**Summary**

The invention relates to a passenger service vehicle as defined in claim 1, a method as defined in claim 18, and use of a vehicle as defined in claim 19.

In some described examples, there is provided a passenger service vehicle having an upper deck and a lower deck, and a passenger staircase extending between the upper deck and the lower deck. The staircase may provide one or more of improved passenger capacity and/or ergonomics, improved fuel efficiency and/or improved fuel capacity, maintaining or improving the safety of such vehicles.

In the described example, the staircase has at least an upper stair portion and a secondary stair portion. The upper stair portion is positioned at, for example connected to, the upper deck. The upper stair portion comprises at least one tread (e.g. one tread and one corresponding riser). The upper stair portion is further connected to the secondary stair portion, for example, via an intermediate landing. The upper stair portion extends transversely with respect to the secondary stair portion.

The upper stair portion extends perpendicular with respect to the secondary stair portion. The upper deck extends for a length of the vehicle, and the upper stair portion extends perpendicularly with respect to the length of the upper deck. The secondary stair portion extends parallel with respect to the length of the upper deck. The intermediate landing may be considered to be a quarter landing.

The staircase comprises a lower stair portion. The lower stair portion is connected to the lower deck. The lower stair portion comprises at least one tread (e.g. one tread and

one corresponding riser). The lower stair portion is connected to the secondary stair portion via an intermediate landing (i.e. the staircase having a lower intermediate landing and an upper intermediate landing). The lower stair portion extends transversely with respect to the secondary stair portion.

The lower stair portion may extend perpendicularly with respect to the secondary stair portion. The lower deck may extend for a length of the vehicle (e.g. in the same manner as the upper deck), and the lower stair portion may extend perpendicularly with respect to the length of the lower deck. The lower intermediate landing may be considered to be a quarter landing.

The upper, secondary and lower stair portions may be considered to be configured generally in a U-shape. The upper, secondary and lower portions may be considered to provide three different directions (e.g. different and distinct) of travel for a passenger moving from the upper deck to the lower deck (and vice versa).

The upper stair portion may comprise a plurality of treads. The upper stair portion may comprise only one tread (e.g. one tread and one corresponding riser). The lower stair portion may comprise a plurality of treads (e.g. treads and risers). The lower stair portion may comprise only one tread (e.g. one tread and one corresponding riser). The secondary stair portion may comprise a plurality of treads, for example, the secondary stair portion may comprise four treads.

Each stair portion may have the same, or similar, sized steps. Each tread and/or riser of the steps may be the same, or substantially the same. The tread of each step may be substantially rectangular. Some or all steps may be the same width and height. The upper and lower intermediate landings may be the same size. For example, a platform

area of the landings may be the same, or substantially the same on the upper and lower intermediate landings. The landings may be squarely shaped, or at least be a different shape of rectangle to the treads of the steps of the stair portions.

The staircase may be configured essentially at one side of the vehicle, such as the farside, or driver's side, of the vehicle. The staircase may be an internal staircase. The staircase may be an integral staircase, for example, the staircase may be considered integral in that the treads and risers of each connect to one another without gaps.

The staircase may be provided rearward of a driver's area. The staircase may be positioned to be between a driver's area on the lower deck and a passenger area on the lower deck. The passenger area may comprise one or more passenger seats. The lower stair portion may be positioned between the driver's area and the passenger area on the lower deck of the vehicle. The upper stair portion may be positioned between a forward passenger area and a rearward passenger area on the upper deck of the vehicle. Those forward and rearward passenger areas may comprise a plurality of passenger seats.

The lower stair portion may not extend, or not extend significantly into a lower deck gangway at all. For example, the staircase may be configured such that the lower stair portion does not extend beyond 10 cm into the lower gangway (e.g. less that around 8 cm). In some examples, the lower stair portion may not extend into the lower gangway at all. In other words, the vehicle and staircase may be configured such that gangway along the lower deck of the vehicle has a common width at least at the staircase region, and in some case along some or all of the length of the remainder of the lower gangway/vehicle.

The lower deck gangway width, at the region that the lower stair portion meets the gangway, may exceed 700 mm, or may even be at or exceed 750 mm. Such a configuration may maintain ease of access along the gangway of the lower deck.

Similarly, the upper stair portion may not extend, or not extend significantly into an upper deck gangway. For example, the staircase may be configured such that the upper stair portion does not extend beyond 10 cm into the upper deck gangway (e.g. less than around 8 cm). In some examples, the upper stair portion may not extend into the upper gangway. In other words, the vehicle and staircase may be configured such that gangway along the upper deck of the vehicle has a common width at least at the staircase region, and in some case along some or all of the length of the remainder of the upper gangway/vehicle.

The upper deck gangway width, at the region that the upper stair portion meets the gangway, may exceed 600 mm, or may even be at or exceed 650 mm. Such a configuration may maintain ease of access along the gangway of the upper deck.

The staircase may be configured such that a recess, or the like, is effectively formed or defined by the upper stair portion. In some examples, the recess may be formed or defined by the upper stair portion and the lower stair portion. That recess may be formed or defined between the upper and lower stair portions, and between the secondary stair portion and the gangways of the vehicle. For example, in some cases (e.g. when the upper/lower stair portions do not extend, or do not extend significantly into respective gangways) a recess may be formed between the gangways of the vehicle and the secondary stair portion. In some examples, that recess may be utilised to accommodate an inner handrail, or other such passenger support, extending along some or all of the secondary stair portion. In such a way, utilisation of the recess for

the inner handrail may not unduly reduce the width, or effective width, of the secondary stair portion. The width or effective width of the secondary stair portion may be similar, or the same, or substantially the same, as one or both of the upper and lower stair portions. In some examples, the secondary stair portion may additionally comprise an outer handrail, extended along some or all of the secondary stair portion, opposite the inner handrail.

The recess formed between the gangway, and in particular the lower deck gangway, and the secondary stair portion, may be open, or may be fully or partially occluded. When open, a passenger travelling on the staircase may achieve a sense of space within the vehicle. When occluded, the effective ducting between the lower deck and the upper deck may be reduced, improving further any thermal isolation between each deck.

In some examples, the recess may be configured as a storage recess (e.g. to allow for control systems, wireless routers, etc.), and/or may be configured as a passenger storage.

The upper deck may comprise a profiled interior roof. The profiled interior roof may comprise a gangway region, positioned roughly above the gangway of the upper deck. The profiled interior roof may comprise side regions. Those side regions may extend above some of all of the passenger seats on either side of the vehicle. The side regions may be configured for ducting such as concealed ducting, and/or storage (e.g. passenger bag storage).

The staircase and interior roof may be configured in a complementary manner, such that passenger space (e.g. height) provided between the gangway of the upper deck

and the gangway region of the roof is similar, or the same, as the passenger space (e.g. height) provided between the upper stair portion and the side region at that staircase. In such a way, the side region when used for storage and or ducting can be maximised, while at the same time a passenger need not unduly duck or crouch when stepping from the upper gangway to the staircase, and vice versa.

In some examples, the gangway region is additionally or alternatively similar, or the same, as the passenger space (e.g. height) provided between the upper intermediate landing and the side region of the roof at the staircase.

The vehicle may comprise a fuel tank (e.g. a tank for gasoline, hydrogen, etc.). The tank may be configured below the staircase. For example, the tank may be configured between, or substantially between, the staircase and a chassis of the vehicle. The tank may be configured between staircase and a wheel axle of the vehicle.

The tank may comprise a body portion. The body portion may be configured to extend in a complementary, or corresponding, manner with respect to the secondary stair portion of the staircase. For example, the body portion may be considered to extend obliquely. An outer profile region of the body portion may correspond with the inclination of some of all of the secondary stair portion.

The tank may comprise a base portion. The base portion may be configured to extend in a complementary, or corresponding, manner with some or all of the lower intermediate landing. For example, some or all of an upper surface of the base portion may extend in a corresponding, or complementary manner, with respect to the lower intermediate landing. The upper surface of the base portion may be commonly spaced from the lower intermediate landing. An outer profile region of the base portion may

correspond with some or all of the profile of the lower intermediate landing. Some or all of the base portion may be considered to extend laterally (e.g. as opposed to obliquely) with respect to the vehicle.

The base portion may extend into a recess in the chassis, for example, extend into an aperture defined by chassis (e.g. the aperture being defined by supporting members of the chassis). The tank may comprise a fuel inlet. The inlet may be positioned at an upper region of the body portion.

The vehicle may be a double-axle vehicle, or a triple-axle vehicle.

According to a described example, there is provided a passenger service vehicle having an upper deck and a lower deck, and a passenger staircase extending between the upper deck and the lower deck, the staircase having at least a lower stair portion and a secondary stair portion, the lower stair portion being connected to the lower deck and comprising at least one tread, and being further connected to the secondary stair portion via an intermediate landing, the lower stair portion extending transversely with respect to the secondary stair portion, the vehicle further comprising a fuel tank having a body portion, configured to extend in a complementary, or corresponding, manner with respect to the secondary stair portion of the staircase, and a base portion configured to extend in a complementary, or corresponding, manner with some or all of the intermediate landing.

The body portion may be considered to extend obliquely, with respect to the vehicle. The base portion may be considered to extend laterally with respect to the vehicle.

The base portion may extend into a recess in the chassis, for example, into an aperture defined in the chassis. The tank may comprise a fuel inlet, positioned at an upper region of the body portion. The inlet may be configured to allow a user to provide fluid, such as gasoline, hydrogen, etc. into the tank.

According to a further described example, there is provided a passenger service vehicle having an upper deck and a lower deck, and a passenger staircase extending between the upper deck and the lower deck, the staircase having at least a first stair portion and a second stair portion, the first stair portion being positioned at the upper deck and comprising at least one tread, and being in stepped communication with the second stair portion via an intermediate landing, the first stair portion extending transversely with respect to the second stair portion.

According to a further described, there is provided a passenger service vehicle having an upper deck and a lower deck, and a passenger staircase extending between the upper deck and the lower deck, the staircase having at least an upper stair portion and a secondary stair portion, the upper stair portion being connected to the upper deck and comprising at least one tread, and being further connected to the secondary stair portion via an intermediate landing, the upper stair portion extending transversely with respect to the secondary stair portion.

According to a further described example, there is a method comprising:

providing a passenger service vehicle having an upper deck and a lower deck,

providing a staircase extending between the upper deck and the lower deck, the staircase having at least an upper stair portion comprising at least one tread, and a secondary stair portion,

providing the upper stair portion at the upper deck, the upper stair portion being connected to the secondary stair portion via an intermediate landing and the upper stair portion extending transversely with respect to the secondary stair portion.

According to a further described example, there is a method comprising:

providing a passenger service vehicle having an upper deck and a lower deck,

providing a staircase extending between the upper deck and the lower deck, the staircase having at least a lower stair portion comprising at least one tread, and a secondary stair portion,

providing the lower stair portion at the lower deck, the lower stair portion being connected to the secondary stair portion via an intermediate landing and the lower stair portion extending transversely with respect to the secondary stair portion.

providing a fuel tank such that a body portion extends in a complementary, or corresponding, manner with respect to the secondary stair portion of the staircase, and a base portion extends in a complementary, or corresponding, manner with some or all of the intermediate landing.

According to a further described example, there is use of a passenger vehicle according to any of the above examples.

According to a further example, there is a staircase for a passenger service vehicle.

The passenger staircase may be configured to extend between an upper deck and a lower deck of the passenger service vehicle.

The staircase may have at least an upper stair portion and a secondary stair portion. The upper stair portion may be configured to be positioned at, for example connected

to, an upper deck. The upper stair portion may comprise at least one tread. The upper stair portion may be connected, or connectable, to the secondary stair portion, for example, via an intermediate landing. The upper stair portion may extend transversely with respect to the secondary stair portion.

The staircase may comprise a lower stair portion. The lower stair portion may be configured to connect to the lower deck. The lower stair portion may comprise at least one tread. The lower stair portion may be connected, or connectable, to the secondary stair portion via an intermediate landing (i.e. the staircase having a lower intermediate landing and an upper intermediate landing). The lower stair portion may extend transversely with respect to the secondary stair portion.

According to a further described example, there is a fuel tank for a passenger service vehicle.

The tank may have a body portion, configured to extend in a complementary, or corresponding, manner with respect to a secondary stair portion of a staircase of the vehicle. The tank may comprise a base portion configured to extend in a complementary, or corresponding, manner with some or all of an intermediate landing of a staircase.

According to a further example, there is provided a passenger service vehicle comprising a staircase, the staircase having upper, secondary and lower stair portions configured in a U-shape.

The upper, secondary and lower portions may be considered to provide three different directions of travel for a passenger moving from the upper deck to the lower deck (and vice versa).

The staircase may be configured such that a recess, or the like, is effectively formed using the upper stair portion (e.g. between the upper and lower stair portions). That recess may be formed between the upper and lower stair portions, and between the secondary stair portion and gangways of the vehicle. For example, in some cases (e.g. when the upper/lower stair portions do not extend, or do not extend significantly into respective gangways) a recess may be formed between the gangways of the vehicle and the secondary stair portion. In some examples, that recess may be utilised to accommodate an inner handrail, extending along some or all of the secondary stair portion. In some examples, the secondary stair portion may additionally/alternatively comprise an outer handrail, extended along some or all of the secondary stair portion.

The upper deck may comprise a profiled interior roof. The profiled interior roof may comprise a gangway region, positioned roughly above the gangway of the deck. The profiled interior roof may comprise side regions. Those side regions may extend above some of all of the passenger seats on either side of the vehicle. The side regions may be configured for ducting such as concealed ducting, and/or storage (e.g. passenger bag storage).

The staircase and interior roof may be configured in a complementary manner, such that passenger space (e.g. height) provided between the upper gangway and the gangway region of the roof is similar, or the same, as the passenger space (e.g. height) provided between the upper stair portion and the side region at the staircase. In some examples, the gangway region is additionally or alternatively similar, or the same, as

the passenger space (e.g. height) provided between the upper intermediate landing and the side region.

It will be appreciated that one or more embodiments/aspects may be useful with in providing a staircase for passenger service vehicles.

The above summary is intended to be merely exemplary and non-limiting.

**Brief Description of the Figures**

A description is now given, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 shows a perspective view of a passenger service vehicle having an upper deck and a lower deck,

Figure 2a shows a plan view of an upper deck of a vehicle having a staircase, and Figures 2b shows an plan view of an upper deck of a vehicle having an alternative staircase; and

**CLAIMS:**

1. A passenger service vehicle having an upper deck and a lower deck, and a passenger staircase extending between the upper deck and the lower deck, the staircase positioned, at the lower deck, between a driver's area and a passenger area, and positioned, at the upper deck, between a forward passenger area and a rearward passenger area, the staircase having at least an upper stair portion and a secondary stair portion, the upper stair portion being connected to the upper deck and comprising at least one tread, and being further connected to the secondary stair portion via an intermediate landing, wherein the upper deck extends for a length of the vehicle, and the secondary stair portion extends parallel with respect to the length of the upper deck, and the upper stair portion extends transversely with respect to the secondary stair portion, and wherein the staircase further comprises a lower stair portion connected to the lower deck, the lower stair portion comprising at least one tread and being connected to the secondary stair portion via an intermediate landing, the lower stair portion extending transversely with respect to the secondary stair portion..

2. A passenger service vehicle according to claim 1, wherein the upper stair portion extends perpendicularly with respect to the length of the upper deck, and perpendicularly with respect to the secondary stair portion.

3. A passenger service vehicle according to claim 1 or 2, wherein the upper stair portion comprises only one tread.

4. A passenger service vehicle according to any of the claims 1 to 3, wherein the lower stair portion extends perpendicularly with respect to the secondary stair portion, and perpendicularly with respect to the length of the lower deck.

5. A vehicle according to claim 4, wherein the upper, secondary and lower stair portions are configured together in a U-shape.

6. A vehicle according to any of the claims 1 to 5, wherein the upper, secondary and lower stair portions are configured to provide three different directions of travel for a passenger moving from the upper deck to the lower deck.

7. A passenger service vehicle according to any of the claims 1 to 6, wherein the lower stair portion comprises only one tread.

8. A passenger service vehicle according to any of the claims 1 to 7, wherein the staircase is configured such that a recess is formed between the upper and lower stair portions, and between the secondary stair portion and gangways of the vehicle.

9. A passenger service vehicle according to claim 8, wherein one or both of the upper stair portion and the lower stair portion does not extend into the upper and/or lower deck gangway.

10. A passenger service vehicle according to any of the claims 1 to 9, wherein the secondary stair portion comprises a plurality of treads, each tread orientated so as to be parallel to the length of vehicle.

11. A passenger service vehicle according to any of the claims 1 to 10, wherein each stair portion has the same, or similar, sized steps, and wherein the tread of each step is substantially rectangular.

12. A passenger service vehicle according to any of the claims 1 to 11, wherein the or each intermediate landing is provided as a quarter landing, sized differently from the tread of the steps of each stair portions.

13. A passenger service vehicle according to any of the claims 1 to 12, wherein the upper deck comprises a profiled interior roof having a gangway region positioned roughly above a gangway of the upper deck, and side regions extending above some of all of the passenger seats on either side of the vehicle, and wherein the staircase and interior roof are configured in a complementary manner, such that passenger space provided between the gangway of the upper deck and the gangway region of the roof is similar, or the same, as the passenger space provided between the upper stair portion and the side region of the roof at the staircase.

14. A passenger service vehicle according to any of the claims 1 to 13 claims, wherein the vehicle comprises a fuel tank configured substantially between the staircase and a chassis of the vehicle.

15. A passenger service vehicle according to claim 14, wherein the tank comprises a body portion extending in a complementary, or corresponding, oblique manner with respect to the secondary stair portion of the staircase, and a base portion extending in a complementary, or corresponding, lateral manner with some or all of the lower intermediate landing.

16. A passenger service vehicle according to claim 15, wherein the base portion extends into a recess in the chassis.

17. A passenger service vehicle according to any of the claims 1 to 16, wherein the vehicle is a double-axle vehicle, or triple-axle vehicle.

18. A method comprising:

providing a passenger service vehicle having an upper deck and a lower deck,

providing a staircase extending between the upper deck and the lower deck, the staircase positioned, at the lower deck, between a driver's area and a passenger area, and positioned, at the upper deck, between a forward passenger area and a rearward passenger area, the staircase having at least an upper stair portion comprising at least one tread, and a secondary stair portion, and a lower stair portion comprising at least one tread;

providing the upper stair portion at the upper deck, the upper stair portion being connected to the secondary stair portion via an intermediate landing and wherein the upper deck extends for a length of the vehicle, and the secondary stair portion extends parallel with respect to the length of the upper deck, and the upper stair portion extends transversely with respect to the secondary stair portion; and

providing the lower stair portion at the lower deck, the lower stair portion being connected to the secondary stair portion via an intermediate landing, and the lower stair portion extending transversely with respect to the secondary stair portion.

19. Use of a passenger service vehicle according to any of the claims 1 to 17.

**Summary**

According to a first aspect, there is provided a passenger service vehicle having an upper deck and a lower deck, and a passenger staircase extending between the upper deck and the lower deck. The staircase may provide one or more of improved passenger capacity and/or ergonomics, improved fuel efficiency and/or improved fuel capacity, maintaining or improving the safety of such vehicles.

The staircase may have at least an upper stair portion and a secondary stair portion. The upper stair portion may be positioned at, for example connected to, the upper deck. The upper stair portion may comprise at least one tread (e.g. one tread and one corresponding riser). The upper stair portion may be further connected to the secondary stair portion, for example, via an intermediate landing. The upper stair portion may extend transversely with respect to the secondary stair portion.

The upper stair portion may extend perpendicular with respect to the secondary stair portion. The upper deck may extend for a length of the vehicle, and the upper stair portion may extend perpendicularly with respect to the length of the upper deck. The secondary stair portion may extend parallel with respect to the length of the upper deck. The intermediate landing may be considered to be a quarter landing.

The staircase may comprise a lower stair portion. The lower stair portion may be connected to the lower deck. The lower stair portion may comprise at least one tread (e.g. one tread and one corresponding riser). The lower stair portion may be connected to the secondary stair portion via an intermediate landing (i.e. the staircase having a

lower intermediate landing and an upper intermediate landing). The lower stair portion may extend transversely with respect to the secondary stair portion.

The lower stair portion may extend perpendicularly with respect to the secondary stair portion. The lower deck may extend for a length of the vehicle (e.g. in the same manner as the upper deck), and the lower stair portion may extend perpendicularly with respect to the length of the lower deck. The lower intermediate landing may be considered to be a quarter landing.

The upper, secondary and lower stair portions may be considered to be configured generally in a U-shape. The upper, secondary and lower portions may be considered to provide three different directions (e.g. different and distinct) of travel for a passenger moving from the upper deck to the lower deck (and vice versa).

The upper stair portion may comprise a plurality of treads. The upper stair portion may comprise only one tread (e.g. one tread and one corresponding riser). The lower stair portion may comprise a plurality of treads (e.g. treads and risers). The lower stair portion may comprise only one tread (e.g. one tread and one corresponding riser). The secondary stair portion may comprise a plurality of treads, for example, the secondary stair portion may comprise four treads.

Each stair portion may have the same, or similar, sized steps. Each tread and/or riser of the steps may be the same, or substantially the same. The tread of each step may be substantially rectangular. Some or all steps may be the same width and height. The upper and lower intermediate landings may be the same size. For example, a platform area of the landings may be the same, or substantially the same on the upper and

lower intermediate landings. The landings may be squarely shaped, or at least be a different shape of rectangle to the treads of the steps of the stair portions.

The staircase may be configured essentially at one side of the vehicle, such as the farside, or driver's side, of the vehicle. The staircase may be an internal staircase. The staircase may be an integral staircase, for example, the staircase may be considered integral in that the treads and risers of each connect to one another without gaps.

The staircase may be provided rearward of a driver's area. The staircase may be positioned to be between a driver's area on the lower deck and a passenger area on the lower deck. The passenger area may comprise one or more passenger seats. The lower stair portion may be positioned between the driver's area and the passenger area on the lower deck of the vehicle. The upper stair portion may be positioned between a forward passenger area and a rearward passenger area on the upper deck of the vehicle. Those forward and rearward passenger areas may comprise a plurality of passenger seats.

The lower stair portion may not extend, or not extend significantly into a lower deck gangway at all. For example, the staircase may be configured such that the lower stair portion does not extend beyond 10 cm into the lower gangway (e.g. less that around 8 cm). In some examples, the lower stair portion may not extend into the lower gangway at all. In other words, the vehicle and staircase may be configured such that gangway along the lower deck of the vehicle has a common width at least at the staircase region, and in some case along some or all of the length of the remainder of the lower gangway/vehicle.

The lower deck gangway width, at the region that the lower stair portion meets the gangway, may exceed 700 mm, or may even be at or exceed 750 mm. Such a configuration may maintain ease of access along the gangway of the lower deck.

Similarly, the upper stair portion may not extend, or not extend significantly into an upper deck gangway. For example, the staircase may be configured such that the upper stair portion does not extend beyond 10 cm into the upper deck gangway (e.g. less than around 8 cm). In some examples, the upper stair portion may not extend into the upper gangway. In other words, the vehicle and staircase may be configured such that gangway along the upper deck of the vehicle has a common width at least at the staircase region, and in some case along some or all of the length of the remainder of the upper gangway/vehicle.

The upper deck gangway width, at the region that the upper stair portion meets the gangway, may exceed 600 mm, or may even be at or exceed 650 mm. Such a configuration may maintain ease of access along the gangway of the upper deck.

The staircase may be configured such that a recess, or the like, is effectively formed or defined by the upper stair portion. In some examples, the recess may be formed or defined by the upper stair portion and the lower stair portion. That recess may be formed or defined between the upper and lower stair portions, and between the secondary stair portion and the gangways of the vehicle. For example, in some cases (e.g. when the upper/lower stair portions do not extend, or do not extend significantly into respective gangways) a recess may be formed between the gangways of the vehicle and the secondary stair portion. In some examples, that recess may be utilised to accommodate an inner handrail, or other such passenger support, extending along some or all of the secondary stair portion. In such a way, utilisation of the recess for

the inner handrail may not unduly reduce the width, or effective width, of the secondary stair portion. The width or effective width of the secondary stair portion may be similar, or the same, or substantially the same, as one or both of the upper and lower stair portions. In some examples, the secondary stair portion may additionally comprise an outer handrail, extended along some or all of the secondary stair portion, opposite the inner handrail.

The recess formed between the gangway, and in particular the lower deck gangway, and the secondary stair portion, may be open, or may be fully or partially occluded. When open, a passenger travelling on the staircase may achieve a sense of space within the vehicle. When occluded, the effective ducting between the lower deck and the upper deck may be reduced, improving further any thermal isolation between each deck.

In some examples, the recess may be configured as a storage recess (e.g. to allow for control systems, wireless routers, etc.), and/or may be configured as a passenger storage.

The upper deck may comprise a profiled interior roof. The profiled interior roof may comprise a gangway region, positioned roughly above the gangway of the upper deck. The profiled interior roof may comprise side regions. Those side regions may extend above some of all of the passenger seats on either side of the vehicle. The side regions may be configured for ducting such as concealed ducting, and/or storage (e.g. passenger bag storage).

The staircase and interior roof may be configured in a complementary manner, such that passenger space (e.g. height) provided between the gangway of the upper deck

and the gangway region of the roof is similar, or the same, as the passenger space (e.g. height) provided between the upper stair portion and the side region at that staircase. In such a way, the side region when used for storage and or ducting can be maximised, while at the same time a passenger need not unduly duck or crouch when stepping from the upper gangway to the staircase, and vice versa.

In some examples, the gangway region is additionally or alternatively similar, or the same, as the passenger space (e.g. height) provided between the upper intermediate landing and the side region of the roof at the staircase.

The vehicle may comprise a fuel tank (e.g. a tank for gasoline, hydrogen, etc.). The tank may be configured below the staircase. For example, the tank may be configured between, or substantially between, the staircase and a chassis of the vehicle. The tank may be configured between staircase and a wheel axle of the vehicle.

The tank may comprise a body portion. The body portion may be configured to extend in a complementary, or corresponding, manner with respect to the secondary stair portion of the staircase. For example, the body portion may be considered to extend obliquely. An outer profile region of the body portion may correspond with the inclination of some of all of the secondary stair portion.

The tank may comprise a base portion. The base portion may be configured to extend in a complementary, or corresponding, manner with some or all of the lower intermediate landing. For example, some or all of an upper surface of the base portion may extend in a corresponding, or complementary manner, with respect to the lower intermediate landing. The upper surface of the base portion may be commonly spaced from the lower intermediate landing. An outer profile region of the base portion may correspond with some or all of the profile of the lower intermediate landing. Some or all

of the base portion may be considered to extend laterally (e.g. as opposed to obliquely) with respect to the vehicle.

The base portion may extend into a recess in the chassis, for example, extend into an aperture defined by chassis (e.g. the aperture being defined by supporting members of the chassis). The tank may comprise a fuel inlet. The inlet may be positioned at an upper region of the body portion.

The vehicle may be a double-axle vehicle, or a triple-axle vehicle.

According to a second aspect, there is provided a passenger service vehicle having an upper deck and a lower deck, and a passenger staircase extending between the upper deck and the lower deck, the staircase having at least a lower stair portion and a secondary stair portion, the lower stair portion being connected to the lower deck and comprising at least one tread, and being further connected to the secondary stair portion via an intermediate landing, the lower stair portion extending transversely with respect to the secondary stair portion, the vehicle further comprising a fuel tank having a body portion, configured to extend in a complementary, or corresponding, manner with respect to the secondary stair portion of the staircase, and a base portion configured to extend in a complementary, or corresponding, manner with some or all of the intermediate landing.

The body portion may be considered to extend obliquely, with respect to the vehicle. The base portion may be considered to extend laterally with respect to the vehicle.

The base portion may extend into a recess in the chassis, for example, into an aperture defined in the chassis. The tank may comprise a fuel inlet, positioned at an upper

region of the body portion. The inlet may be configured to allow a user to provide fluid, such as gasoline, hydrogen, etc. into the tank.

According to a third aspect, there is provided a passenger service vehicle having an upper deck and a lower deck, and a passenger staircase extending between the upper deck and the lower deck, the staircase having at least a first stair portion and a second stair portion, the first stair portion being positioned at the upper deck and comprising at least one tread, and being in stepped communication with the second stair portion via an intermediate landing, the first stair portion extending transversely with respect to the second stair portion.

According to a fourth aspect, there is provided a passenger service vehicle having an upper deck and a lower deck, and a passenger staircase extending between the upper deck and the lower deck, the staircase having at least an upper stair portion and a secondary stair portion, the upper stair portion being connected to the upper deck and comprising at least one tread, and being further connected to the secondary stair portion via an intermediate landing, the upper stair portion extending transversely with respect to the secondary stair portion.

According to a fifth aspect, there is a method comprising:

providing a passenger service vehicle having an upper deck and a lower deck,

providing a staircase extending between the upper deck and the lower deck, the staircase having at least an upper stair portion comprising at least one tread, and a secondary stair portion,

providing the upper stair portion at the upper deck, the upper stair portion being connected to the secondary stair portion via an intermediate landing and the upper stair portion extending transversely with respect to the secondary stair portion.

According to a sixth aspect, there is a method comprising:

providing a passenger service vehicle having an upper deck and a lower deck,

providing a staircase extending between the upper deck and the lower deck, the staircase having at least a lower stair portion comprising at least one tread, and a secondary stair portion,

providing the lower stair portion at the lower deck, the lower stair portion being connected to the secondary stair portion via an intermediate landing and the lower stair portion extending transversely with respect to the secondary stair portion.

providing a fuel tank such that a body portion extends in a complementary, or corresponding, manner with respect to the secondary stair portion of the staircase, and a base portion extends in a complementary, or corresponding, manner with some or all of the intermediate landing.

According to a seventh aspect there is use of a passenger vehicle according to any of the first, second, third or fourth aspects.

According to an eighth aspect, there is a staircase for a passenger service vehicle.

The passenger staircase may be configured to extend between an upper deck and a lower deck of the passenger service vehicle.

The staircase may have at least an upper stair portion and a secondary stair portion. The upper stair portion may be configured to be positioned at, for example connected to, an upper deck. The upper stair portion may comprise at least one tread. The upper stair portion may be connected, or connectable, to the secondary stair portion, for

example, via an intermediate landing. The upper stair portion may extend transversely with respect to the secondary stair portion.

The staircase may comprise a lower stair portion. The lower stair portion may be configured to connect to the lower deck. The lower stair portion may comprise at least one tread. The lower stair portion may be connected, or connectable, to the secondary stair portion via an intermediate landing (i.e. the staircase having a lower intermediate landing and an upper intermediate landing). The lower stair portion may extend transversely with respect to the secondary stair portion.

According to a ninth aspect, there is a fuel tank for a passenger service vehicle.

The tank may have a body portion, configured to extend in a complementary, or corresponding, manner with respect to a secondary stair portion of a staircase of the vehicle. The tank may comprise a base portion configured to extend in a complementary, or corresponding, manner with some or all of an intermediate landing of a staircase.

According to a tenth aspect, there is provided a passenger service vehicle comprising a staircase, the staircase having upper, secondary and lower stair portions configured in a U-shape.

The upper, secondary and lower portions may be considered to provide three different directions of travel for a passenger moving from the upper deck to the lower deck (and vice versa).

The staircase may be configured such that a recess, or the like, is effectively formed using the upper stair portion (e.g. between the upper and lower stair portions). That recess may be formed between the upper and lower stair portions, and between the secondary stair portion and gangways of the vehicle. For example, in some cases (e.g. when the upper/lower stair portions do not extend, or do not extend significantly into respective gangways) a recess may be formed between the gangways of the vehicle and the secondary stair portion. In some examples, that recess may be utilised to accommodate an inner handrail, extending along some or all of the secondary stair portion. In some examples, the secondary stair portion may additionally/alternatively comprise an outer handrail, extended along some or all of the secondary stair portion.

The upper deck may comprise a profiled interior roof. The profiled interior roof may comprise a gangway region, positioned roughly above the gangway of the deck. The profiled interior roof may comprise side regions. Those side regions may extend above some of all of the passenger seats on either side of the vehicle. The side regions may be configured for ducting such as concealed ducting, and/or storage (e.g. passenger bag storage).

The staircase and interior roof may be configured in a complementary manner, such that passenger space (e.g. height) provided between the upper gangway and the gangway region of the roof is similar, or the same, as the passenger space (e.g. height) provided between the upper stair portion and the side region at the staircase. In some examples, the gangway region is additionally or alternatively similar, or the same, as the passenger space (e.g. height) provided between the upper intermediate landing and the side region.

The invention includes one or more corresponding aspects, embodiments or features in isolation or in various combinations whether or not specifically stated (including claimed) in that combination or in isolation. For example, features associated with particular recited embodiments relating to the first aspect, may be equally be appropriate as features of embodiments relating the second, third, fourth, fifth, sixth, seventh, eighth, ninth or tenth aspects, and vice versa. As will be appreciated, features associated with particular recited embodiments relating to methods, may be equally appropriate as features of embodiments relating specifically to apparatus, and vice versa.

It will be appreciated that one or more embodiments/aspects may be useful with in providing a staircase for passenger service vehicles.

The above summary is intended to be merely exemplary and non-limiting.

**Brief Description of the Figures**

A description is now given, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 shows a perspective view of a passenger service vehicle having an upper deck and a lower deck,

Figure 2a shows a plan view of an upper deck of a vehicle having a staircase, and Figures 2b shows an plan view of an upper deck of a vehicle having an alternative staircase; and

**CLAIMS:**

1. A passenger service vehicle having an upper deck and a lower deck, and a passenger staircase extending between the upper deck and the lower deck, the staircase positioned, at the lower deck, between a driver's area and a passenger area, and positioned, at the upper deck, between a forward passenger area and a rearward passenger area, the staircase having at least an upper stair portion and a secondary stair portion, the upper stair portion being connected to the upper deck and comprising at least one tread, and being further connected to the secondary stair portion via an intermediate landing, wherein the upper deck extends for a length of the vehicle, and the secondary stair portion extends parallel with respect to the length of the upper deck, and the upper stair portion extends transversely with respect to the secondary stair portion.

2. A passenger service vehicle according to claim 1, wherein the upper stair portion extends perpendicularly with respect to the length of the upper deck, and perpendicularly with respect to the secondary stair portion.

3. A passenger service vehicle according to claim 1 or 2, wherein the upper stair portion comprises only one tread.

4. A passenger service vehicle according to any of the claims 1 to 3, wherein the staircase comprise a lower stair portion connected to the lower deck, the lower stair portion comprising at least one tread and being connected to the secondary stair portion via an intermediate landing, the lower stair portion extending transversely with respect to the secondary stair portion.

5. A passenger service vehicle according to claim 4, wherein the lower stair portion extends perpendicularly with respect to the secondary stair portion, and perpendicularly with respect to the length of the lower deck.

6. A vehicle according to claim 4 or 5, wherein the upper, secondary and lower stair portions are configured together in a U-shape.

7. A vehicle according to any of the claims 4 to 6, wherein the upper, secondary and lower stair portions are configured to provide three different directions of travel for a passenger moving from the upper deck to the lower deck.

8. A passenger service vehicle according to any of the claims 4 to 7, wherein the lower stair portion comprises only one tread.

9. A passenger service vehicle according to any of the claims 4 to 8, wherein the staircase is configured such that a recess is formed between the upper and lower stair portions, and between the secondary stair portion and gangways of the vehicle.

10. A passenger service vehicle according to claim 9, wherein one or both of the upper stair portion and the lower stair portion does not extend into the upper and/or lower deck gangway.

11. A passenger service vehicle according to any of the claims 1 to 10, wherein the secondary stair portion comprises a plurality of treads, each tread orientated so as to be parallel to the length of vehicle.

12. A passenger service vehicle according to any of the claims 1 to 11, wherein each stair portion has the same, or similar, sized steps, and wherein the tread of each step is substantially rectangular.

13. A passenger service vehicle according to any of the claims 1 to 12, wherein the or each intermediate landing is provided as a quarter landing, sized differently from the tread of the steps of each stair portions.

14. A passenger service vehicle according to any of the claims 1 to 13, wherein the upper deck comprises a profiled interior roof having a gangway region positioned roughly above a gangway of the upper deck, and side regions extending above some of all of the passenger seats on either side of the vehicle, and wherein the staircase and interior roof are configured in a complementary manner, such that passenger space provided between the gangway of the upper deck and the gangway region of the roof is similar, or the same, as the passenger space provided between the upper stair portion and the side region of the roof at the staircase.

15. A passenger service vehicle according to any of the claims 1 to 14 claims, wherein the vehicle comprises a fuel tank configured substantially between the staircase and a chassis of the vehicle.

16. A passenger service vehicle according to claim 15, wherein the tank comprises a body portion extending in a complementary, or corresponding, oblique manner with respect to the secondary stair portion of the staircase, and a base portion extending in a complementary, or corresponding, lateral manner with some or all of the lower intermediate landing.

17. A passenger service vehicle according to claim 16, wherein the base portion extends into a recess in the chassis.

18. A passenger service vehicle according to any of the claims 1 to 17, wherein the vehicle is a double-axle vehicle, or triple-axle vehicle.

19. A passenger service vehicle having an upper deck and a lower deck, and a passenger staircase extending between the upper deck and the lower deck, the staircase having at least a lower stair portion and a secondary stair portion, the lower stair portion being connected to the lower deck and comprising at least one tread, and being further connected to the secondary stair portion via an intermediate landing, the lower stair portion extending transversely with respect to the secondary stair portion, the vehicle further comprising a fuel tank having a body portion, configured to extend in a complementary, or corresponding, manner with respect to the secondary stair portion of the staircase, and a base portion configured to extend in a complementary, or corresponding, manner with some or all of the intermediate landing.

20. A method comprising:

providing a passenger service vehicle having an upper deck and a lower deck,

providing a staircase extending between the upper deck and the lower deck, the staircase positioned, at the lower deck, between a driver's area and a passenger area, and positioned, at the upper deck, between a forward passenger area and a rearward passenger area, the staircase having at least an upper stair portion comprising at least one tread, and a secondary stair portion,

providing the upper stair portion at the upper deck, the upper stair portion being connected to the secondary stair portion via an intermediate landing and wherein the upper deck extends for a length of the vehicle, and the secondary stair portion extends

parallel with respect to the length of the upper deck, and the upper stair portion extends transversely with respect to the secondary stair portion.

21. Use of a passenger service vehicle according to any of the claims 1 to 19.