESCRIPTION OF THE ILLUSTRATED AND EXEMPLARY EMBODIMENTS

Similar reference characters indicate corresponding parts throughout the drawings. Dimensions of certain parts shown in the drawings may have been modified and/or exaggerated for the purposes of clarity or illustration.

Referring to the drawings for a more detailed description, a fall restraint apparatus 10 is illustrated, demonstrating by way of examples arrangements in which the principles of the present invention may be employed. In a first possible arrangement as illustrated in figure 1 the fall restraint apparatus 10 can be used in conjunction with a semi-trailer vehicle 12. The vehicle 12 includes a prime mover 14 having wheels 16 and a trailer platform 18 having wheels 20 adapted to carry a load.

The fall restraint apparatus 10 of figure 1 includes a first telescopic cable supporting member 24 and a second telescopic cable supporting member 26. The first cable supporting member 24 is adapted to engage at least one of the wheels 16 of the prime mover 14. The second cable supporting member 26 is adapted to engage at least one of the wheels 20 of the trailer 18. The first and second cable supporting members 24, 26 are movable between retracted and extended positions. In the extended position a static cable 28 is connected between the upper ends 30, 32 of the first and second cable supporting members 24, 26.

In a first embodiment the fall restraint apparatus 10 for use with a vehicle 12 includes a first cable supporting member 24 having an engagement means engagable with a first wheel of the vehicle and a second cable supporting member 26 having an engagement means engagable with a second wheel of the vehicle, the first and second cable supporting members 24, 26 extendable above at least a portion of the vehicle 12, wherein a cable 28 is connected between upper portions 30, 32 of said first and second cable supporting members 24, 26 to thereby provide a support to which a user's safety harness can be coupled.
A user's harness (not shown) is connected by way of a rope or cord to thereby provide a fall restraint means for the user. The static cable 28 is drawn taut to provide a fixed line that will not collapse in the event that the user falls from the vehicle 12. As the reader will appreciate the static cable 28 provides a support from which the user is suspended if they fall off the top of the load 22.

The ends 30, 32 of the first and second cable supporting members 24, 26 are attached to the trailer platform 18 by way of anchoring cables 34, 36. The anchoring cables 34, 36 extend in opposing directions from the upper ends as illustrated in figure 1. This means that the tension applied by the respective anchoring cables 34, 36 counteracts the load resulting from the tightening of the static cable 28. This ensures that the upper ends 30, 32 are not pulled together, which would result in damage to the cable supporting members 24, 26. The reader should however appreciate that cables 28, 34 and 36 may be replaced by a single cable that slidably engages ends 30, 32.

Figure 2 illustrates the cable supporting member 24 in an upright retracted position. The cable supporting members 24, 26 are identical in configuration and therefore the reader should appreciate that any discussion of cable supporting member 24 relates likewise to cable supporting member 26.

The cable supporting member 24 as illustrated in figure 2 includes a base 38 having an upright plate 40 adjoining an outwardly extending flange 42. The plate 40 connected to an axle 44 having wheels 46, 48. As illustrated in figure 2, the flange 42 is adapted to rest upon the ground when cable supporting member 24 is in a substantially upright position. This ensures that the cable supporting member 24 can be positioned in front or behind a wheel 16 of the vehicle 12. The vehicle 12 can then be moved so that the wheel 16 rests on top of the flange 42 thereby securing the cable supporting member 24 in position beside the vehicle 12.

As the reader will appreciate this means that when the cable supporting member 24 is in an extended position it will not tip over when lateral force is applied. The same applies for cable supporting member 26 that is positioned under wheel 20.
The base 38 further includes a caster or jockey wheel assembly 50 mounted on a crossbar 52 that extends between arms 54, 56. The arms are attached to, and extend rearwardly from, the upright plate 40, however other configurations are possible. Each arm 54 and 56 includes a passageway 58 that is configured to accommodate a respective type of a forklift. In this way a forklift can be used to move the apparatus 10 or to load it onto the back of a truck for transportation. The jockey wheel assembly 50 is attached to shaft 60.

The cable supporting member 24 includes a hydraulically operated telescopic hoist cylinder 62 attached to base 38. In the present embodiment the hoist cylinder 62 is raised using a switch 64 connected to a hydraulic reservoir 66. A directional control valve (not shown) controls the flow of hydraulic fluid into and out of the hoist cylinder 62.

The telescopic hoist cylinder 62, illustrated in the figures is a three stage telescopic unit and includes an outer portion 70, engaging an intermediate portion 72 that engages an upper portion 74. The upper portion 74 includes a connection means 76 for connecting the anchoring cable 34 and the static cable 28 thereto. The reader should appreciate that the connection means 76 attached to cable supporting member 26 engages anchoring cable 36 and the static cable 28.

As illustrated in figure 3, in a second embodiment the apparatus 10 includes a pivotable handle 68 that is connected to the hydraulic reservoir 66. The telescopic hoist cylinder 62 is raised into an extended position by pumping the handle 68, as indicated by the arrows. This forces hydraulic fluid through pipes (not shown) into the telescopic hoist cylinder 62 from the hydraulic reservoir 66.

To lower the hoist cylinder 62 the directional control valve is adjusted such that the hydraulic fluid drains back into the hydraulic reservoir 66 under the influence of gravity. The top of the telescopic hoist cylinder 62 is extendible to a height of 5m from the ground.

A handle 80 is attached to the outer portion 70 by way of a clamp 82 as illustrated in figure 6. The user grasps the handle 80 when they want to move the cable supporting member 24 into a position adjacent to the vehicle 12 or when they
have finished using the apparatus 10 and want to move the apparatus away from the
vehicle. The handle 80 is clamped to the cable supporting member 24 and is
adjustable to different heights to accommodate users of varying heights.

Wheels 46, 48 that are attached to the axle 44 are larger than the jockey wheel
50. Wheels 46, 48 bear the significant proportion of the weight during relocation of
the cable supporting member 24. The jockey wheel assembly 50, which is configured
to pivot about a vertical axis, assists in manoeuvrability.

The jockey wheel assembly 50 is mounted to the crossbar 52 such that the
jockey wheel assembly 50 is located above the axle 44 when the cable supporting
member 24 is in an upright position as illustrated in figure 2. This means that when
the cable supporting member 24 is being moved it can be incline rearwardly, as
illustrated in figure 5, to be supported on all three wheels 46, 48 and 50.

The connection means 76 is fixably attached to the upper portion 74 and
includes eyelets 84, 86, as illustrated in figure 6. Eyelet 84 on the cable supporting
member 24 is adapted to engage static cable 28 and eyelet 86 is adapted to engage
anchoring cable 34. The reader should appreciate that the connection means 76
attached to cable supporting member 26 engages anchoring cable 36 and the static
cable 28.

The anchoring cable 34 is fixably attached through eyelet 86 such that the
cable 34 can be pulled taut and tied off to an anchoring point on the vehicle such as
the edge of the vehicle tray or other tie down point.

The static cable 28 engages the eyelet 84 so that the user can pull the static
cable 28 taut from the ground when the cable supporting member 26 is in the
extended position. It is envisaged that the static cable 28 will be fixably attached
through an eyelet on one the cable supporting members and slidably attached through
an eyelet on the other telescopic member. This means that the user can grasp the free
end of the static cable and pull it taut. The free end can then be tied off onto the fall
restraint apparatus or the vehicle.

A line (not shown) extends between a harness that is attached to a user and the
static cable. The line includes a snap lock fitting at it terminal end, such as a
carabiner with screw gate, for attachment to the static cable. This ensures that the movement of the worker along the load is not restricted at the same time as providing a fall restraint in the event that the worker slips off the top of the load.

In a third embodiment, as illustrated in figure 7, the fall restraint apparatus 10 is configured for use with a vehicle 88, includes a first cable supporting member 90 and a second cable supporting member 92 reversibly fastenable to said vehicle 88, the first and second cable supporting members 90, 92 are extendable above at least a portion of the vehicle 88, wherein a cable 28 is connected between upper portions 30, 32 of said first and second cable supporting members 90, 92 to thereby provide a support to which a user’s safety harness can be coupled.

The vehicle 88 in the present example is an excavator having a body 94 and cab 96 mounted on a pivot atop an undercarriage 98 having continuous tracks 100, 102. The excavator 88 further includes an articulated arm 104 and bucket 106.

The first and second cable supporting members 90, 92 may be attached directly to the vehicle 88 or to specialised mounting devices. As illustrated in figure 8 the first and second support members 90 and 92 include a depending channel 108, formed by a backing plate 110 attached to an outwardly extending flange 112 and depending lip 114.

The depending channel 108 engages with a side 116 of the vehicle 88. In such a configuration the weight of the supporting members 90, 92 inhibit the apparatus from disengaging from the vehicle 88 unless it is lifted and removed by way of forklift tynes. The vehicle may include a slot (not shown) into which the depending lip 114 can engage.

As discussed, once the first and second support members 90, 92 are attached to the vehicle 88 they are adjusted so as to extend above an upper portion of the vehicle body 94. Cables 34 and 36, or in another form the ends of cable 28, are then connected to vehicle 88 to provide a static cable that is able to support the weight of a user.

As illustrated in figure 8 the hoist cylinder 62 may be operated by way of a switch 64. In one embodiment the apparatus 10 is connected to the vehicle to provide...
an external source of power to drive the hydraulic fluid out of the reservoir 66 and into the hoist cylinder 62, to raise the telescopic members 70, 72, 74. It should however be appreciate that the apparatus may include an integrated power source such as a battery or motor.

As illustrated in figure 9, the cable supporting members 90, 92 is reversibly fastenable to respective mounting devices 120, 122 that is fixedly attached to said vehicle 88. The reader should appreciate that any discussion with respect to supporting member 90 also relates to the second supporting member 92.

The first cable supporting members may be connected to a vehicle by way of a cam locking device (not shown). The cable supporting members may include projections that are configured to cooperate with a mounting device having a plate and nut. The use of a cam locking device means the cable support member will not accidentally dislodged from the vehicle during use.

The mounting devices 120, 122 are attached by way of a weld, bolts or any other form of attachment. A first mounting plate 120 is located towards the front 128 of the vehicle 88, as illustrated in figure 9, and the second mounting device 122 is attached towards the rear 130 of the vehicle. This configuration enables the user to access all areas on top of the vehicle without being restricted due to the reach of the safety cable.

As illustrated in figure 10a and 10b the cable support member 90 includes curved hangers 132 that are engagable with rail 134 on the mounting device 120. The cable support member 90 further includes movable engagement members 136a, 136b having respective outwardly extending arms 138 that include movable projections 140. The movable projections 140 are configured to engage with apertures 142 and 144 that are located through outwardly projecting wings 146 and 148. In this way the cable supporting member can be lifted so that it is supported by hanger 132 on the rail 134. The movable projections 140 can be adjusted so that they engage with the apertures 142, 144 to lock the cable supporting member to the vehicle. The movable projections 140 can be operated by way of a hydraulic ram. Alternatively the engagement members 136a, 136b, may be replaced by a pin arrangement that is
manually inserted through apertures 142, 144 and a corresponding opening on the
cable supporting member.

The skilled addressee will now appreciate the many advantages of the present
invention. The apparatus provides a fall restraint apparatus that can be used on
various types and configurations of vehicles. The ease with which the apparatus can
be set up and dismantled is advantageous for transport worker who are often under
tight schedules.

In a first aspect, the use of separate telescopic members that engage individual
wheels means that the apparatus can be easily modified for use on different vehicles.

In a second aspect the apparatus can be used on vehicle that do not have wheels such
as excavators having continuous tracks to provide a fall restraint device for the user.

Various features of the invention have been particularly shown and described
in connection with the exemplified embodiments of the invention, however, it must be
understood that these particular arrangements merely illustrate and that the invention
is not limited thereto. Accordingly the invention can include various modifications,
which fall within the spirit and scope of the invention. For the purpose of the
specification the word “comprise” or “comprising” means “including but not limited
to”.
THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A fall restraint apparatus for use with a vehicle including first and second cable supporting members for reversible attachment to the vehicle, the first and second cable supporting members being extendable above at least a portion of the vehicle, wherein a cable is connected between upper portions of said first and second cable supporting members to thereby provide a support to which a user can be tethered.

2. The fall restraint apparatus according to claim 1 wherein the first and second cable supporting members are vertically extendible above the vehicle.

3. The fall restraint apparatus according to claim 1 or 2 wherein the supporting members include respective telescopic members.

4. The fall restraint apparatus according to any one of the preceding claims wherein the cable acts as a support for a user that provides fall restraint thereby preventing the user from accidentally falling from the vehicle.

5. The fall restraint apparatus according to any one of the preceding claims wherein the cable extending between the first and second cable supporting members is drawn taut to provide a static line to which a user's safety harness can be attached.

6. The fall restraint apparatus according to any one of the preceding claims wherein upper ends of the first and second cable supporting members are attached to respective positions on the vehicle by way of respective anchoring cables.

7. A fall restraint apparatus for use with a vehicle including a first cable supporting member having an engagement means engagable with a first wheel of the vehicle and a second cable supporting member having an engagement means engagable with a second wheel of the vehicle, the first and second cable supporting members extendable above at least a portion of the vehicle, wherein a cable is connected between upper portions of said
first and second cable supporting members to thereby provide a support to which a user's safety harness can be coupled.

8. The fall restraint apparatus according to claim 7 wherein the first and second cable supporting members are attached to respective bases, each base having an outwardly extending flange and at least two wheels.

9. The fall restraint apparatus according to claim 8 wherein the flange extends outwardly from the base to a distance of between 30-40cm.

10. The fall restraint apparatus according to claim 8 or 9 wherein the base includes an axle having two wheels and a jockey wheel assembly.

11. The fall restraint apparatus according to claim 10 wherein the jockey wheel assembly is attached to a rearwardly extending frame such that the jockey wheel is located above the axle when the telescopic member is in an upright position and supports the rear of the apparatus when in a reclined position.

12. The fall restraint apparatus according to any one of claims 8-11 wherein the base includes two sleeves of a size to accommodate the tynes of a forklift.

13. The fall restraint apparatus according to any one of the preceding claims wherein the first and second cable supporting members are preferably hydraulically operated.

14. The fall restraint apparatus according to any one of the preceding claims wherein the apparatus may includes more than two cable supporting members that engage a static cable.

15. A method of providing fall restraint for vehicles, including the steps of: locating a first cable supporting member adjacent to a first wheel of the vehicle;
locating a second cable supporting member adjacent a second wheel of the vehicle;
repositioning the vehicle such that said first wheel engages with said first cable supporting member and said second wheel engages with said second
cable supporting member; and
attaching a cable between upper ends of the first and second cable
supporting member wherein the cable acts as a support for a user to thereby
inhibit a fall from the vehicle.

16. The method according to claim 15 wherein the first and second cable
supporting members include respective flanges.

17. A fall restraint apparatus for use with a vehicle, including a first cable
supporting member and second cable supporting member reversibly
mountable to said vehicle, the first and second cable supporting members
extendable above at least a portion of the vehicle, wherein a cable is
connected between upper portions of said first and second cable supporting
members to thereby provide a support to which a user's safety harness can
be coupled.

18. The fall restraint apparatus according to claim 17 wherein the first and
second support members include a depending channel that is engagable
with a side of the vehicle.

19. The fall restraint apparatus according to claim 17 or 18 wherein an
interference fit may be used to inhibit movement of the support members
once engaged with a side of the vehicle.

20. The fall restraint apparatus according to any one of claims 17-19 wherein
the first cable supporting member is reversibly mountable to a first
mounting device being attached to said vehicle and the second cable
supporting member is reversibly fastenable to a second mounting device
being attached to said vehicle.

21. The fall restraint apparatus according to claim 20 wherein the mounting
devices may also be incorporated into the bodywork of the vehicle during
the manufacture process.

22. The fall restraint apparatus according to claim 20 or 21 wherein the first
and second cable supporting members preferably include a locking means
that prevents disconnection of the supporting members from the respective mounting devices.

23. The fall restraint apparatus according to any one of claims 17-22 wherein the apparatus preferably includes forklift tyne engagement means that assist in the attachment and removal of the support members from the vehicle.

24. The fall restraint apparatus according to any one of claims 17-23 wherein the apparatus may include a base used to locate said apparatus in an upright position when not in use.

25. A fall restraint apparatus for use with a vehicle including first and second tether member supports for reversible attachment to the vehicle, the first and second tether member supports being extendable above at least a portion of the vehicle, wherein a tether member, to which a user can be tethered, is connected between upper portions of said first and second tether member supports.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl. B60R 21/02 (2006.01), A62B 35/00 (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)

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: IPC B60R21/IC, B60R22/IC and keywords CABLE, WIRE, SUPPORT, COLUMN, EXTEND, EXPAND, FIRST, SECOND and similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tbody>
<tr>
<td>X</td>
<td>GB 2419571 A (SEVERFIELD-ROWEN PLC) 03 May 2006</td>
<td>1-6, 14, 17, 24, 25</td>
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<td></td>
<td>See page 8 line 8 to page 13 line 31, Figures 1-6.</td>
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<td>Y</td>
<td>FR 2571670 A1 (OLIVIER ERIC) 18 April 1986</td>
<td>1-5, 13, 17, 25</td>
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<td>See Abstract and Figure 1.</td>
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<tr>
<td>X</td>
<td>AU 2002301550 A (HEGGS, John) 12 June 2003</td>
<td>1-2, 4-6, 17-22, 25</td>
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<td>See pages 2-11, Figures 1-2.</td>
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[X] Further documents are listed in the continuation of Box C  [X] See patent family annex

* Special categories of cited documents:  "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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Date of the actual completion of the international search: 22 June 2009
Date of mailing of the international search report: 06 JUL 2009

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<td>X</td>
<td>JP 7127240 A (FUKUTOME KAZUO) 16 May 1995 See Abstract and drawings Figures 1-5.</td>
<td>1-6, 17-22, 25</td>
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<td>Y</td>
<td>CA 2557985 A1 (UNIQUE CONCEPTS LTD.) 23 February 2008 See page 9 lines 1-5, Figures 2-3.</td>
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<td>GB 2419571</td>
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Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX