



Service trolley for use in an aircraft or a train

The present invention relates to a service trolley for use in an aircraft or a train or for use on a vessel, the service trolley comprising a case with upright side walls and at least one door having a door panel, for access to the interior of the case.

In the passenger aircraft sector such service trolleys are also termed catering trolleys. The present invention therefore very definitely also relates to so-called catering trolleys.

The term service trolley will be used in the remainder of this application.

With a view to safety, very stringent requirements are imposed on service trolleys for use in, in particular, passenger aircraft. The panels from which the case of the service trolley is constructed, and very particularly also the door having a door panel, must be able to withstand forces of the magnitude of 9G, in order to prevent the contents in the case of the service trolley being able to escape in the event of disasters or adverse flying conditions. This is because articles flying around can be very dangerous for passengers in the aircraft. Since every kilo of baggage leads to a substantial sum in fuel costs, a further aim is usually to keep the weight of the service trolley as low as possible.

In service trolleys the doors are conventionally constructed on the basis of a so-called sandwich panel. The sandwich panel consists of a foam core with an aluminium sheet on either side. Depending on the airlines and their wishes, a decorative coating is applied to the aluminium sheet. The airline colours, logo, etc. are usually incorporated in this decorative coating. The decorative coating can be a film, can be a powder coating applied to the aluminium sheet or can be some other form of coating. What is important is that the sandwich panel is finally placed in a frame, which frame usually consists of aluminium sections. This frame provides a U-shaped seat around the sandwich panel for accommodating the side edges of the sandwich panel all round. Before fitting the frame around the sandwich panel, the sandwich panel first has to be provided with its decorative coating. As has been stated, this decorative coating is tailored to the customer concerned, usually the airline. The disadvantage of this production method is that the door has to be custom-made very early in the production line, which makes it expensive to keep a stock of doors since a stock of doors that may or may not be completely finished and are already provided with the decorative coating must be kept for essentially every customer.

The aim of the present invention is to provide a service trolley of the type indicated in the preamble having, in particular, an improved door, which, in particular, is able to



withstand the 9G demanded in the case of use in passenger aircraft.

According to the invention the above aim is achieved in that the door is made up of one or more extruded hollow tubular sections which form the door panel, which hollow tubular sections are made, in particular, of aluminium or an aluminium alloy. The door according to the invention made up of one or more hollow tubular sections is found to comply with this so-called 9G requirement, whilst the weight of such a door can be lower compared with a conventional, sandwich panel door. Here it is stated in particular that it can be lower, since in practice it is not necessarily lower if the door according to the invention is further reinforced by providing the hollow tubular sections with, for example, a large number of reinforcing webs, which is not possible with so-called sandwich panels. The strength of a door according to the invention can thus exceed that of a conventional door for a service trolley, possibly at the expense of the weight.

In order to shift the tailoring as far as possible to the end of the production line, it is preferable according to the invention if a cover plate is provided on the door panel and if one of the panel surfaces, in particular the panel surface facing away from the interior of the case, is provided with two, mutually parallel slots in which mutually parallel side edges of the cover plate are accommodated or at least can be accommodated. In this way it is possible to keep the door according to the invention for the service trolley according to the invention in stock as a semi-finished product or optionally completely or virtually completely finished, without this leading to stocking individual doors for each individual customer. After all, on the other hand, it is possible to keep sufficient stock of the cover plates per customer and to fit the associated or desired cover plate to the door according to the invention as soon as a customer wants a service trolley.

In order with this arrangement to be able to fit the cover plate in such a way that additional fixing means are not necessarily needed for fixing the cover plate, it is preferable according to the invention if the two slots are undercuts. In this context undercuts are understood to be, in particular, slots which do not extend transversely to the panel surface but extend parallel to the panel surface or at an angle of between 90° and 0° with respect to the panel surface in particular between 60° and 0° with respect to the panel surface.

From the standpoint of cost it is preferable according to the invention in this context if the undercuts open towards one another and is particularly preferential if the cover plate is essentially flat, that is to say if the edges are not flanged. In the case of undercuts opening towards one another, a cover plate can easily be slid between them, and an

essentially flat cover plate is preferred with this arrangement, since this is more advantageous from the standpoint of cost. An essentially flat cover plate can have a relief if desired.

With regard to the slots and undercuts discussed above, it is pointed out that these preferably extend in the longitudinal direction, that is to say the extrusion direction, of the one or more hollow tubular sections. The reason for this is that the slots or undercuts can then already be formed directly during the extrusion process and therefore no additional process steps are needed in order to produce these.

In order to keep the mould costs low and not to make the costs of the extrusion process unnecessarily high, it is preferable according to the invention if the door is made up of two or more, in particular three, of said tubular sections and if at least two adjacent sections of said tubular sections are joined to one another by means of a U-joint running in the longitudinal direction, in particular the extrusion direction, of said tubular sections. Such a U-joint is easy to produce during extrusion. In this context a U-joint is understood to be, in particular, a U-shaped recess, which can also be termed a seat, formed in the longitudinal edge of the one tubular section, in which the longitudinal edge of the other of the adjacent tubular sections can be accommodated. With this arrangement it is possible, in particular, to effect the accommodation of the one edge in the seat in the other edge with a positive fit. By providing the longitudinal edges to be inserted into one another with ribs and grooves which pair up with one another and sliding the tubular sections into one another such that they slide with respect to one another in the longitudinal direction, it is possible to produce anchoring transversely to said longitudinal direction. With a view to simple readjustability, in particular adjustability, of the door to the door opening in the service trolley in which the door has to be hung, it is, however, preferable according to the invention if the U-joint allows mutual movement of the tubular sections transversely to said longitudinal direction and parallel to the panel surface for the purposes of fitting and if the U-joint is preferably secured, for example by means of pop rivets or screws. In this way the dimensions of the door panel in the transverse direction, that is to say transverse to the extrusion direction/longitudinal direction and parallel to the panel surface, can be adjusted by sliding the adjacent tubular sections further or less far into one another at the U-joint. After correct adjustment, the appropriate position can be preferably secured, for example by means of pop rivets or screws.

According to a further embodiment of the invention, the door is a swing door with

two door panels, each formed from one or more of said hollow tubular sections. In this context a swing door is understood to be, in particular, a door with two panel sections, which panel sections are attached, along longitudinal edges facing away from one another, to the case such that they hinge, and the other longitudinal edges of which panel sections are close to one another when the swing door is in the closed position. The advantage of such a swing door is that less room is needed for opening it than in the case of a conventional door.

According to a further advantageous embodiment, the hollow tubular sections are made of aluminium or an aluminium alloy.

According to yet a further aspect of the invention, the latter relates to a passenger aircraft, a passenger train and to a passenger vessel provided with one or more service trolleys according to the invention.

Finally, the invention also relates to a door for a service trolley according to the invention.

The present invention will be explained in more detail below with reference to an illustrative embodiment shown diagrammatically in the drawing. In the drawing:

Figure 1 shows a diagrammatic perspective view of a service trolley according to the invention intended for use in a passenger aircraft;

Figure 2 shows a cross-sectional view (transversely with respect to the extrusion direction) of a door panel according to the invention made up of three hollow tubular sections;

Figure 3 shows a view corresponding to that in Figure 2, but for the purposes of further clarification shown with the three hollow tubular sections in a disassembled state;

Figure 4 shows a view corresponding to that in Figure 2, but now of a door panel made from a one-piece hollow tubular section;

Figure 5 shows a detailed view from Figure 2 or, if desired, Figure 4 (this comes down to the same) showing a fitted cover plate.

Figure 1 shows, in perspective and diagrammatically, a service trolley 1 which, except for the door (although this is not clearly visible in Figure 1), is essentially identical to conventional service trolleys. The service trolley consists of two upright longitudinal side walls 2, 3, a rear wall 4, a top wall 5, which is sunken with respect to the top edges of the wall sections 2, 3, 4, a base 6 and, opposite the rear wall 4, a door 7 that is attached by means of hinges 8 to upright side wall 2. As is customary per se, the door 7 can be closed

by means of a closure 9, indicated diagrammatically here, and after removal of the closure 9 can be opened by means of a bolt that is not shown here but is very generally known from the state of the art. A card holder is indicated by 10. According to the invention, this card holder 10 is advantageously mounted on the cover plate 12 to be discussed below. Card holders as such are not unusual with such service trolleys. Finally, wheels 13, by means of which the service trolley can be moved, as well as pedals 11 for activating or releasing the brake are also shown in Figure 1.

With reference to Figure 2, the door panel 17, shown in this figure in cross-section (cross-section transversely to the longitudinal/extrusion direction), consists of three extruded tubular sections, numbered as 14, 15 and 16, respectively. To provide a possibility for universal fitting of the hinges, both for left- and right-handed opening, the door panel 17 is provided at the corners 18 and 19 with a reinforcement with a cylindrical longitudinal passage. Each of the tubular sections 14, 15 and 16 is shown here as a tubular section with two chambers. However, it should be clear that the tubular sections 14, 15 and 16 can also be single chamber tubular sections or tubular sections with more than two chambers.

For the purposes of fitting to one another, the central tubular section 15 is provided at both longitudinal edges with a U-shaped longitudinal seat 20 and 21, respectively. As can be seen in the situation shown in Figure 3, the tubular sections 14 and 16 are each provided with a longitudinal edge 22, 23 which fits in the seat 21 and 20, respectively. In the direction of double-headed arrow 24, the longitudinal edge sections 22 and 23 will preferably fit in the seat 21 and 20, respectively, essentially without play. In the direction of double-headed arrow 25, the longitudinal edge sections 22 and 23 will fit in the seat 21 and 20, respectively, such that they are able to move. This makes it possible to adjust the width dimension B of the door panel to that of the trolley 1 concerned and thus to be able to finish the door panel to accurate dimensions. As is indicated diagrammatically in Figure 2 by 26, the tubular sections 14, 15 and 16 can then, after adjustment, be fixed to one another by means of screws or pop rivets or other types of fixing means.

At the bottom, at least regarded in accordance with the way drawn in Figures 2 and 3, the tubular sections 14 and 16 are also provided with lips 27 which, together with the longitudinal edge sections 22 and 23 respectively, define a seating slot in which the bottom arms 28 of the U-shaped seat 20 and 21 fit. These lips prevent adjacent tubular sections from being able to tilt relative to one another about the securing means 26. The provision of the securing means 26 on the side of the door facing towards the outside has the

advantage that tilting of the parts of the sections about the securing means 26 under loading from inside the case towards the outside is prevented. Furthermore, the lips 27 serve as a buffer to protect the door against damage as a consequence of trays and drawers sliding in the service trolley.

Now, partly also with reference to Figure 5 in addition to Figures 2 and 3, the door panel 17 is provided with two slots 29 in which, in each case, one of the opposing longitudinal edges 30 of the cover plate 12 can be accommodated. In this case the slots 29 are made as undercuts opening towards one another. The cover plate 12 is of flat construction here. The cover plate 12 could optionally have a relief. However, constructing the cover plate 12 without a relief is more advantageous from the standpoint of cost. The cover plate 12 can be fitted in the undercuts 29, for example by sliding the panel 12 into the undercuts 29 transversely to the plane of the drawing in the longitudinal direction, that is to say the extrusion direction. Fitting of the cover plate 12 will, however, be simpler if this is made to bulge somewhat, as is indicated in an exaggerated manner in Figure 5 by 32, in order then to make the longitudinal edges 30 of the cover plate 32 drop into the undercuts 29 by, as it were, pressing the bulged out cover plate 32 flat.

It is pointed out that it would also be possible to work with several cover plates 12. Thus, it is, for example, conceivable to provide two additional undercuts 29, opening in opposite directions, in the region of arrow 33 in Figure 2.

Figure 4, finally, shows a door panel made from a one-piece tubular section 27. Since, except for the fact that it is in one piece instead of three pieces, this one-piece tubular section 27 is essentially the same as what has been shown in Figures 2 and 3, a more detailed description of the one-piece tubular section 27 can be dispensed with. As will be clear, in the example shown the one-piece tubular section is made up of 5 chambers. However, there can also be more or fewer chambers.

Finally, it is pointed out that the tubular section or the tubular sections can be provided with end pieces on one or both ends.

These end pieces can have parts protruding into the chambers of the tubular sections. These end pieces give a neat finish and, especially in the case of multiple tubular sections, extra rigidity to the door panel if they join the tubular sections to one another in the transverse direction.

CLAIMS

1. A service trolley comprising a case with upright side walls and at least one door having a door panel, for access to the interior of the case, characterised in that the door is made up of one or more extruded hollow tubular sections which form the door panel.
2. The service trolley according to claim 1, characterised in that a cover plate is provided on the door panel and in that one of the panel surfaces, in particular the panel surface facing away from the interior of the case, is provided with two, mutually parallel slots in which mutually parallel side edges of the cover plate are accommodated or at least can be accommodated.
3. The service trolley according to claim 2, characterised in that the two slots are undercuts.
4. The service trolley according to claim 3, characterised in that the undercuts open towards one another and in that the cover plate is preferably flat.
5. The services trolley according to any one of the preceding claims, characterised in that the door is made up of two or more, in particular three, of said tubular sections and in that at least two adjacent sections of said tubular sections are joined to one another by means of a U-joint running in the longitudinal direction of said tubular sections.
6. The service trolley according to claim 5, characterised in that the U-joint allows mutual movement of the tubular sections transversely to said longitudinal direction and parallel to the panel surface and in that the U-joint is preferably secured, for example by means of pop rivets or screws.
7. The service trolley according to any one of the preceding claims, characterised in that the door is a swing door with two door panels, each formed from one or more of said hollow tubular sections.

8. The service trolley according to any one of the preceding claims, characterised in that the hollow tubular sections are made of aluminium or an aluminium alloy.
9. A service trolley according to any one of the preceding claims for use in a passenger aircraft.
10. A service trolley according to any one of claims 1 to 8 for use in a passenger train.
11. A service trolley according to any one of claims 1 to 8 for use in a passenger vessel.
12. A door for a service trolley according to any one of claims 1 to 8.