A vehicle includes a coupling assembly (71, Fig 27) for connecting first (101) and second (152) sections of a brake supply line, the coupling assembly comprising complementary first and second couplings which fit together. A safety device 11 is complementary to one coupling eg on trailer 57 and can be fitted to the coupling so that it cannot be connected to the other coupling. The safety device 11 includes a blocking device (see figs 14-26) which is operable to prevent removal of the safety device from the coupling. A loading bay device 314 has a blocking device operable to prevent use of the loading bay eg by locking of door 304. The safety device 11 and the loading bay device 314 are in communication with each other, e.g. by way of a cable 316 or by wireless communication. The blocking device in the loading bay device 314 changes from a blocking state to an unblocking state when it is detected that the safety device 11 is fitted to the coupling. The blocking device in the safety device 11 is changed from an unblocking state to a blocking state preventing its removal from the coupling, when it is detected that use of the loading bay is not prevented by the loading bay device 314.

Fig. 3
Fig. 4

Fig. 5
Fig. 5A

Fig. 5B
Fig. 37
LOADING BAY SAFETY APPARATUS

This invention relates to apparatus for preventing a vehicle from being driven away from a loading bay during loading/unloading.

The normal sequence of events is that a vehicle (a semi-trailer, a drawbar trailer, or a lorry) is driven up to a loading bay and the driver contacts staff in the building. The loading bay has a door, usually of the ‘up and over’ type, and a dock leveller. The dock leveller is a powered ramp which is adjusted in height to accommodate differences in vehicle loading heights and to enable forklifts to drive from the building into the vehicle. To prevent accidents several safeguards are currently employed. Current systems include:

- Traffic lights, some of which are linked to the dock leveller. This does not prevent the driver from moving off but relies upon him obeying the lights. These systems are quite expensive.
- A traffic barrier system which retains the vehicle at the loading bay until a barrier is raised. This also relies upon correct procedure and is expensive.
- An inbuilt wheel blocking device which is installed in the ground at each bay and which is raised to prevent the vehicle from leaving until loading is complete. This is very expensive and also relies upon correct procedure to be effective.
- A wheel clamp which is fitted when the vehicle arrives and which provides a physical and visual barrier to indicate to the driver and he/she should not drive off. This also relies upon procedures and is cumbersome to operate.

It would be desirable to be able to provide apparatus for preventing a vehicle from being driven away from a loading bay during loading/unloading, the apparatus not requiring physical interaction between a vehicle driver and a loading bay operative.
The present invention provides apparatus for preventing a vehicle from being driven away from a loading bay during loading/unloading, comprising:

a safety device which is complementary to a coupling on the vehicle and which when fitted to the coupling prevents the vehicle from being driven away;

the safety device including a first blocking device having an unblocking state, allowing the safety device to be selectively fitted to and removed from the coupling, and a blocking state preventing removal; and

a loading bay device which is operable to selectively enable and disable use of the loading bay for loading/unloading;

the loading bay device including a second blocking device having a blocking state, preventing the loading bay device from enabling use of the loading bay, and an unblocking state allowing the loading bay device to enable use of the loading bay;

the apparatus including:

communication means for communicating between the safety device and the loading bay device; and

control means for controlling the first and second blocking devices;

the control means being arranged to perform the following functions:

detecting whether the safety device is fitted to the coupling,

detecting whether the loading bay device is prevented from enabling use of the loading bay,

causing the second blocking device to change from the blocking state to the unblocking state when it is detected that the safety device is fitted to the coupling, and

causing the first blocking device to change from the unblocking state to the blocking state when it is detected that the loading bay device is not prevented from enabling use of the loading bay.

In a first embodiment of the safety apparatus, interlocking between loading bay functions and a vehicle brake coupling is achieved via a cable carrying electrical power and signals.

The first embodiment comprises:

a safety device for attachment to the brake coupling of a trailer,
an umbilical cable, capable of transmitting electrical signals and power, that
connects the safety device to loading bay apparatus inside the building, and means by
which the necessary length of umbilical cable, necessary to connect from the brake
coupling of the trailer to the wall of the building, can be stowed and protected from
damage; and

a loading bay device that switches power to the loading bay apparatus, releases
the loading bay door and/or the dock leveller, and switches the traffic lights, or any
combination of these.

In the first embodiment, the safety device comprises means for attachment to a
brake coupling, means of detecting when it is, and is not, attached to a brake coupling, a
two-position switch, and a blocking device capable of locking the device onto a brake
coupling. The switch is locked in a first position until the safety device is fitted to a
brake coupling. Only when the safety device is fitted to a brake coupling, does it
become possible to move the switch to the second position. In the second position the
switch sends a signal into the building, down the umbilical cable, to the loading bay
device. If and when it receives an appropriate signal from the loading bay device, the
blocking device within the safety device locks the safety device on and prevents its
removal from the brake coupling. Whilst this signal is present the switch cannot be
returned to the first position. The safety device may also comprise a visual display
indicating its status and the status of the loading bay device.

The umbilical cable comprises an electrical cable containing a sufficient number
of cores to carry command signals, status signals, and actuating electrical power.
Shielding of the cable is sufficient to withstand overriding by heavy goods vehicle.
Sufficient length of cable is provided to connect between the side of the building and
the forward end of the longest, standard articulated trailer. Means are provided for
retaining the cable when not in use such that it does not come into contact with the
vehicle or the ground. The cable is securely attached to a manifold on the side of the
building and the safety device. The cable retaining means allows a driver to manually
move the safety device, attached to the free end of the cable, out to the front of the
trailer.
The loading bay device comprises a device to switch power to a dock leveller and optionally lock it in a retracted position and/or a device to lock closed a loading bay door and/or a device to switch traffic lights between red and green, an inhibiting means such that an electrical signal is required to enable the dock leveller to be supplied with power (and unlocked) and/or the door to be unlocked and/or the traffic lights to be switched to red, and means for sending an electrical signal to the safety device when the dock leveller is supplied with power (and unlocked), the loading door is unlocked and/or the traffic lights are switched to red. The loading bay device may also comprise a visual display indicating its status and the status of the safety device.

In the initial state of the safety apparatus in the first embodiment, the loading bay device is inoperative: the door is locked closed and/or the traffic lights are locked onto green and/or the stowed dock leveller is isolated from the power supply (and locked). The safety device is stowed so that it cannot be damaged. The switch in the safety device is in the first position and is inhibited from being moved to the second position. The displays on the loading bay device and the safety device are green.

When a trailer is parked at the loading bay, the air brake connector is removed from the coupling on the trailer. The safety device is attached to the brake coupling, enabling the switch to be moved to the second position. This sends a "safe" signal to the loading bay device. The displays on the loading bay device and the safety device change to amber.

In response to the "safe" signal, the loading bay device is unlocked and use of the loading bay is enabled. The door is unlocked and/or the traffic lights are switched to red and/or power is switched to the dock leveller (and it is unlocked). The blocking device in the safety device now prevents its removal from the brake coupling. The displays on the loading bay device and the safety device have changed to red.

On completion of the loading or unloading process the door is locked closed and/or the traffic lights are locked onto green and/or the dock leveller locked in the stowed position is isolated. This unblocks the safety device, which can then be removed from the brake coupling and returned to its retracted position. These actions also turn
the displays on the loading bay device and the safety device back to green and make it safe to move the trailer.

Benefits:

- A low cost interlocking system to prevent trailer 'drive-aways'.
- A true interlock ensuring interaction between the loading process and the movement of the trailer.
- The location of the cable can ensure that only the brakes of the trailer being loaded can trigger the loading process.
- The cable prevents loss or theft of the safety device.
- The driver does not need to enter the building and operative inside the building do not need to leave it.

In a second embodiment of the safety apparatus, wireless communication is used instead of a cable. The safety device additionally includes a transmitter and receiver device and a battery power supply. When the switch is in the second position a coded signal is transmitted to the loading bay device. If and when an appropriate signal is received from the loading bay device, the blocking device within the safety device locks onto the brake coupling, preventing its removal. Until it receives an 'unblocking' signal the switch cannot be returned to the first position. In the second embodiment the loading bay device additionally includes a transmitter and receiver device.

The second embodiment provides the following additional benefits:

- The cost of an umbilical cable is avoided.
- The location of a wireless communication aerial can ensure that only a trailer parked at a particular bay can facilitate loading operations of that individual bay.
- Radio frequency transmission from the safety device can be used to locate the safety device and prevent its theft or removal from site.

In a preferred embodiment the safety device comprises first and second coaxial parts which are arranged one inside the other, the first coaxial part having a tapering
surface for engaging a complementary surface of the said coupling, the second coaxial part carrying at least one plunger which engages with the first coaxial part to prevent relative rotation of the first and second coaxial parts, the plunger having an extension which extends radially through the first coaxial part and projects from the said tapering surface, the extension being acted on by the said complementary surface, when the safety device is fitted to the said coupling, so as to push the plunger out of engagement with the first coaxial part, thereby allowing relative rotation of the coaxial parts, the first coaxial part carrying a detent element which is radially movable between a projection position, in which it projects from the said tapering surface and is engageable with a circumferentially extending groove in the said complementary surface, and a retracted position, in which it does not so project, the coaxial parts being relative rotatable between a first position, in which the detent element is free to move between its projecting and retracted positions, and a second position, in which the detent element is prevented from moving to its retracted position from its projecting position.

In another embodiment the safety device includes a coupling part in the form of a palm-type coupling.

The invention will be described further, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a schematic side view of a loading bay with safety apparatus for preventing a vehicle from being driven away during loading/unloading, in a first embodiment according to the invention;

Figure 2 is a view similar to Figure 1, with the safety apparatus connected to a parked trailer;

Figure 3 is a view similar to Figure 3, with use of the loading bay enabled;

Figure 4 is a table showing the various states of switches in the safety apparatus, corresponding to the situations of Figures 1 to 3;

Figure 5 is a diagrammatic representation of safety apparatus in a second embodiment according to the invention, using wireless communication;

Figures 5A and 5B show logical sequences used in the safety apparatus of Figure 5;
Figures 6 to 8 are views similar to Figures 1 to 3 respectively, but with the second embodiment of safety apparatus;

Figure 9 schematically shows a loading bay door and a switch unit forming part of the safety apparatus in one embodiment, the door being open;

Figure 10 is similar to Figure 9, but with the door closed;

Figure 11 shows a door bolt and a switch unit forming part of the safety apparatus in another embodiment;

Figure 12 is similar to Figure 11, but with the bolt trapped in the switch unit;

Figure 13 is an axial section through a standard coupling assembly, showing male and female couplings separated;

Figure 14 is an axial section through a safety device forming part of the safety apparatus in one embodiment, fitted on a male coupling similar to that shown in Figure 13;

Figure 15 is an axial section in a plane at 90° to the plane of Figure 14;

Figure 16 is a view similar to Figure 15 but with the safety device not being fitted to the coupling;

Figure 17 is an axial section through an inner coaxial part of the safety device;

Figure 18 is a section taken on line A-A in Figure 17;

Figure 19 is an axial section through the inner coaxial part in a plane at 90° to the plane of Figure 17;

Figure 20 is a section taken on line B-B in Figure 19;

Figure 21 is an axial section through an outer coaxial part of the safety device, showing a body and an extension axially separated;

Figure 22 is a cross-section through the safety device, the coaxial parts being in a first relative position;

Figure 23 is a view similar to Figure 22, but with the coaxial parts in a second relative position;

Figure 24 is schematic cross-section of a locking device in an unblocked condition;

Figure 25 is a view similar to Figure 24, showing the locking device in a blocked condition;

Figure 26 is a side view of a spigot which forms part of the locking device;
Figure 27 is a schematic side view of part of an articulated vehicle, showing another type of standard coupling assembly;

Figure 28 is a plan view corresponding to Figure 27;

Figure 29 is a part-sectional plan view of one coupling of the coupling assembly of Figures 27 and 28;

Figure 30 is a side view of the coupling shown in Figure 29;

Figure 31 is a section taken on line C-C in Figure 30;

Figure 32 is a section taken on line D-D in Figure 31;

Figure 33 is a side view of a coupling similar to that shown in Figures 29 and 30;

Figure 34 is a longitudinal section through a safety device for use with the type of coupling shown in Figures 27 to 33, before fitting to the coupling;

Figure 35 is an end view of the security device of Figure 34;

Figure 36 is an end view similar to Figure 35, but after the safety device has been fitted to the coupling and a knob has been turned to lock the safety device; and

Figure 37 is a longitudinal section through the safety device, corresponding to Figure 36.

Figures 1 to 3 show a loading bay 300 with a first embodiment of safety apparatus 302 in accordance with the invention. The loading bay 300 includes a door 304, a dock leveller 306, and a set of traffic lights 308 having a red light 310 and a green light 312. The safety apparatus 302 comprises a safety device (SD) 11 for fitting to a brake coupling on a trailer unit 57 and a loading bay device (LBD) 314 for enabling/disabling use of the loading bay 300 for loading or unloading. These two devices are described in more detail below.

The safety device 11 is fixed to the free end of an umbilical cable 316 wound on a reel 318 which automatically retracts the cable to a position (Fig. 1) in which the safety device 11 is clear of the ground. The cable 316 is connected to the loading bay device 314 by further cabling (not shown).

The safety device 11 includes a (first) blocking device (described in more detail below) having an unblocking state, allowing the safety device to be fitted to (and removed from) the brake coupling, and a blocking state, preventing removal of the safety device
from the brake coupling. The loading bay device 314 includes a (second) blocking device (described in more detail below) having a blocking state, preventing the loading bay device from enabling use of the loading bay 300, and an unblocking state, allowing the loading bay device to enable use of the loading bay. For control of the first and second blocking devices, the safety device (SD) 11 has two switch contacts As and Ss and the loading bay device (LBD) 14 has two switch contacts Aa and Sa. The control logic for activating the blocking devices in the various stages of operation (shown in Figs. 1 to 3) is shown in Figure 4.

In Figure 1 the loading bay 300 is not in use. The SD contact Ss and the LBD contact Sa (connected in series in the supply line to the SD blocking device) are open (so that the SD blocking device is in the unblocking state), and the SD contact As and the LBD contact Aa (connected in series in the supply line to the LBD blocking device) are closed (so that the LBD blocking device is in the blocking state). The loading bay device 314 locks the door 304 closed, illuminates the green traffic light 312, and isolates the dock leveller 306 from the power supply. Indicator lights (not shown) on the safety device 11 and the loading bay device 314 are green.

In Figure 2 a trailer unit 57 has been parked at the loading bay 300 and the safety device 11 has been fitted on to the brake coupling. A locking device (described in detail below) on the safety device 11 is operated manually, closing the SD contact Ss and opening the SD contact As. Power is thus supplied to the LBD blocking device, changing it to the unblocking state, so that the loading bay device is allowed to enable use of the loading bay. Indicator lights on the safety device 11 and the loading bay device 314 are amber.

In Figure 3 the loading bay device 314 has been used to enable use of the loading bay by unlocking the door 304, switching on power to the dock leveller 306, and illuminating the red traffic light 310. This operation of the loading bay device 314 opens the LBD contact Aa and closes the LBD contact Sa. Power is supplied through the contacts Ss and Sa to the SD blocking device, changing it to the blocking state and thereby preventing the locking device from being moved from the locked position to the
unlocked position. The indicator lights on the safety device 11 and the loading bay device 314 are red.

On completion of loading/unloading, the dock leveller 306 is retracted and disconnected from the power supply by the LBD, the door 304 is closed and locked by the LBD, the traffic lights 308 are changed to red by the LBD, and the LBD contact Aa is closed and LBD contact Sa is opened, so that power is no longer supplied to the SD blocking device, allowing the SD locking device to be unlocked and the safety device 11 to be removed from the brake coupling. This closes the SD contact As and opens the SD contact Ss, so that the loading bay is again in the condition shown in Figure 1.

Figures 5 to 8 illustrate a second embodiment of the safety apparatus 302, which uses wireless communication instead of the umbilical cable. Referring to Figure 5, the loading bay device includes a transmitter/receiver (transceiver) and a decoder, as well as the above-mentioned contacts Sa and Aa and blocking device. The safety device includes a transmitter/receiver, a decoder, and a battery, as well as the above-mentioned contacts As and Ss and blocking device. Figure 5A shows the logical sequence followed by control circuitry the safety device 11, and Figure 5B shows the logical sequence followed by control circuitry in the loading bay device 314.

The above description of the operation of the safety device 11 and the loading bay device 34 with reference to Figures 1 to 3 also applies to the operation with reference to Figures 6 to 8.

The radio signal transmitted between the safety device 11 and the loading bay device 314 includes a code specific to the loading bay 300. The safety device 11 includes a "low battery power" warning light (not shown). The safety device 11 transmits a signal periodically, irrespective of whether it is fitted to a brake coupling; this signal can be used to locate the device if it removed from its normal location and/or trigger an alarm at a boundary of the loading bay.

Figures 9 and 10 show an embodiment in which the loading bay device includes a switch unit 320 which receives a tongue 322 attached to the loading bay door 304.
When the door is closed (Fig. 10) the tongue 322 enters the switch until 320 and operates a number of electrical contacts which are used to switch power to and from the dock leveller 306 and traffic 308. In addition the switch until 320 has the above-mentioned contacts Aa and Sa. The tongue 322 is trapped in the switch unit 320 until released by a blocking device such as a solenoid.

Figures 11 and 12 shows another type of switch unit 324, which can receive a manually operated bolt 326 mounted in a bracket 328 on the loading bay door 304. The switch until 324 is mounted on the door frame and contains a number of electrical contacts which are operated by means of a two-position knob 330 and are used to switch power to and from the dock leveller 306 and traffic lights 308. When the door 304 is closed the bolt 326 is inserted into the switch unit 324 (Fig. 12). The switch unit 324 also contains the above-mentioned contacts Aa and Sa and blocking device.

The knob 330 can only be moved between its two positions (A and B) when the blocking device is in the unblocking or inactive state and the bolt 326 is engaged in the switch unit 324. When the knob 330 is in position A (Fig. 12), the bolt 326 is trapped. The contacts Aa and Sa are operated in the above-described manner as a function of the position of the knob.

The standard coupling assembly (according to British Standard BS AU 138b:2000) shown in Figure 13 is for use in the supply line (also called the emergency line) which supplies air under pressure to release a braking device on the trailer unit of an articulated vehicle. In the event that the air supply fails, the braking device is automatically engaged to prevent movement of the trailer unit (or to brake the moving trailer unit). The assembly comprises a first coupling 1 (female coupling) on the end of a flexible hose (not shown), constituting a first supply line section on the tractor unit of the vehicle, and a second coupling 2 (male coupling) on the end of a second supply line section (not shown) provided on the trailer unit. The female coupling 1 has four captive balls 3 which engage in an annular circumferential groove 4 in the male coupling 2. A self-sealing valve 6 in the female coupling 1 is opened by the male coupling 2.
Figures 14 to 26 illustrate a preferred embodiment of the safety device 11, which can be fitted to the male coupling 2 to prevent the female coupling 1 from being fitted to it, thereby preventing disengagement of the braking device of the trailer unit. The safety device 11 has first and second coaxial parts 12 and 13, one inside the other. The inner part 12 has an internal surface 14 which tapers conically and which is complementary to the outer surface 16 of the male coupling 2. The outer part 13 carries two pairs of diametrically opposite plungers 17, 18, the pairs being both axially and angularly offset (in this example by 90°). The plungers 17, 18 are urged by respective springs 19 to engage (as in Figure 16) in respective recesses 21 in the inner part 12, thereby preventing relative rotation of the parts 12, 13.

Each of the plungers 17, 18 has an extension 22 which extends radially through a slot 23 (Figures 17 to 20) in the inner part 12 and projects (as in Figure 16) from the inner surface 14. When the safety device 11 is pushed onto the male coupling 2, the extensions 22 are acted on by the surface 16 so as to push the plungers 17, 18 out of the recesses 21, thereby allowing relative rotation of the parts 12, 13 through an angle (for example 65°) determined by the lengths of the slots 23. The inner part 12 has detent elements in the form of captive balls 24 (in this example, four) which are radially movable in bores 26 (Figures 17, 19), each ball 24 being movable between a projecting position (Figure 23), in which it projects from the inner surface 14 and is engageable with the groove 4, and a retracted position (Figure 22).

The outer part 13 has an annular inner surface region 27 (Figure 21) which faces the annular outer surface region of the inner part 12 containing the bores 26 and which has recesses 28. When the parts 12, 13 are in a first relative position (Figures 16, 22) the recesses 28 are in register with the bores 26 and the balls 24 are free to move between the projecting and retracted positions. When the parts 12, 13 are in a second relative position (Figure 23) the recesses 28 are out of register with the bores 26 and therefore the balls 24 are prevented from moving to their retracted positions.

The outer part 13 of the safety device 11 comprises a body 29 (Figure 21) covered by a sleeve 31 and extended by an extension 32 which fits in a recess 33 in the end of the body 29, has an internal collar 34 against which one end of the inner part 12 abuts,
and is adapted to cover a hexagonal base portion 36 of the male coupling 2 in order to prevent or inhibit an unauthorised person from defeating the safety device by disconnecting the coupling 2 from the trailer unit (and attaching a replacement coupling). The extension 32 has the region 27 with the recesses 28. The other end of the inner part 12 abuts against a bearing 37.

The end of the body 29 remote from the extension 32 houses a locking device 38 (lock) operated by a knob 39 to rotate a spigot 41 having flats 42 which engage corresponding flats 43 in the inner part 12. Accordingly, when the spigot 41 is turned, by turning the knob 39 of the lock 38, the inner part 12 is turned relative to the outer part 13. The spigot 41 has an extension 44 which extends beyond the plunger extensions 22, thereby inhibiting access to them.

It is to be noted that the plungers 17 prevent movement of the parts 12, 13 from the first position to the second position unless the safety device 11 is fitted on the male coupling 2.

Figures 14 to 16 show the umbilical cable 316 connected to circuitry 332 (shown only diagrammatically) which is connected to the switch contacts As, Ss (not shown in Figs. 14 to 16) in the safety device 11 and to the blocking device 334 (Figures 24, 25), which acts between the inner part 12 and the outer part 13. In Figure 24 the locking device 38 (Figs. 14 to 16) is in the unlocked state and the blocking device 334 is in the unblocking state. In Figure 25 the locking device 38 (Figs. 14 to 16) is in the locked state and the blocking device 334 is in the blocking state. The blocking device 334 may comprise a solenoid, an electromagnet, or a piezoelectric element, for example. A similar blocking device can be used in the loading bay device 314.

The preferred procedure for loading a trailer unit 57 is as follows.

1) The driver of the articulated vehicle with the trailer unit 57 arrives in the vicinity of the loading bay 300 and reverses towards the dock leveller 306. The driver gets out of the tractor unit, walks to the back of the trailer unit 57, and opens its doors. The driver then reverses the vehicle further (preferably into contact with a buffer).
2) The driver disconnects the female coupling 1 from the male coupling 2, thereby disconnecting the brake supply line, with the result that the brakes of the trailer unit 57 lock on.

3) The driver fits the safety device 11 on the male coupling 2, and turns the knob 39 to secure the safety device to the coupling 2, thereby preventing re-connection of the emergency braking device.

4) A warehouse operative operates the loading bay device 314 so as to enable use of the loading bay 300 for loading. This enables operation of the dock leveller 306, opening of the bay door 304, and changing the traffic lights 308 from green to red.

5) Loading then commences. Meanwhile, the tractor unit of the vehicle can be driven away, if desired. In the example shown in the drawings the trailer unit 57 is a semi-trailer, which is temporarily supported by a frame.

6) When loading has been completed, the warehouse operative retracts the dock leveller 306, closes the bay door 304, and operates the loading bay device 314 to disable use of the loading bay and change the traffic lights 308 to green.

7) The driver remove the safety device from the coupling 2, re-connects the brake supply line, and drives the trailer unit 57 away.

The above-described safety apparatus is of relatively low cost. Its use ensures that the trailer unit cannot be moved until loading is completed. By physically interlocking the brakes of the trailer unit with the operation of the loading bay, reliance upon procedural compliance is avoided, eliminating the possibility of human error. No modification of the vehicle is required. The above-described procedure obviates direct contact between the driver and the warehouse operative.

Various modifications may be made within the scope of the invention. For example, although the safety device has been described in an embodiment suited to a particular type of coupling, it could be modified to suit other couplings. In particular, if the coupling included a self-sealing valve, the spigot of the locking device could be designed to unseat the valve or to allow the valve to self-seal. The safety device could be used in a brake line other than the emergency line, e.g. in an auxiliary line. Furthermore, a modified safety device could be used on a female coupling, which would
require inversion of the functions of the inner and outer coaxial parts of the safety device, as will easily be understood.

The standard coupling assembly 71 (according to International Standard ISO 1728) shown in Figures 27 and 28 is in the supply line (emergency line) which supplies air under pressure to release the braking device on the trailer unit 57. The assembly 71 comprises a first coupling 101 on the end of a flexible hose 72, constituting a first supply line section on the tractor unit 73, and a second coupling 102 on the end of a second supply line section 74 provided on the trailer unit 57. A self-sealing valve (not shown) in the first coupling 101 is opened by the second coupling 102.

One of the couplings (the second coupling 102) is shown in Figures 29 to 32, the other coupling being similar. Each coupling comprises a body 76 carrying a face seal 77. One side of the body 76 is provided with an integral rim 78 and the diametrically opposite side is provided with an integral projecting spur 79. The two couplings 101, 102 are connected by placing their face seals 77 in the mutual contact and rotating them about their common axis 81 until the spur 79 of each coupling engages under the rim 78 of the other coupling so that the seals 77 are clamped hermetically together. The relative motion of the complementary couplings 101, 102 resembles the rotation of one hand palm against the other, this type of coupling therefore being referred to as a "palm coupling" or a "glad hand coupling".

Figure 33 shows an embodiment of the type of coupling described above with reference to Figures 27 to 32, in which similar parts are given the same reference numerals so that further description is not necessary.

It will be appreciated that a safety device 11 for use with a palm coupling as described above, in particular the second coupling 102, will have a body with a rim and a spur similar to those described above and will also have a locking device for locking it to the palm coupling.

Such a safety device 11 is shown in Figures 34 to 37. It comprises a coupling part 201 which is complementary to the second coupling 102 (described above) and projects
in the axial direction from a generally cylindrical inner part or body 202 which is surrounded by a generally cylindrical outer part or sleeve 203. The coupling part 201 comprises a body portion 204 shared so as to be complementary to the body 76 of the second coupling 102, a spur portion 206 for engagement with the rim 78, and a rim portion 207 which is to engage the spur 79 and which is connected to the inner body 202.

The outer sleeve 203 is axially slidable relative to the inner body 202 between a first position (Figure 34), in which the coupling part 201 is exposed for connection to the coupling 102, and a second position (Figure 37), in which the sleeve 203 covers the body part 204 (and also the body 76 of the coupling 102) to prevent disconnection of the coupling part 201 from the coupling 102. The inner body 202 carries a lock 208 operated by a knob 39 as described above. The lock 208 has a locking member 209 which is rotatable (by rotation of the knob 39) between a locking position (Figures 36 and 37), in which it engages in an annular internal recess 211 in the sleeve 203 to retain the sleeve in its second position (Figure 37), and an unlocking position (Figures 34 and 35). Furthermore, the sleeve 203 when in its first position (Figure 34) hinders access to the knob 39 and also interferes with the knob so as to prevent it from being turned to a position in which it is free.

The inner body 202 and the coupling part 201 define a diametral slot 212 which accommodates a latching plate 213 guided and retained by pins 214 engaging in elongate cut-outs 216. The plate 213 is urged by a compression spring 217 into a latching position (Figure 34) in which it engages in an annular internal recess 218 in the sleeve 203 in the first position, thereby preventing the sleeve from being moved to the second position (Figure 37). When the coupling part 201 is connected to the coupling 102, the spur 79 acts on an extension 219 of the latching plate 213 so as to move the plate 213 out of engagement with the recess 21, thereby allowing the sleeve 203 to be moved to its second position (Figure 37).

The sleeve 203 is provided with a carrying handle 221 which is pivotable between the positions shown in Figures 34 and 35 respectively. The sleeve 203 is freely
rotatable about its own axis relative to the inner body 202, in both the first position (Figure 34) and the second position (Figure 37).

The lock 208 is associated with a blocking device (not shown) as described above with reference to Figures 24 and 25. The body 202 contains circuitry 332 which is connected to the blocking device, to the above-described switch contacts As, Ss (not shown in Figures 34 to 37), and to the above-described umbilical cable 316.

It will be appreciated that the safety devices 11 described above are applicable not only to articulated vehicles but also to rigid vehicles, with suitable modification of the brake line.

As explained above, the dock leveller is retracted and stowed and the door is closed before the loading bay device switches of the power supply to them. Most loading bay systems require the dock leveller to be retracted before the door can be closed. In some circumstances the door may need to be independent of the loading bay device, in which case the loading bay device will be modified to lock and unlock the dock leveller in the stowed position, an “unblocking” signal being sent to the safety device only when the dock leveller is stowed; when the safety device is removed from the coupling, it sends a “blocking” signal to the loading bay device, ensuring that the dock leveller is locked in the stowed position as well as being isolated from the power supply.
CLAIMS:

1. Apparatus for preventing a vehicle from being driven away from a loading bay during loading/unloading, comprising:
   a safety device which is complementary to a coupling on the vehicle and which when fitted to the coupling prevents the vehicle from being driven away;
   the safety device including a first blocking device having an unblocking state, allowing the safety device to be selectively fitted to and removed from the coupling, and a blocking state preventing removal; and
   a loading bay device which is operable to selectively enable and disable use of the loading bay for loading/unloading;
   the loading bay device including a second blocking device having a blocking state, preventing the loading bay device from enabling use of the loading bay, and an unblocking state allowing the loading bay device to enable use of the loading bay;
   the apparatus including:
   communication means for communicating between the safety device and the loading bay device; and
   control means for controlling the first and second blocking devices;
   the control means being arranged to perform the following functions:
   detecting whether the safety device is fitted to the coupling,
   detecting whether the loading bay device is prevented from enabling use of the loading bay,
   causing the second blocking device to change from the blocking state to the unblocking state when it is detected that the safety device is fitted to the coupling, and
   causing the first blocking device to change from the unblocking state to the blocking state when it is detected that the loading bay device is not prevented from enabling use of the loading bay.

2. Apparatus as claimed in claim 1, in which the safety device includes a first locking device which has a locked state, preventing removal of the safety device from the coupling, and an unlocked state, the first blocking device in the blocking state
preventing the first locking device in the locked state from changing to the unlocked state.

3. Apparatus as claimed in claim 1 or 2, in which the locking bay device includes a second locking device which has a locked state, preventing the loading bay device from enabling use of the loading bay, and an unlocked state, the second blocking device in the blocking state preventing the second locking device in the locked state from changing to the unlocked state.

4. Apparatus as claimed in any preceding claim, in which the control means is arranged to perform the additional function of causing the first blocking device to change from the blocking state to the unblocking state when the second blocking device changes from the unblocking state to the blocking state.

5. Apparatus as claimed in any preceding claim, in which the first blocking device can be changed from the unblocking state to the blocking state only when the safety device is fitted on the coupling.

6. Apparatus as claimed in any preceding claim, in which the loading bay device includes a switch for controlling supply of electrical power to an operating component of the loading bay.

7. Apparatus as claimed in any preceding claim, in which the loading bay device includes a locking device for locking a door and/or a dock leveller.

8. Apparatus as claimed in any preceding claim, in which the loading bay disabling device includes traffic lights.

9. Apparatus as claimed in any preceding claim, in which the safety device and/or the loading bay device includes an indicator for indicating the status of the device as a function of the states of the blocking devices.
10. Apparatus as claimed in claim 9, in which the indicator gives a first indication, e.g. a green light, when the first blocking device is in the unblocking state, the second blocking device is in the blocking state, the safety device is not fitted to the coupling and the loading bay device is prevented from enabling use of the loading bay, a second indication, e.g. an amber light, when the safety device is fitted to the coupling, the first blocking device is in the unblocking state, and the second blocking device is in the unblocking state, and a third indication, e.g. a red light, when the loading bay device enables use of the loading bay, the first blocking device is in the blocking state, and the second blocking device is in the unblocking state.

11. Apparatus as claimed in any preceding claim, in which the communication means includes a cable.

12. Apparatus as claimed in claim 11, in which the cable is carried by a retracting device which keep the security device out of contact with the ground.

13. Apparatus as claimed in any preceding claim, in which the communication means includes a transmitter/receiver on the safety device and a transmitter/receiver on the loading bay device.

14. Apparatus as claimed in claim 13, in which there is wireless communication between the transmitters/receivers.

15. Apparatus as claimed in any preceding claim, for use with a vehicle having a brake supply line and a coupling assembly for connecting first and second sections of the brake supply line, the coupling assembly comprising complementary first and second couplings which are provided on the respective first and second sections of the brake supply line and which fit together to connect the first and second sections, the safety device being complementary to one of the couplings.

16. Apparatus as claimed in claim 15, the vehicle having a tractor unit and a trailer unit, the first section of the brake line being on the trailer unit and the second section being on the trailer unit, the safety device being complementary to the second coupling.
17. Apparatus as claimed in any preceding claim, the safety device having a tapering surface for engaging a complementary surface of the said coupling.

18. Apparatus as claimed in claim 17, in which the safety device includes first and second coaxial parts which are arranged one inside the other, the first coaxial part having the said tapering surface, the second coaxial part carrying a plunger which engages with the first coaxial part to prevent relative rotation of the first and second coaxial parts, the plunger having an extension which extends radially through the first coaxial part and projects from the said tapering surface, the extension being acted on by the said complementary surface, when the safety device is fitted to the said coupling, so as to push the plunger out of engagement with the first coaxial part, thereby allowing relative rotation of the coaxial parts, the first coaxial part carrying a detent element which is radially movable between a projection position, in which it projects from the said tapering surface and is engageable with a circumferentially extending groove in the said complementary surface, and a retracted position, in which it does not so project, the coaxial parts being relative rotatable between a first position, in which the detent element is free to move between its projecting and retracted positions, and a second position, in which the detent element is prevented from moving to its retracted position from its projecting position.

19. Apparatus as claimed in claim 18, in which the safety device has an extension which inhibits access to the plunger extension when the security device is not fitted to the said coupling.

20. Apparatus as claimed in claim 18 or 19, in which there are at least two said plungers at different axial locations.

21. Apparatus as claimed in any of claims 18 to 20, in which there are at least two said plungers at different circumferential locations.
22. Apparatus as claimed in any of claims 18 to 21, in which the second coaxial part has a recess into which the detent element can retract when the coaxial parts are in the said first relative position.

23. Apparatus as claimed in any of claims 1 to 17, for use with a coupling which comprises a body provided with a face seal, a rim on one side, and a projecting spur on the diametrically opposite side, the safety device including a coupling part which is complementary to the said coupling and which comprises a body portion having a rim portion on one side, for engagement with the spur of the said coupling, and having a spur portion on the diametrically opposite side, for engagement with the rim of the said coupling.

24. Apparatus as claimed in claim 23, in which the safety device includes an inner part connected to the rim portion of the coupling part and an outer part which is slidable between a first position, in which the coupling part is exposed for connection to the said coupling, and a second position, in which the outer part is able to prevent disconnection of the coupling part from the said coupling.

25. Apparatus as claimed in claim 24, in which the safety device includes a locking member which is movable between a locking position, in which it is engageable in an internal recess in the outer part in the second position, and an unlocking position, in which it is not so engageable.

26. Apparatus as claimed in claim 24 or 25, in which, in the first position, the outer part interferes with a knob on the locking member so as to prevent turning of the knob from a position in which the locking member is in the unlocking position to a position in which the locking member is in the locking position.

27. Apparatus as claimed in any of claims 24 to 26, in which the safety device includes a latching member which is mounted in the inner part so as to be movable between a latching position, in which it is engageable with an internal recess in the outer part in the first position, and an unlatching position, in which it is not so engageable.
28. Apparatus as claimed in claim 27, in which the latching member has an extension which extends into the rim portion and which is to be acted on by the spur of the said coupling to move the latching member from the latching position to the unlatching position.

29. Apparatus as claimed in any of claims 24 to 28, in which the outer part is substantially cylindrical.

30. Apparatus as claimed in claim 29, in which the outer part is rotatable relative to the inner part.

31. Apparatus for preventing a vehicle from being driven away from a loading bay during loading/unloading, substantially as described with reference to Figures 1 to 4 or Figures 5 to 8 of the accompanying drawings.
**Application No:** GB0407510.7  
**Examiner:** Mr Dave McMunn  
**Claims searched:** 1-31  
**Date of search:** 20 July 2004

**Patents Act 1977: Search Report under Section 17**

**Documents considered to be relevant:**

<table>
<thead>
<tr>
<th>Category</th>
<th>Relevant to claims</th>
<th>Identity of document and passage or figure of particular reference</th>
</tr>
</thead>
</table>
| A        | 1                  | US 6318947 B1  
RITE-HITE. See Figs. |
| A        | 1                  | US 4843373 A  
RITE-HITE. See Figs. |
| A        | 1                  | US 5453735 A  
RITE-HITE. See Figs. |
| A        | 1                  | GB 2356389 A  
GUNTON. See Figs. |
| A        | 1                  | EP 0009956 A1  
RITE-HITE. See Figs. |
| A        | 1                  | WO 79/00576 A1  
RITE-HITE. See Figs. |

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- **X** Document indicating lack of novelty or inventive step
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**Field of Search:**

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC

- **B8E**

Worldwide search of patent documents classified in the following areas of the IPC

- **B65G**

The following online and other databases have been used in the preparation of this search report:

- WPI, EPDOC, JAPIO.