

DEVICE FOR COUPLING TRACTOR AND TRAILER VEHICLES

FIELD OF INVENTION

5 The present invention relates to an apparatus by which a tractor vehicle can be coupled to a trailer vehicle, and particularly to a powered coupling device by which a tractor can be coupled to, and uncoupled from, a towing arm of a trailer under remote control.

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. An eye at the forward end of the towing arm is inserted between a pair of flanges located at a tractor towing point at the rear end of a tractor. A coupling pin is inserted through the eye of the towing arm and two aligned apertures in the respective flanges, to couple the trailer to the tractor.

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The tractor and trailer combination is usually configured so that it can readily make turns to the left and right, and can negotiate undulations.

30 In one known configuration, the flanges are horizontally arranged and the coupling pin is arranged vertically through vertically-aligned apertures in the flanges and through the eye at the forward end of the towing arm. This connection allows the tractor and trailer to turn relative to one another, at least about the vertical axis of the coupling pin.

The rear end of the towing arm is typically attached to the forward end of an 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 connection allows the tractor-trailer combination to flex, such as when traversing an undulating road surface.

In 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 the tractor flanges and aligned with the flange apertures. The ground crew can then couple the trailer to the tractor by inserting the coupling pin. This requires at least two personnel, one driving the tractor and at least one to manipulate the towing arm and coupling pin. 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 two or more personnel may be required.

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 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 choice.

BRIEF DESCRIPTION OF THE INVENTION

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The present invention may be broadly said to be a coupling device comprising:

(a) first and second members being spaced apart on opposite sides of a space therebetween, each of the first and second members having a hole, the holes being aligned on a common axis which intersects the space,

(b) a driving means, and

5 (c) a coupling member being moveable by the driving means to move along the common axis between a first configuration in which the coupling member spans the space between the first and second members with respective portions of the coupling member located in the holes, and a second configuration in which the coupling member is clear of the space between the first and second members.

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The common axis may be substantially horizontal or vertical in use of the coupling device.

15 Preferably, the driving means is a linear actuator comprising a ram and cylinder which are substantially aligned along the common axis, the ram being driven to slide within the cylinder by introduction of a pressurised fluid into the cylinder.

The driving means may be pneumatically operated by application of compressed air, or hydraulically operated by application of a pressurised liquid.

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Preferably, the holes are circularly cylindrical and have a common diameter and the coupling member is a circularly cylindrical pin which is dimensioned to be a sliding fit within the holes.

25 Preferably, activation of the driving means moves the coupling member from the first configuration to the second configuration, and continued activation of the driving means maintains the coupling member in the second configuration.

30 Preferably, the coupling device further comprises a biasing means which biases the coupling member away from the second configuration and towards the first configuration. In the absence of activation of the driving means, the biasing means moves the coupling member from the second configuration to the first configuration

and maintains the coupling member in the first configuration until reactivation of the driving means. The biasing means may comprise a spring means.

5 Preferably, the coupling member comprises a sliding pin with an enlarged circular head which is a sliding fit inside a cylindrical guide tube, and the pin and the guide tube are substantially aligned along the common axis.

10 Preferably, the first and second members present respective inward facing surfaces on opposite sides of the space between the first and second members, and at least a portion of a distal edge of one or both of these inward facing surfaces is chamfered for facilitating insertion of a towing member into the space between the first and second members.

15 Preferably, the coupling device further comprises a pair of guide members, the guide members each extending at least partly between the first and second members and presenting respective inward facing surfaces which diverge outwardly from one another on respective opposite sides of the common axis for facilitating insertion of a tractor towing member into the space between the first and second members and into a predetermined alignment with the common axis.

20 Preferably, the coupling device further comprises a third member from which the first and second members each extend in a first direction, and an attachment member which extends from the third member in a second direction opposite to the first direction, the attachment member having a aperture through which a pin can be inserted to attach the coupling device to a tractor vehicle. A resilient buffer means may extend from the third member in the second direction. The resilient buffer means may comprise respective buffer members on opposite sides of the attachment member.

30 Preferably, the coupling device further comprises an indicator means which provides an indication of when the coupling means is in the first configuration, in the second configuration, or between the first and second configurations. The coupling device may further comprise a first limit switch which is operated only when the coupling

member is in the first configuration, and a second limit switch which is operated only when the coupling member is in the second configuration. The indicator means may include one or more visible or audible indicators which provide distinguishable indications of when the first limit switch is operated, when the second limit switch is
5 operated, and when neither limit switch is operated.

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
10 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

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

Figure 1 shows a part cross-sectional view of a fragment of a tractor and a
20 coupling device attached thereto,

Figure 2 shows a cross-sectional side view of a main part of the coupling device seen in Figure 1,

Figure 3 shows a cross-sectional plan view of the main part of the coupling device seen at line 1-1 in Figure 2,

25 Figure 4 shows a cross-sectional end view of the main part of the coupling device seen at line 4-4 in Figure 2,

Figure 5 shows a part cross-sectional side view of a coupling pin seen in Figure 1,

Figure 6 shows a top plan view of the head of the pin shown in Figure 5,

30 Figure 7 shows a side view of a guide cylinder as seen in direction A in Figure 2,

Figure 8 shows a top plan view of the main part of the coupling device as seen at line 3-3 in Figure 2,

Figure 9 shows a cross-sectional plan view of the main part of the coupling device as seen at line 2-2 in Figure 2,

Figure 10 shows a driver buffer of the coupling device seen in Figure 1, and

Figure 11 shows a schematic diagram of a control and indication system for the coupling device seen in Figure 1.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1 shows a coupling device 1 fitted to the rear end of a tractor 2 (shown only in fragment).

The coupling device has a main chassis 3, as may be best appreciated from Figures 2, 3 and 4. The chassis 3 has first and second limbs 4, 5 that are spaced apart on opposite sides of a space 6 between the two limbs. The two limbs each extend substantially horizontally in a common direction from a vertical member 7. The first limb 4 is pierced by a circular hole 10. The second limb 5 has a circular hole 12 which, in the preferred embodiment shown in the figures, pierces the second limb. Alternatively, the hole in the second limb may be a blind hole (not shown). The two holes 10, 12 preferably share a common diameter and are aligned along a common axis 14 which intersects the space 6.

Figures 5 and 6 show a cylindrical coupling pin 16 which is dimensioned to be a sliding fit within the two holes 10, 12 in the limbs 4, 5. The pin 16 is driven along the common axis 14 by a linear actuator 20 which in the preferred embodiment shown in Figure 1 is a hydraulic ram 20R and cylinder 20C. Other linear actuators are also suitable for driving the coupling pin. For example, one other suitable linear actuator is a pneumatically operated ram and cylinder.

The coupling pin 16 is driven along the axis 14 by the actuator 20 between first and second configurations. In the first configuration (shown in broken lines as pin 16A in Figure 1), the coupling pin spans the space 6 between the first and second limbs 4, 5 with respective portions of the coupling pin located in the holes 10, 12. In the second

configuration (shown in solid lines as pin 16 in Figure 1), the coupling pin 16 is withdrawn clear of the space 6 between the first and second limbs.

5 In the preferred embodiment, and as shown in the figures, the coupling device 1 is used with the common axis 14 substantial vertical. Alternatively, the device could be used in other orientations, for example with the common axis substantially horizontal.

10 Activation of the actuator 20, such as by application of a pressurised hydraulic fluid, drives the coupling pin 16 (upward in the embodiment shown in Figure 1) from the first configuration to the second configuration. Continued activation of the actuator maintains the coupling pin in the second configuration.

15 As shown in Figure 1, the coupling device 1 includes two biasing springs 22. One end of each spring is attached to a respective end of a T-bar 23 on the upper end of the actuator ram 20R. The opposite end of each spring is attached to a mounting plate 24 on which the actuator cylinder 20C is mounted. The two springs 22 provide a pull on the coupling pin 16 (this being a downward pull in the embodiment shown in Figure 1), via the actuator ram 20R, to bias the coupling pin 16 away from the second configuration and towards the first configuration. In the absence of activation of the
20 actuator 20, the two biasing springs 22 move the coupling pin 16 from the second configuration to the first configuration and maintain the coupling pin in this first configuration until reactivation of the actuator.

25 Other numbers of biasing springs may be used, for example only a single spring, or three or four or more than four springs.

Other suitable biasing systems include the use of the weight of the coupling pin and its associated hardware to move the pin 16 downward by gravitational force.

30 As may be best appreciated from Figure 5 and 6, the coupling pin 16 has an enlarged circular head 25. This head 25 is a sliding fit inside a cylindrical guide tube 26 which is attached, such as by tack or fillet welds 27, to the top of the upper limb 4, to be in alignment with the axis 14. The guide tube 26 is reinforced by radial supporting

flanges 28 which are attached to the guide tube and the upper limb 4 or vertical member 7. The coupling pin 16 and the guide tube 26 are substantially aligned along the common axis 14. The guide tube 26 may be best appreciated from Figures 2, 4, 7, 8 and 9.

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The mounting plate 24, to which the actuator cylinder 20C is mounted and to which the springs 22 are attached, is fixed to a top end flange 29 at the top of the guide tube 26.

10 A threaded bolt 30 is fitted in a suitably-threaded radial hole 32 (seen in Figures 5 and 6) at the perimeter of the pin head 25 and is engaged in an axially-directed slot 34 in the guide tube. As the coupling pin moves between the two configurations (shown in Figure 1 as coupling pins 16, 16A), the bolt (shown in Figure 1 as bolts 30, 30A) correspondingly slides in the slot 34 but prevents rotation of the coupling pin about
15 the axis 14.

As best seen in Figures 1, 2 and 3, portions of the distal edges of the opposing inward-facing surfaces of the two limbs 4, 5 are chamfered to provide respective ramps 36, 38. These ramps facilitate vertical positioning of an end portion of a towing member
20 to help guide and vertically align the end portion of the towing member during its insertion into the space 6 between the first and second limbs.

To further facilitate this insertion, and particularly with horizontal positioning, the coupling device also includes a pair of guide plates 40, 41. These guide plates extend
25 between the first and second limbs 4, 5 and present respective inward-facing surfaces 42, 43, which may be best appreciated from Figures 3 and 4, and which diverge outwardly from one another on respective opposite sides of the common axis 14. These guide plates 40, 41 facilitate insertion of a tractor towing arm (not shown) into the space 6 between the first and second limbs 4, 5, and into a predetermined
30 alignment of an aperture or 'eye' in the distal end of the tractor towing arm with the common axis 14 of the coupling device 1.

As shown in Figures 1, 2 and 3, the coupling device 1 has an attachment arm 44 which extends horizontally from the vertical member 7, and in a direction opposite to the horizontally extending limbs 4, 5. The attachment arm 44 has a slightly elongated aperture 46 through which an attachment pin 48 (shown in Figure 1) is passed to
5 attach the coupling device 1 to the rear end of the tractor 2.

Figure 1 shows cavity 50 and associated co-axially aligned holes 52, 54 provided in the rear end of the tractor. The attachment arm 44 is accommodated in the cavity 50, and the attachment pin 48 is then inserted through hole 52 and aperture 46 and into
10 hole 54, to attach the coupling device 1 to the tractor 2.

As shown in Figure 1, resilient buffer blocks 56 are placed between the outer vertical face of the vertical member 7 and the rear face of the rear end of the tractor 2, above and below the attachment arm 44. The rear end of the tractor 2 may include a
15 projection 58 on which at least a lower one of the buffer blocks 56 can rest. Alternatively, or additionally, the buffer blocks can be attached to the rear face of the tractor, or to the vertical member 7 of the coupling device, by any other suitable means, for example by use of an adhesive.

20 A distance plate 60 (shown in Figures 1, 2 and 3) can be used as packing to compensate for at least some of any excess of the depth of the cavity 50 over the vertical thickness of the attachment arm 44. The distance plate 60 is preferably attached to the attachment arm 44, for example by tack welds.

25 The coupling pin is positively connected to the actuator ram by a threaded fastener 62 (shown in Figure 1) which is screwed into a threaded axial hole 64 (seen best in Figure 5) which is provided at the head 25 of the coupling pin 16.

Figure 10 shows a resilient driving block 66 (also seen in Figure 1) which is fitted
30 between the driving end of the actuator ram 20R and the head 25 of the coupling pin 16.

The resilient buffer and driving blocks 56, 66 help reduce impact shocks and the associated noise when engaging and disengaging a trailer towing arm (not shown) into the coupling device 1 and when the coupling pin 16 moves between the first and second configurations to engage and disengage with an eye in the trailer towing arm.

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In conventional practice, a conventional coupling pin is passed, similarly to the attachment pin 48 shown in Figure 1, through the holes 52, 54 at the tractor towing point and through an eye at the leading end of the trailer towing arm, located in cavity 50, to secure the trailer to the tractor. However, this requires manual insertion of the conventional coupling pin after manual intervention to insert the trailer towing arm into the cavity 50 and align the eye of the towing arm with the holes 52, 54.

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These operations usually require one or more ground crew members, depending on the size and weight of the coupling components, and expose the crew to hazards. For example, hazards arise when the crew are working in close proximity between a reversing tractor and a stationary trailer prior to coupling. Or, after coupling, when a coupled tractor and trailer may begin to move before the crew is clear. Such operations are often co-ordinated using voiced instructions or hand signals between the tractor driver and ground crew. However, mis-communication gives rise to the risk of injury, particularly in typical working environments which can be very noisy.

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The coupling device 1 of the present invention is attached, semi-permanently, to the rear end of a tractor vehicle 2, as described above. The coupling device has an attachment arm 44 which locates in the cavity 50 at the rear end of the tractor, the cavity 50 being conventionally provided for accepting a leading end of a towing arm of a trailer to be towed by the tractor, as described in the preceding paragraphs. An attachment pin 48 secures the coupling device to the tractor.

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When the coupling device 1 of the present invention is fitted to a tractor, the actuator can be powered using a source of pressurised fluid. In one embodiment, the compressed air supply used for the tractor brakes is used to drive the coupling pin. However, this may cause tractor braking problems if the supply has insufficient capacity to power both systems.

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In one preferred embodiment, an electrically-driven hydraulic pump that is independent of the braking system is used to provide a pressurised liquid for activating the actuator and driving the coupling pin.

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In use of the current invention, the coupling device 1 is fitted to a tractor 2, as shown in Figure 1 and as described above. The tractor driver activates the actuator 20 to move the coupling pin 16 from the first configuration as described above (and shown in broken lines as pin 16A in Figure 1), against the biasing of the springs 22, to be
10 clear of the space 6 between the limbs 4, 5, i.e. to the second configuration as described above. The driver then positions the tractor to engage a trailer towing eye (not shown) into the space 6 in the coupling device 1. To this end, the trailer towing arm is supported at a predetermined height above ground, and particularly at the approximate height of the space 6 between the limbs 4, 5 of the coupling device 1 as
15 fitted to the tractor 2.

The chamferings or ramps 36, 38 of the limbs 4, 5 facilitate insertion in the case of minor vertical mis-alignments between the towing arm and the coupling device. Similarly, the diverging guide plates 40 facilitate insertion in the case of minor
20 horizontal mis-alignments between the towing arm and the coupling device.

A mirror or mirrors (not shown) can be suitably placed and oriented to provide the tractor driver with a better view of the alignment and insertion operation while still occupying the normal tractor driving position.

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Once the trailer towing arm is inserted into the coupling device 1 with the eye of the towing arm aligned with the holes 10, 12 in the limbs 4, 5 of the coupling device, the activation of the actuator 20 is released and the biasing springs 22 pull the coupling pin 16 downward to secure the towing arm to the coupling device and thereby to the
30 tractor. The coupled tractor-trailer combination can then be driven to a new location.

To decouple the tractor and trailer, the actuator 20 is activated to lift the coupling pin 16, against the downward bias of the springs 22, and clear of its engagement with the eye of the towing arm. The tractor can then be driven away from the trailer.

- 5 It is to be noted that the actuator activation and biasing can be arranged in directions opposite to those described above. However, the use of springs to bias the coupling pin into the engaged or coupling configuration provides the coupling device with a degree of fail-safe operation in that if there is any loss of activation of the actuator, such as a loss of pressure of the hydraulic or pneumatic fluid, the coupling pin will
10 remain in or revert to a fully engaged position. There is no requirement for a continuation of actuator activation to maintain the engagement. Therefore, a coupled trailer cannot inadvertently be decoupled from a tractor by failure of a power source.

Figure 11 shows a schematic layout of a control and indication system for use with
15 the coupling device 1 described above. A 24 volt DC supply from the tractor vehicle (not shown) powers a DC motor 70 to drive a pump 72 which supplies pressurised fluid via a conduit 74 to a hydraulic cylinder 20C of an actuator for moving a coupling pin 16 of a coupling device 1, as described above.

- 20 The actuator has a release limit switch RLSW which is operated when the actuator is at the second disengaged configuration described above, i.e. when the coupling pin 16 is fully withdrawn from the space 6, in a disengaged or released position in which the tractor is not coupled to a trailer towing arm. The release limit switch RLSW has a normally-open contact pair RL1 which closes upon operation of the release limit
25 switch RLSW, i.e. when the actuator is at the second configuration i.e. when the coupling pin is in the trailer release position.

The actuator has a lock limit switch LLSW which is operated when the actuator is at the first configuration described above, i.e. the coupling pin 16 is fully inserted and
30 passes through the space 6, in a position for engaging a trailer towing arm and thereby locking a coupled tractor and trailer together. The lock limit switch LLSW has a normally-open contact pair LL1 which closes upon operation of the lock limit switch

LLSW when the actuator is at the first configuration i.e. when the coupling pin is in the locked trailer coupling position.

A first relay has a coil RA which is energised upon closure of an on/off switch SW.

- 5 The first relay has first and second normally-open contact pairs RA1, RA2.

A second relay has a coil RB which is in series with the normally-open contact pairs RA1 and RL1, across the 24 volt supply. The second relay is therefore energised when the on/off switch SW is on and the actuator is at the second configuration, i.e.

- 10 when the coupling pin is in the trailer release position.

The second relay has a normally-open contact pair RB1 and a normally-closed contact pair RB2.

- 15 A yellow lamp YL, which is in series with the normally-open contact pair RB1 of the second relay, across the 24 volt supply, is illuminated upon closure of the contact pair RB1. Therefore the yellow lamp YL illuminates when the on/off switch SW is on and the actuator is at the second configuration, i.e. when the coupling pin is in the trailer release position.

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A third relay has a coil RC which is in series with the normally-open contact pairs RA2 and LL1, across the 24 volt supply. The third relay has a normally-closed contact pair RC1. The third relay is energised, and its normally-closed contact pair RC1 opened, when both the normally-open contact pair RA2 of the first relay and the

25 normally-open contact pair LL1 of the lock limit switch LLSW are closed, i.e. when the on/off switch SW is on and the actuator is at the first configuration, i.e. when the coupling pin is in the locked trailer coupling position.

- 30 A green lamp GL, which is in parallel with coil RC of the third relay, is illuminated when the third relay coil RC is energised, i.e. when both the normally-open contact pair RA2 of the first relay and the normally-open contact pair LL1 of the lock limit switch LLSW are closed, i.e. when the on/off switch SW is on and the actuator is at

the first configuration, i.e. when the coupling pin is in the locked trailer coupling position.

5 A red lamp RL and a buzzer BZ are connected together in parallel, the parallel combination being connected in series with the normally-closed contact pair RB2 of the second relay and the normally-closed contact pair RC1 of the third relay. The red lamp is illuminated and the buzzer sounded when both the normally-closed relay contact pairs RB2 and RC1 are closed, i.e. whenever the actuator is between the first and second configurations, i.e. when the coupling pin is between the locked trailer
10 coupling position and the trailer release position.

The actuator control switch on the hydraulic fluid pump and the indicator lamps and buzzer are suitably located for control and monitoring by the tractor driver from the normal driving position so that the driver can couple and uncouple the tractor to a
15 trailer without leaving the driving position and without requiring a ground crew.

By the automated coupling and decoupling operations described above, 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
20 trailer couplings to a tractor, a reduced time spent coupling and decoupling a trailer-tractor combination, and an increased level of safety.

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
25 improvements may be made without departing from the scope or spirit of the invention. For one example, the coupling device can be used in any orientation, such as with the actuator below the driven coupling pin. For another example, the coupling device is attached to a trailer for coupling to a tractor towing arm.

LIST OF FEATURES LABELLED IN THE DRAWINGS

coupling device 1	attachment pin 48
tractor 2	cavity 50
main chassis 3	holes 52, 54
first and second limbs 4, 5	buffer blocks 56
space 6	distance plate 60
vertical member 7	fastener 62
holes 10, 12	axial hole 64
common axis 14	driving block 66
coupling pin 16	motor 70
actuator 20	pump 72
ram 20R	conduit 74
cylinder 20C	hydraulic cylinder 20C
biasing spring 22	on/off switch SW
T-bar 23	release limit switch RLSW
mounting plate 24	contact pair RL1 (of RLSW)
head 25	lock limit switch LLSW
guide tube 26	contact pair LL1 (of LLSW)
tack welds 27	1st relay coil RA
supporting flanges 28	contact pairs RA1, RA2 (of 1st relay)
top end flange 29	2nd relay coil RB
bolt 30	contact pairs RB1, RB2 (of 2nd relay)
radial hole 32	3rd relay coil RC
slot 34	contact pair RC1 (of 3rd relay)
ramps 36, 38	yellow lamp YL
guide plates 40, 41	green lamp GL
inward-facing surfaces 42, 43	red lamp RL
attachment arm 44	buzzer BZ
aperture 46	

CLAIMS

1. A coupling device comprising:
 - (a) first and second members being spaced apart on opposite sides of a
5 space therebetween, each of the first and second members having a hole, the holes
being aligned on a common axis which intersects the space,
 - (b) a driving means, and
 - (c) a coupling member being moveable by the driving means to move
along the common axis between a first configuration in which the coupling member
10 spans the space between the first and second members with respective portions of the
coupling member located in the holes, and a second configuration in which the
coupling member is clear of the space between the first and second members.
2. A coupling device as claimed in claim 1, wherein the common axis is
15 substantially horizontal in use of the coupling device.
3. A coupling device as claimed in claim 1, wherein the common axis is
substantially vertical in use of the coupling device.
- 20 4. A coupling device as claimed in any one of the preceding claims, wherein the
driving means is a linear actuator comprising a ram and cylinder which are
substantially aligned along the common axis, the ram being driven to slide within the
cylinder by introduction of a pressurised fluid into the cylinder.
- 25 5. A coupling device as claimed in any one of the preceding claims, wherein the
driving means is pneumatically operated by application of compressed air.
6. A coupling device as claimed in any one of claims 1 to 4, wherein the driving
means is hydraulically operated by application of a pressurised liquid.
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7. A coupling device as claimed in any one of the preceding claims, wherein the
holes are circularly cylindrical and have a common diameter and the coupling

member is a circularly cylindrical pin which is dimensioned to be a sliding fit within the holes.

8. A coupling device as claimed in any one of the preceding claims, wherein
5 activation of the driving means moves the coupling member from the first configuration to the second configuration, and continued activation of the driving means maintains the coupling member in the second configuration.

9. A coupling device as claimed in any one of the preceding claims, further
10 comprising a biasing means which biases the coupling member away from the second configuration and towards the first configuration, wherein, in the absence of activation of the driving means, the biasing means moves the coupling member from the second configuration to the first configuration and maintains the coupling member in the first configuration until reactivation of the driving means.

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10. A coupling device as claimed in claim 9, wherein the biasing means comprises a spring means.

11. A coupling device as claimed in any one of the preceding claims, wherein the
20 coupling member comprises a sliding pin with an enlarged circular head which is a sliding fit inside a cylindrical guide tube, the pin and guide tube being substantially aligned along the common axis.

12. A coupling device as claimed in any one of the preceding claims, wherein the
25 first and second members present respective inward facing surfaces on opposite sides of the space between the first and second members, and at least a portion of a distal edge of one or both of these inward facing surfaces is chamfered for facilitating insertion of a towing member into the space between the first and second members.

30 13. A coupling device as claimed in any one of the preceding claims, further comprising a pair of guide members, the guide members each extending at least partly between the first and second members and presenting respective inward facing surfaces which diverge outwardly from one another on respective opposite sides of

the common axis for facilitating insertion of a tractor towing member into the space between the first and second members and into a predetermined alignment with the common axis.

5 14. A coupling device as claimed in any one of the preceding claims, further comprising a third member from which the first and second members each extend in a first direction, and an attachment member which extends from the third member in a second direction opposite to the first direction, the attachment member having a aperture through which a pin can be inserted to attach the coupling device to a tractor
10 vehicle.

15 15. A coupling device as claimed in claim 14, further comprising a resilient buffer means which extends from the third member in the second direction.

15 16. A coupling device as claimed in claim 15, wherein the resilient buffer means comprises respective buffer members on opposite sides of the attachment member.

17. A coupling device as claimed in any one of the preceding claims, further comprising an indicator means which provides an indication of when the coupling means is in the first configuration, in the second configuration, or between the first
20 and second configurations.

18. A coupling device as claimed in claim 17, further comprising a first limit switch which is operated only when the coupling member is in the first configuration, and a second limit switch which is operated only when the coupling member is in the
25 second configuration, wherein the indicator means includes one or more visible or audible indicators which provide distinguishable indications of when the first limit switch is operated, when the second limit switch is operated, and when neither limit switch is operated.

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