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(56) Documents Cited:
GB 2486756 A US 4455119 A

(58) Field of Search:
INT CL **B60P, B65G**
Other: **Online WPI and EPODOC**

(54) Title of the Invention: **Improvements in and relating to door assemblies for transporters**
Abstract Title: **Door assembly for transporters having pivot guide means**

(57) A door assembly 20 for use with a transporter 10 has a door 30 and a door mounting portion 40 for coupling to a transporter 10. The door mounting portion 40 comprising a door pivot 32 and a guide 70 for the door pivot 32. Where the door mounting portion 40 further comprises a door pivot location actuator 80 arranged to move the door pivot 32 along the guide 70 to change the door pivot 32 position relative to the transporter 10 and a door rotation actuator 50 for selectively opening and closing the door 30 by rotating the door 30 about the pivot 32. The arrangement is of use for multi-deck transporters to avoid a trip hazards for livestock. Also claimed is a transporter 10 having such a door assembly 20 and a method of loading livestock into the a transporter 10 where the location actuator 80 matches the upper edge of the door 30 to the upper edge of an uppermost deck of the transporter 10.

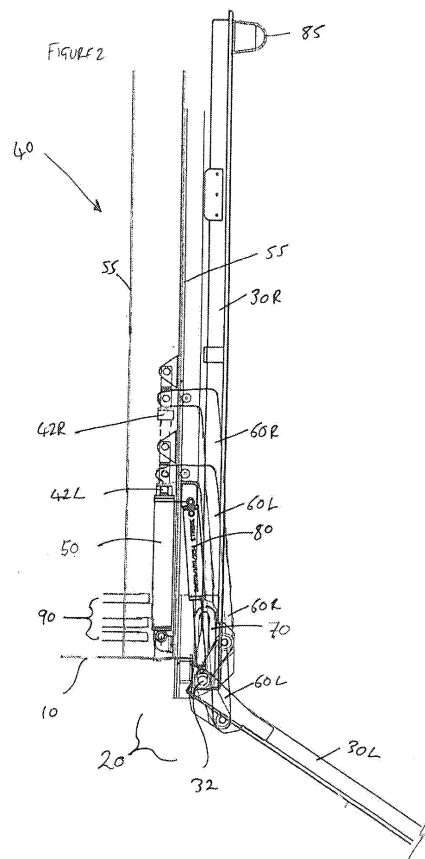


FIGURE 1

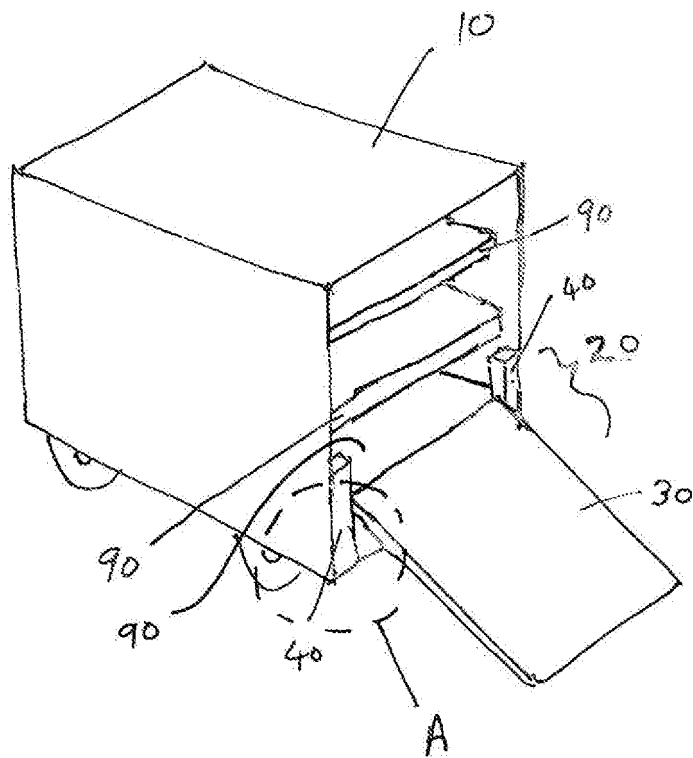


FIGURE 2

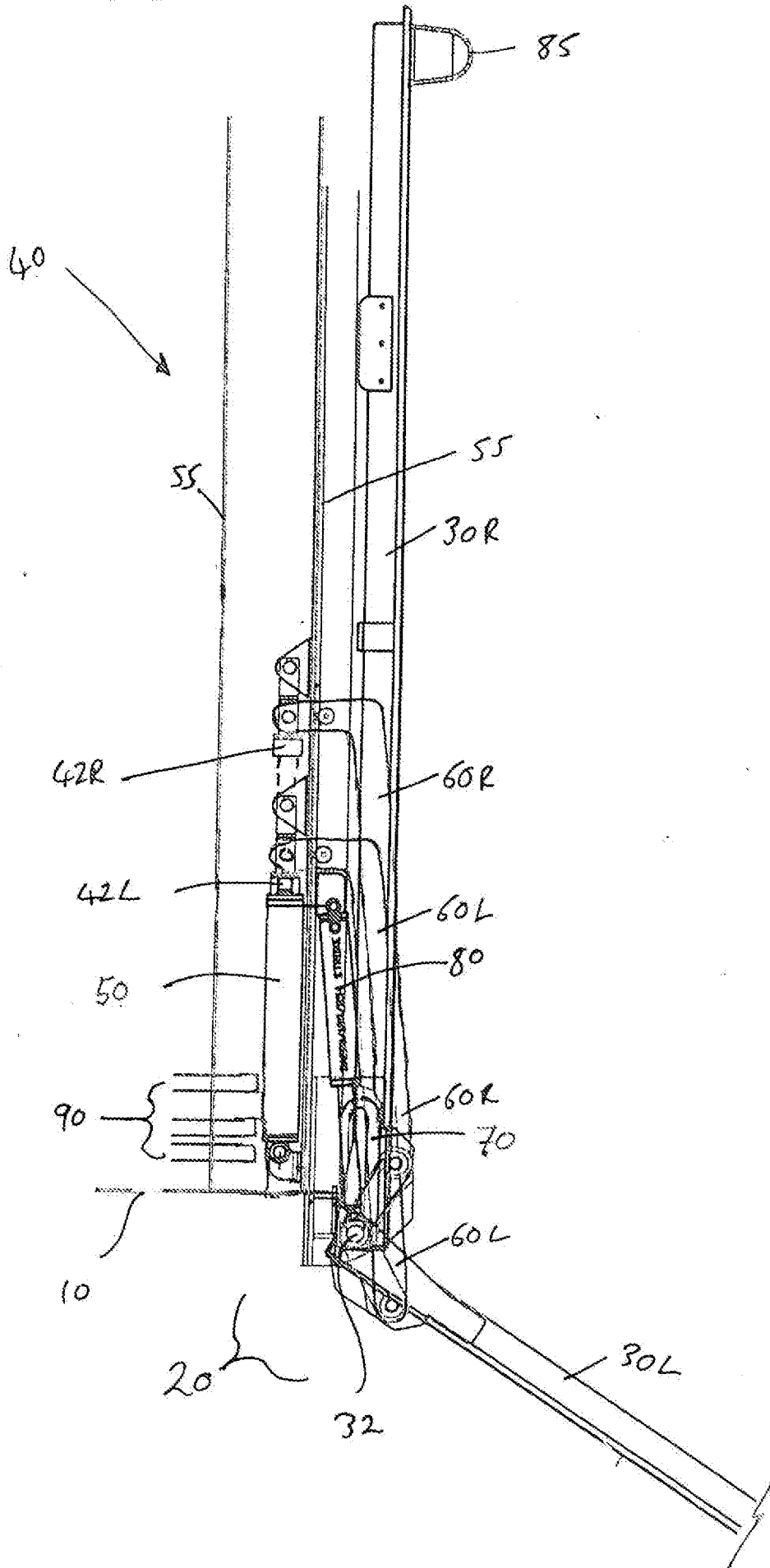
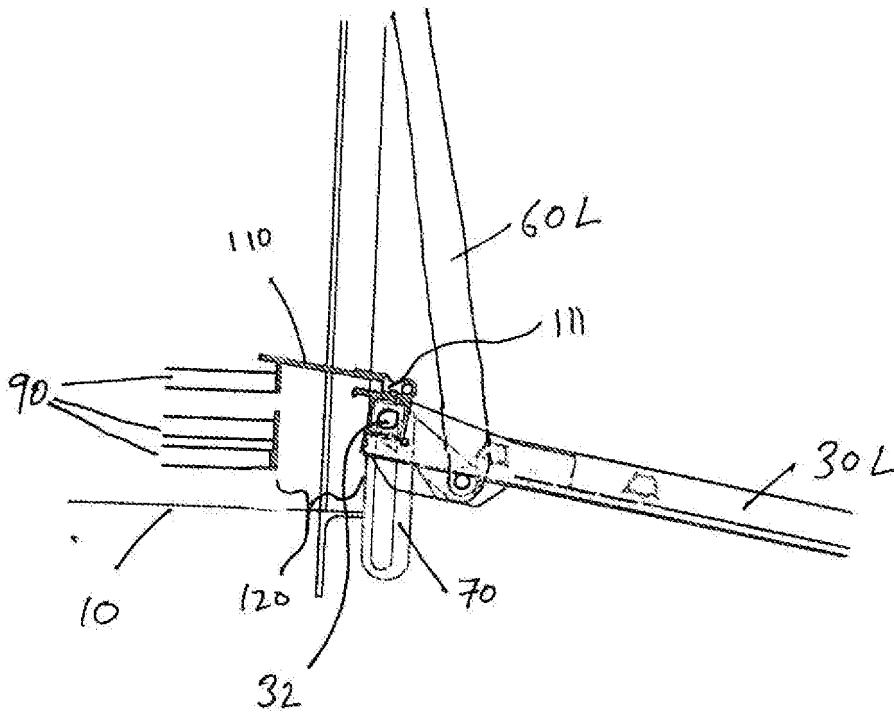


FIGURE 3



IMPROVEMENTS IN AND RELATING TO DOOR ASSEMBLIES FOR TRANSPORTERS

Field of the Invention

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The present invention relates to door assemblies for use with transporters, transporters incorporating a door assembly and especially, but not limited to, door assemblies for use with livestock transporters and transporters for use in transporting livestock. The present invention further relates to associated methods.

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Background to the Invention

Trailers and other transporters for use in transporting livestock generally comprise a door which is opened to allow loading, closed to prevent loaded livestock from exiting the transporter, and opened again to allow unloading. Typically, the door doubles as a ramp which livestock can walk on during the loading/unloading process, and closing the door comprises raising the door by rotation about a pivot at a lower edge of the transporter body.

To reduce the effort required to raise the door, a spring assist system may be used. However, this still requires manual effort in raising and lowering the door. Equally, the position of the spring assist system typically used exposes the spring to dirt and potential damage from livestock during the loading process.

For trailers or transporters comprising a plurality of decks enabling livestock to be carried on the separated decks in several tiers, when the decks are lowered to the base of the trailer or transporter, depending upon the thickness of the other decks stacked below the deck in use, there may be a step formed by a height difference between the upper surface of a deck from which livestock is to be loaded or unloaded, and the upper edge of the door, used as a ramp. Even a small step of a few cm. in height may be problematic when loading or unloading small livestock such as piglets or lambs and may result in delays or injury to the livestock.

Hence, there is a need for a door suitable for use as a loading/unloading ramp with a multi-deck transporter which avoids the presence of such height differences.

It is an aim of the present invention to address at least one problem associated with the prior art, whether referred to herein or otherwise.

Summary of the Invention

According to the present invention there is provided an apparatus and method as set forth in the appended claims. Other features of the invention will be apparent from the dependent claims, and the description which follows.

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A first aspect of the invention provides a door assembly for use with a transporter, the door assembly comprising: a door and a door mounting portion for coupling the door to a transporter, the door mounting portion comprising a door pivot and a guide for the door pivot, wherein the door mounting portion further comprises a door pivot location actuator arranged to
10 move the door pivot along the guide to change the door pivot position relative to the transporter, and a door rotation actuator for selectively opening and closing the door by rotating the door about the pivot.

A second aspect of the invention provides a transporter comprising a door assembly according
15 to the first aspect of the invention, wherein the transporter comprises a plurality of decks moveable between a stacked configuration with one or more of the decks stacked on a floor of the transporter and a deployed configuration with the decks arranged separated to form a plurality of storeys upon which livestock is transportable.

A third aspect of the invention provides a method of loading livestock, the method comprising
20 loading livestock into a transporter according to the second aspect of the invention, through the door; wherein the door pivot location actuator is used to match the height of the upper edge of the proximal end of the door to the height of the upper edge of the floor or of the uppermost deck of the decks in the stacked configuration deck in use.

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Throughout this specification, the terms “comprising” or “comprises” mean including the component(s) specified but not to the exclusion of the presence of others.

The terms “consisting essentially of” or “consists essentially of” mean including the
30 components specified but excluding other components except for materials present as impurities, unavoidable materials present as a result of processes used to provide the components, and components added for a purpose other than achieving the technical effect of the invention.

The terms “consisting of” or “consists of” mean including the components specified, but
35 excluding other components.

Whenever appropriate, depending upon the context, the use of the terms "comprises" or "comprising" may also be taken to include the meanings "consists essentially of" or "consisting essentially of" and "consists of" or "consisting of".

- 5 The optional features set out herein may be used either individually or in combination with each other where appropriate and particularly in the combinations as set out in the accompanying claims. The optional features for each aspect of the invention, as set out herein, are also applicable to any other aspects or exemplary embodiments of the invention, where appropriate.

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A first aspect of the invention provides a door assembly for use with a transporter. The door assembly comprises a door and a door mounting portion for coupling the door to a transporter. The door mounting portion includes a door pivot and a guide for the door pivot. The door mounting portion also includes a door pivot location actuator, such as a hydraulic actuator, for instance a first hydraulic ram which may be operable by a control means, arranged to move the door pivot along the guide to change the door pivot position relative to the transporter. The door assembly also includes a door rotation actuator for selectively opening (lowering) and closing (raising) the door by rotating the door about the pivot. The door rotation actuator may suitably be a second hydraulic ram, for instance, operably connected to the door through a rigid linkage means and arranged to rotate the door between closed and open positions, and vice versa, by means of the rigid linkage means.

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The door may be mounted on door pivots at opposite extremities of a proximal end of the door, relative to the transporter, for rotation about a horizontal axis defined by the door pivots, with the door pivots arranged to be moved in a vertical direction by the door pivot location actuator.

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The guide may be a slot within which the door pivot is slidably retained.

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The second aspect of the invention provides a transporter comprising a door assembly according to the first aspect of the invention. The transporter comprises a plurality of decks moveable between a stacked configuration with one or more of the decks stacked on a floor of the transporter and a deployed configuration with the decks arranged separated to form a plurality of storeys upon which livestock is transportable. The transporter may be loaded by first having the decks all in the stacked configuration, loading the uppermost deck with livestock, and then moving the loaded deck to a raised position, spaced from the next adjacent deck, so that the next adjacent deck may be loaded. The proximal end of the door, originally aligned with the upper edge of the topmost deck of the stack, may be repositioned by means of the door pivot movement actuator to be aligned with the uppermost surface of the next deck to be loaded. This avoids or reduces the risk of any step being present, such a step potentially

being caused by a height differential between the upper edge of the deck to be loaded and the upper edge of the proximal end of the door. This loading or unloading process, as set out above, may be repeated for each deck in order. A similar process may be used *mutatis mutandis* for unloading of the livestock.

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The transporter suitably has door pivots that are arranged to be moved at least between a first position holding the proximal end of the door with its upper edge at a height corresponding to the height of a corresponding upper edge of the floor and a second position holding the proximal edge of the door with its upper edge at a height corresponding to the height of an upper edge of an uppermost deck of the decks in the stacked configuration.

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A flap may be provided at the upper edge of the proximal end of the door, hinged thereto, and arranged to cover any gap between the upper edge of the proximal end of the door and the upper edge of the uppermost deck in the stacked configuration.

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The third aspect of the invention provides a method of loading livestock, the method comprising loading livestock into a transporter according to the second aspect of the invention, through the door; wherein the door pivot location actuator is used to match the height of the upper edge of the proximal end of the door to the height of the upper edge of the floor or of the uppermost deck of the decks in the stacked configuration deck in use.

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The method of this aspect of the invention suitably involves opening the door, then moving the door pivot to change the ramp angle of the door relative to the ground.

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Brief Description of the Drawings

For a better understanding of the invention, and to show how embodiments of the same may be carried into effect, reference will now be made, by way of example, to the accompanying diagrammatic drawings in which:

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Figure 1 is a schematic, perspective view showing a transporter according to a first exemplary embodiment of the invention, with the door in a lowered (open) position;

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Figure 2 is a schematic cross-sectional side view close up view of the region A of Figure 1, showing the rear floor region of the transporter and the door assembly of the first exemplary embodiment of the invention; and

Figure 3 is a schematic cross-sectional side view close up view of the rear floor region of a transporter and a door assembly according to a second exemplary embodiment of the

invention, but with the door pivot location actuator and door rotation actuator not shown in the Figure for the sake of clarity.

Description of the Preferred Embodiments

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As illustrated by Figures 1 and 2, a transporter body 10 has a door assembly 20 with a door 30 and a door mounting portion 40. The transporter has three decks 90. The door 30 is shown in Figure 1 in an open position 30 with the lowermost, distal part of the door resting on the ground supported by rubber bumper 85. The door 30 is shown in Figure 2 both in an open, position 30L (L for lowered), with the lowermost part of the door 30 resting on the ground supported by the bumper 85, and also in a closed position 30R (R for raised). In the open position the door 30 forms a ramp to facilitate loading or unloading of the transporter, for example with livestock. The door 30 is mounted at its proximal end to rotate between the open position and the closed positions about a pivot 32, with the rotation controlled by the extension of the door rotation actuator 40. With the door 30 in the raised closed position 30R the actuator ram 42 is extended as indicated at 42R and with the door 30 in the lowered open position the actuator ram 42 is retracted as indicated at 42L.

The door rotation actuator 50 comprises a hydraulic ram. The actuator may be protected from damage by virtue of its position relative to an actuator guard 55. The actuator guard 55 extends around the actuator 50, to shield the actuator 50 from contact by animals or other bodies as loading, or unloading takes place. The actuator guard 55 also extends to form a barrier that lies between the door 30 and the transporter body 10. The actuator guard 55 is conveniently provided in the form of a pillar which forms a side or corner extremity of the transporter body 10. To aid in the raising and lowering of the ram 42, ram guide means are provided on the actuator guard 55. The ram guide means support the ram 42 from one or more sides. In use the ram guide means provide a smooth surface contact between the ram 42 and an adjacent portion of the actuator guard 55. The ram guide means may suitably comprise a nylon or other polymeric or low friction bushing or runner.

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To couple the door rotation actuator 40 to the door 30 a linkage 60 is provided. The linkage 60 extends through an opening formed in the actuator guard 55. The linkage 60 comprises a coupling component that is mounted between the ram 42 and the door 30, with a pivoting coupling at each end. The coupling component is made robust, and is of generally simple construction. This serves to prevent damage to the door assembly. In the event that damage occurs to the coupling component, the coupling component provided is easy and relatively cheap to replace. A service hatch or the like (not shown) is suitably provided in the actuator guard 55 to facilitate maintenance/replacement of the actuator and linkage if required. In relation to pivot 32, it will be appreciated that an equivalent arrangement to that shown in the

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Figures is provided on each side of the transporter 10, at each extremity of the proximal end of the door 30. There may or may not be a corresponding drive rotation actuator etc. on each side of the transporter.

- 5 The door mounting portion 40 also comprises a guide 70 in the form of a slotted plate with the door pivot 32 slidably retained in the slot. The door pivot location actuator 80 is a second hydraulic ram pivotally mounted to the door mounting portion 40 at one end and to the door pivot 32 at the other end. Moving the door pivot 32 up and down along the slot in the guide 70 changes the pivot position, which alters the height of the upper edge of the proximal portion of
10 the door end relative to the floor of the transporter 10.

In Figure 1, the door is shown with its distal end positioned by the door pivot location actuator 80 so that its upper edge is level with the upper edge of the lowermost deck 90.

- 15 Figure 3 shows a second exemplary embodiment of the invention, but with the door rotation actuator 50 and the door pivot location actuator 80 not shown, for the sake of clarity, even though both of these features are actually also present in the second exemplary embodiment of the invention.

- 20 For this embodiment, a flap 110 is provided as a rigid step to form a bridge over a gap 120 between the end(s) of the decks 90 and the proximal end of the door 30L (shown only in the open lowered position in this Figure). The flap 110 may move with the proximal end of the door by rotating about hinge 111 as the pivot 32 is slid up or down the guide 70 in the slot, driven by the door pivot location actuator.

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Control circuitry and associated hydraulic supply lines have been omitted from the drawing for clarity. It will be appreciated that the door may also include a secondary safety catch or other locking mechanism to hold it in the raised or lowered positions, and that when a hydraulic actuator is used, fail safe valves and manual override systems may be provided to increase
30 security in operation.

Although a few preferred embodiments have been shown and described, it will be appreciated by those skilled in the art that various changes and modifications might be made without departing from the scope of the invention, as defined in the appended claims.

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It will be appreciated that example embodiments of the invention may provide for efficient loading of livestock, and reduce the likelihood of delays and damage to livestock which could arise if there were to be an excessive height difference and/or a gap between the upper

surfaces of decks 90 and the upper surface of the proximal edge of the door 30 during any loading or unloading of livestock.

5 All of the features disclosed in this specification and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

10 Each feature disclosed in this specification may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

CLAIMS

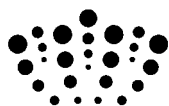
1. A door assembly for use with a transporter, the door assembly comprising:
a door and a door mounting portion for coupling the door to a transporter, the door mounting portion comprising a door pivot and a guide for the door pivot, wherein the door mounting portion further comprises a door pivot location actuator arranged to move the door pivot along the guide to change the door pivot position relative to the transporter, and
a door rotation actuator for selectively opening and closing the door by rotating the door about the pivot.
2. The door assembly of claim 1 wherein the door is mounted on door pivots at opposite extremities of a proximal end of the door, relative to said transporter, for rotation about a horizontal axis defined by the door pivots, with the door pivots arranged to be moved in a vertical direction by the door pivot location actuator.
3. The door assembly of claim 1 or claim 2 wherein the door pivot location actuator is a first hydraulic ram.
4. The door assembly of any preceding claim wherein the door rotation actuator is a second hydraulic ram.
5. The door assembly of any preceding claim wherein the guide is a slot within which the door pivot is slidably retained.
6. A transporter comprising a door assembly according to any preceding claim, wherein the transporter comprises a plurality of decks moveable between a stacked configuration with one or more of the decks stacked on a floor of the transporter and a deployed configuration with the decks arranged separated to form a plurality of storeys upon which livestock is transportable.
7. The transporter of claim 6 wherein the door pivots are arranged to be moved at least between a first position holding the proximal end of the door with its upper edge at a height corresponding to the height of a corresponding upper edge of the floor and a second position holding the proximal edge of the door with its upper edge at a height corresponding to the height of an upper edge of an uppermost deck of the decks in the stacked configuration.
8. The transporter of claim 7 wherein a flap is provided at the upper edge of the proximal end of the door, hinged thereto, and is arranged to cover a gap between the upper edge of the

proximal end of the door and the upper edge of the uppermost deck in the stacked configuration.

9. A method of loading livestock, the method comprising loading livestock into a transporter according to any one of claims 7 to 9, through the door; wherein the door pivot location actuator is used to match the height of the upper edge of the proximal end of the door to the height of the upper edge of the floor or of the uppermost deck of the decks in the stacked configuration deck in use.

10. The method of claim 9 comprising opening the door, then moving the door pivot to change the ramp angle of the door relative to the ground.

11. A door assembly, method or transporter substantially as herein-described, with reference to the accompanying drawings.



Application No: GB1309355.4

Examiner: Mr Patrick Phillips

Claims searched: 1 - 10

Date of search: 5 November 2013

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

| Category | Relevant to claims | Identity of document and passage or figure of particular relevance |
|----------|----------------------------|--|
| X,Y | X: 1, 2, 5 Y: 4, 6 - 10 | US 4455119 A (SMITH) Whole document particularly Figures. |
| Y | 4, 6 - 10 | GB 2486756 A (PARKHOUSE) Whole document particularly Figures 3 and 4 and Page 7; Line 15 to 17. |

Categories:

| | | | |
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| X | Document indicating lack of novelty or inventive step | A | Document indicating technological background and/or state of the art. |
| Y | Document indicating lack of inventive step if combined with one or more other documents of same category. | P | Document published on or after the declared priority date but before the filing date of this invention. |
| & | Member of the same patent family | E | Patent document published on or after, but with priority date earlier than, the filing date of this application. |

Field of Search:

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

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

B60P; B65G

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

WPI, EPODOC

International Classification:

| Subclass | Subgroup | Valid From |
|----------|----------|------------|
| B60P | 0001/43 | 01/01/2006 |
| B60P | 0003/04 | 01/01/2006 |