

DEVICE FOR COUPLING A TRAILER TO A TRACTOR

FIELD OF INVENTION

5 The present invention relates to an apparatus by which a trailer vehicle can be coupled to a tractor vehicle. The present invention particularly relates to a trailer vehicle with a towing arm that is pivotally mounted to the trailer chassis for coupling the trailer vehicle to a tractor vehicle.

10 BACKGROUND

It is known to use articulated vehicles comprising a tractor coupled to one or more trailers for towing by the tractor. A trailer is coupled to a powered tractor which is then used to move the trailer from a starting location to a destination.

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In a typical application freight is carried directly in or on trailers, or may be loaded into containers which are carried in or on trailers, and the trailers coupled to tractors for moving the freight between locations.

20 In one known arrangement, a towing arm is mounted to the forward end of a trailer. A forward end of the towing arm is coupled to a tractor towing point at the rear end of a tractor, to couple the trailer to the tractor.

25 The tractor and trailer combination is usually articulated; that is, the combination is configured so that it can readily make turns to the left and right, and can negotiate undulations. In one configuration that provides this articulation the rear end of the trailer towing arm is attached to the forward end of a chassis of the trailer by a pivotal connection, the pivot axis being arranged horizontally to allow the eye at the forward end of the towing arm to rise and fall relative to the chassis of the trailer. This pivotal
30 connection allows the tractor-trailer combination to flex, such as when traversing an undulating road surface.

In one typical current practice, a tractor is backed up to a trailer under direction from a ground crew who position the trailer towing arm so that the eye is located between a pair of tractor flanges and aligned with apertures in the flanges. The ground crew can then couple the trailer to the tractor by inserting the coupling pin through the apertures and the eye. This requires at least two personnel, one driving the tractor and at least one to manipulate the towing arm. Additional crew are usually required in the case of large trailers, for example when the towing arm is too heavy for one person to manage.

10 The manipulation of heavy trailer towing tackle and the close proximity between a reversing tractor and a stationary trailer makes this operation particularly hazardous for the ground crew. High noise levels and other distractions are common in such situations and can make communication between ground crew and tractor driver difficult. The crew can be exposed to increased risk of injury if communications
15 between the driver and ground crew are not heard or are mis-understood.

Hence, it is accordingly an object of the present invention to provide an apparatus for facilitating the coupling of trailers to tractors which addresses at least some the abovementioned disadvantages or which will at least provide the public with a useful
20 choice.

BRIEF DESCRIPTION OF THE INVENTION

The present invention may be broadly said to be a trailer vehicle consisting at least in
25 part of:

- (a) a chassis,
- (b) a towing arm, and
- (c) a support link,

wherein;

30 the towing arm is pivotally attached to the chassis for rotation of the towing arm relative to the chassis about a substantially horizontal pivot axis,
the towing arm has a distal end remote from the pivot axis,

a first end of the support link is connected to the chassis at an attachment point that is lower than the pivot axis, and

a second end of the support link is connected to the trailer towing arm at a connection point that is between the pivot axis and the distal end.

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Preferably, the towing arm is pivotally attached to the chassis at two separate locations along the pivot axis and the two separate locations are arranged symmetrically about a fore and aft centreline of the trailer vehicle. The connection point preferably lies on a fore and aft centreline of the trailer vehicle.

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The connection point is preferably offset below a straight line between the pivot axis and the distal end of the towing arm.

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The attachment point preferably lies substantially on a fore and aft centreline of the trailer vehicle.

Preferably, the link supports the towing arm to hold the distal end of the trailer towing arm substantially at a predetermined height relative to the chassis.

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The link may include a first elongate tubular portion which is pivotally attached to the chassis at the attachment point, and a second elongate portion which is pivotally attached to the trailer towing arm at the connection point and is telescoped coaxially within the first tubular portion. A threaded nut may be fitted to a complementarily threaded portion of the second elongate portion to bear directly or indirectly against

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an abutment end of the first elongate portion. Adjustment of the position of the nut on the threaded portion of the second elongate portion adjusts the height of the distal end of the towing arm relative to the chassis. A compression spring may be fitted coaxially around the second elongate portion, between the nut and the abutment end of the first elongate portion. The length of the compression spring changes to

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accommodate changes in the height of the distal end of the towing arm relative to the chassis.

This invention may also be broadly said to consist in the parts, elements and features referred to or indicated herein, individually or collectively, including any or all combinations of any two or more of said parts, elements or features. Where specific integers mentioned herein have known equivalents in the art to which this invention relates, such known equivalents are deemed to be incorporated herein as if specifically set forth.

BRIEF DESCRIPTION OF THE DRAWINGS

10 A preferred form of the present invention will now be described with reference to the accompanying drawings in which:-

Figure 1 is a side elevation of a portion of a trailer vehicle,

Figure 2 is an upward-looking plan view of a portion of the trailer vehicle seen
15 in part in Figure 1,

Figure 3 shows a partly cross-sectioned side elevation and a partly cross-sectioned axial end view (as seen at line A-A show in the side elevation) of a tubular member of a support link seen in Figures 1 and 2,

Figure 4 is a detail view of a pivotal mounting connection of the tubular
20 member to an L-shaped flange on a trailer chassis seen in Figures 1 and 2,

Figure 5 is a side elevation of an elongate member of the support link, and

Figure 6 is a partly cross-sectioned axial view showing the attachment of an end of the elongate member of Figure 5 to flanges on a towing arm.

25 DETAILED DESCRIPTION OF THE INVENTION

Figures 1 and 2 show a portion of a trailer vehicle, hereinafter called a trailer. The trailer has a chassis 1 (only a fragment of which is shown in the figures), a towing arm 2, and a support link 3. The towing arm is attached to the chassis by a pivotal attachment 4 which allows the towing arm to be rotatable relative to the chassis about
30 a substantially horizontal pivot axis 5. The towing arm has a distal end 6 that is remote from the pivot axis. The trailer can be coupled to a tractor vehicle (not shown) using a towing eye 7 provided at the distal end 6 of the towing arm.

One end of the support link 3 is connected to the chassis 1 at an attachment point 8 that is lower than the pivot axis 5. The attachment point 8 preferably lies on a fore and aft centreline 10 of the trailer vehicle.

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The other end of the support link 3 is connected to the trailer towing arm 2 at a connection point 12 that is between the pivot axis 5 and the distal end 6 of the towing arm. The connection point 12 preferably lies substantially on the fore and aft centreline 10.

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As may be best appreciated from the plan view of Figure 2, the towing arm is pivotally attached to the chassis at two separate locations (only one of which is shown). These attachment locations are spaced apart along the pivot axis 5, and are arranged symmetrically about the fore and aft centreline 10.

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The support link includes a tubular member 14, seen in Figures 1 and 2 but shown in detail in Figure 3. The tubular member has a cylindrical hollow body 16 having at one end a reinforced rim 18. Two diametrically opposed round pins 20 project outwardly from opposite sides of the cylindrical body.

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A pair of L-shaped support flanges 22 are mounted to the chassis 1 to provide the chassis attachment point 8.

Figure 4 shows a detailed view of the attachment of one side of the hollow body 16 of the tubular member to the vertical leg of one of the L-shaped support flanges 22. Each projecting pin 20 is located in a respective hole 24 in one of the two flanges 22 to pivotally mount the tubular member 14 to the trailer chassis 1. A split pin (not shown), or other suitable fastener, may be fitted into a diametrically-aligned hole 26 provided near the outer end of the projecting pin 20 to retain a flat washer 28 fitted on the outer end of the projecting pin 20.

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The support link also includes an elongate member 30, seen in Figures 1 and 2 but shown in detail in Figure 5. The elongate member 30 is generally cylindrical and has

a first end portion 32 which slides axially within the hollow body 16 of the tubular member 14, a screw-threaded mid-portion 34, and a second end portion 36.

Figures 2 and 3, and particularly the detailed view of Figure 6, show the attachment
12 of the support link 3 to the towing arm 2. The outer end of the second end portion
36 of the support link is located between a pair of mounting flanges 38 which are
fixed to the towing arm 2. A headed pin 40 is fitted into aligned holes in the two
flanges and a diametrically-aligned hole 42 provided through the outer end of the
second end portion 36.

A split pin (not shown), or other suitable fastener, may be fitted into a diametrically-
aligned hole 44 provided near the outer end of the headed pin 40 to retain a flat
washer 46 fitted on the outer end of the headed pin 40 and to retain the headed pin 40
in the holes in the two mounting flanges 38.

The elongate member 30 slides telescopically inside the tubular member 14,
reciprocating back and forth as the distal end 6 of the towing arm 2 rises and falls,
such as when the trailer is being towed along an undulating surface.

A screw-threaded nut or collar 48 is fitted to the threaded mid-portion 34 of the
elongate member 30 to provide a limit to the fall of the distal end of the towing arm
when the nut directly or indirectly abuts the reinforced rim 18 of the tubular member
14. Adjustment of the position of the nut or collar 48 along the screw-threaded mid-
portion provides a corresponding adjustment of the height of the distal end of the
towing arm relative to the trailer chassis.

A compression spring 50 is preferably fitted over the elongate member 30 of the
support link, between the reinforcing rim 18 of the tubular member 14 and the
adjusting nut or collar 48. In this case, the nut abuts indirectly on the reinforcing rim
via the intermediate compression spring. The compression spring provides support to
the towing arm while at the same time allowing the distal end, and particularly the
towing eye, of the towing arm to rise and fall. The resilient elongation and

contraction of the spring allows the support arm to correspondingly extend and contract to accommodate this rise and fall of the towing eye.

The link 3 supports the towing arm 2 to hold the distal end 6 of the trailer towing arm substantially at a predetermined height relative to the chassis.

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The angle of the resiliently supported towing arm, relative to the trailer chassis, is adjusted using the nut or collar to bring the towing eye at the distal end of the towing arm to the height of the coupling point of a tractor with which the trailer is to be coupled. The tractor can then readily engage the towing eye without intervention of a ground crew because the towing eye is held at the correct height. The resiliency of the spring allows the distal end of the towing arm to rise or fall when engaging the tractor towing point to accommodate minor differences in height between the tractor towing point and the disengaged towing arm when supported by the link.

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By simplifying the tractor-trailer coupling operation and substantially eliminating the need to lift a heavy towing arm to a height suitable to engage a tractor towing point, the present invention provides an increased efficiency of tractor-trailer coupling and decoupling operations, a reduction in the number of personnel needed to connect and disconnect trailer couplings to a tractor, a reduced time spent coupling and decoupling a trailer-tractor combination, and an increased level of safety.

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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. For one example, the mid portion of the elongate member can be plain, i.e. the thread described above is dispensed with and the threaded adjusting nut or collar is replaced with a plain collar which can slide freely along the plain mid-portion. A peg is selectively inserted into one of a series of holes provided along the length of the mid-portion to limit the travel and set the height of the distal end of the towing arm.

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LIST OF FEATURES LABELLED IN THE DRAWINGS

trailer chassis 1	hole 24
towing arm 2	diametrically-aligned hole 26
support link 3	flat washer 28
5 pivotal attachment 4	20 elongate member 30
pivot axis 5	first end portion 32
distal end 6	screw-threaded mid-portion 34
towing eye 7	second end portion 36
attachment point 8	mounting flanges 38
10 fore and aft centreline 10	25 headed pin 40
connection point 12	diametrically-aligned hole 42
tubular member 14	second end portion 36
cylindrical hollow body 16	diametrically-aligned hole 44
reinforced rim 18	flat washer 46
15 round pins 20	30 screw-threaded nut or collar 48
L-shaped support flanges 22	compression spring 50

CLAIMS

1. A trailer vehicle consisting at least in part of:
 - (a) a chassis,
 - 5 (b) a towing arm, and
 - (c) a support link,wherein;

the towing arm is pivotally attached to the chassis for rotation of the towing arm relative to the chassis about a substantially horizontal pivot axis,

 - 10 the towing arm has a distal end remote from the pivot axis,

a first end of the support link is connected to the chassis at an attachment point that is lower than the pivot axis, and

a second end of the support link is connected to the trailer towing arm at a connection point that is between the pivot axis and the distal end.

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2. A trailer vehicle as claimed in claim 1, wherein the towing arm is pivotally attached to the chassis at two separate locations along the pivot axis and the two separate locations are arranged symmetrically about a fore and aft centreline of the trailer vehicle.- 20
3. A trailer vehicle as claimed in claim 1 or 2, wherein the connection point lies on a fore and aft centreline of the trailer vehicle.
4. A trailer vehicle as claimed in any one of the preceding claims, wherein the
25 connection point is offset below a straight line between the pivot axis and the distal end of the towing arm.
5. A trailer vehicle as claimed in any one of the preceding claims, wherein the attachment point lies substantially on a fore and aft centreline of the trailer vehicle.- 30
6. A trailer vehicle as claimed in any one of the preceding claims, wherein the link supports the towing arm to hold the distal end of the trailer towing arm substantially at a predetermined height relative to the chassis.

7. A trailer vehicle as claimed in any one of the preceding claims, wherein the link includes a first elongate tubular portion which is pivotally attached to the chassis at the attachment point, and a second elongate portion which is pivotally attached to
5 the trailer towing arm at the connection point and is telescoped coaxially within the first tubular portion.

8. A trailer vehicle as claimed in claim 7, wherein a threaded nut is fitted to a complementarily threaded portion of the second elongate portion to bear directly or
10 indirectly against an abutment end of the first elongate portion.

9. A trailer vehicle as claimed in claim 8, wherein adjustment of the position of the nut on the threaded portion of the second elongate portion adjusts the height of the distal end of the towing arm relative to the chassis.
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10. A trailer vehicle as claimed in claim 8 or 9, wherein a compression spring is fitted coaxially around the second elongate portion, between the nut and the abutment end of the first elongate portion.

20 11. A trailer vehicle as claimed in claim 10, wherein the length of the compression spring changes to accommodate changes in the height of the distal end of the towing arm relative to the chassis.