

Freight container, in particular
for air transport

5. The invention relates to freight containers, in particular for air transport, of the kind having a supporting frame made of profiled sections, the supporting frame having two parallel longer sides constituted by respective polygonal frames, the upper edges of which form roof sections and which rest on a base frame and are joined by transverse sections, the polygonal frames being reinforced by vertical struts extending between the base frame and the roof sections.

10. Such freight containers have been used in the field of aircraft equipment for a long time now. Up to now, in an aircraft fuselage divided into an upper deck and lower deck, the lower deck is usually loaded with containers while the upper deck remains reserved for passengers. Normally the lower and upper deck differ, especially in height. The latter usually has a shape defined by the floor of the deck and the skin of the fuselage body, which is semi-circular in cross section, while the lower deck is delimited by two substantially parallel, opposed surfaces, viz., by a deck separating surface and a floor built into the bottom of the fuselage, and its side surfaces are likewise formed by the fuselage. Containers have accordingly been

specially made for the lower deck, with their external outline matching the lower deck.

5. In pursuit of rationalisation of aviation, there is increasing change over, especially on night flights, to load the upper deck also with freight, when there is only a small need for passengers. However, as the so-called lower deck containers are not suitable for stacking, because of too weak a supporting frame, this calls for development of special
10. air freight containers. Also, too much empty space remains between them, which has a negative effect on the profitability of air transport.

15. The lower deck containers also indeed have to be secured individually to the floor of the aircraft, but no devices are provided to permit them to be secured to each other, especially when stacked.

20. It is therefore the object of the invention to develop containers which, in spite of being made according to standard can be readily stacked on each other and secured to each other.

25. According to the present invention, a container of the kind referred to above is provided with a flat member extending between the roof sections of the supporting frame and provided with clamping members for securing a super-imposed like container in position. By this arrangement it is possible to place containers on top of each other on one deck.

30. If the polygonal frames of the containers are constructed symmetrically and have two vertical struts, it has also been found useful to arrange the struts at a distance apart which corresponds to double the distance between one of the vertical struts and the end of the frame.

The clamping elements are preferably claw-like and engage in a groove in a flange projecting out from one transverse section of the base frame; they can be tightened like a buckle.

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It is also possible that, at least one transverse section of the base frame has a laterally opening groove parallel to the floor, in which the clamping members engage, the lower wall of the groove being formed with recesses each defining a pair of shoulder-like ledges and each clamping member is hammer-shaped, the shaft passing through a respective recess and the head engaging the corresponding ledges. This embodiment in particular has the important advantage that the container is prevented from slipping in all directions. This inability to shift is an important requirement for stacking of air freight containers.

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Preferably in such a case the shaft of each hammer-shaped clamping member is journaled on a pin passing through a hole in the shaft transverse to the axis of the shaft. This hole is preferably elongated in a direction parallel to the shaft axis, to permit axial movement of the clamping member against the force of a means for storing energy. This design takes into account the sometimes different heights of the wall of the groove and makes possible easier latching of the hammer-head in the groove. The means for storing energy can also be arranged on the securing element itself and press the hammer head towards the locking position on the wall of the groove.

- Preferably the roof sections are hollow and house sliding devices to guide closure means for the container and the hollow roof sections have opposed slots to accommodate the closure means. The roof sections may be joined to corner posts by connecting sections, the connecting sections and corner posts also being hollow and having opposed slots, the slots in each roof section, connecting section and corner post being continuous with one another. The closure means are conveniently in the form of a roll door engaging in the respective slots. This has the advantage that access to the interior of stacked containers remains possible. Between the aircraft wall and the roll door there remains sufficient space for a passageway and to allow the desired container to be located. The roll door is pushed through under the flat member which is stressed by the container above it, without the stability of the stack or individual container suffering thereby.
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- When the slot extends along not only the roof sections but also the opposite corner posts of a transverse side, and the connecting sections between the corner posts and the roof sections, the roll door can be pulled down right to the transverse section of the base frame. This improves further the access to the freight, without affecting the stacking ability.
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- The use of hollow section for roof sections, connecting sections and corner posts has further the
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the advantage that, inside them, rollers supporting the door can be arranged, between which the roll door can be guided to run.

5. A rolling up drum, on which the area of the roll door can be rolled up, is preferably provided between two opposed vertical struts; this can contain a means of storing energy, against the return force of which the roll door has to be either opened or closed.

10. This container has, besides the above mentioned advantages, among others also the advantage that it can be made according to a standard and in large quantities. The height, compared with known containers, is hardly increased, especially if a textile covering is chosen for the sides instead of the metal covering usual up to now.

15. Further advantages, features and details of the invention appear from the following description of preferred embodiments, and with the aid of the drawings, viz.,

20. Figure 1: A schematic cross section through an aircraft fuselage loaded with freight containers;

25. Figure 2: A perspective view of an aircraft freight container;

Figure 3: A perspective view of an enlarged and

sectioned part of a modification of Figure 2; and

Figure 4: A part of the section along line IV-IV in Figure 2.

A fuselage 1 of an aircraft is divided into an upper deck 2 and a lower deck 3. Both are separated by a floor 4.

Loaded on this floor 4, i.e. in the upper deck 2 are, for example in Figure 1, three freight containers 5.

A freight container 5 has a light metal frame 7 which consists basically of two polygonal frames 13 which form the long sides 11, 12 of the container 5, with transverse sections 14 connecting them. These polygonal frames 13 are mounted on a base frame 15 made up of longitudinal and transverse sections 15_l and 15_q respectively. In addition, the long sides 11, 12 are reinforced by struts 17 running parallel to the base 9 and also vertical struts 16 running perpendicular to the base 9.

These vertical struts 16 are arranged between roof sections 18 and base frame 15 in such a way that they can withstand a considerable loading. In Figure 1 is shown schematically that the vertical struts 16_a, 16_b, 16_c of a plurality of stackable containers 5_a, 5_b, 5_c are arranged such that, in stacked condition, they lie preferably exactly one over the other and thus they fulfil the load-bearing function in an optimum manner.

From the point of view of design this means that the distance a between a pair of vertical struts 16 of a container 5 on a long side 11 or 12 is approximately equal to twice the distance b, which is the distance of the vertical strut 16 from a corner post 19 of the polygonal frame 13. The dimensions a and b depend basically on the width c of the floor 4 and the number of containers 5 to be stacked next to and on top of each other, respectively, and also on the height h of the corner post 19.

Transverse sections 15_q of the base frame 15 have a groove formed in a flange 20, which projects beyond the length a + (2 x b) of the long side, in which clamps 21 hinged on the floor 4

engage and so secure the container 5 in place. Running across the roof sections 18 is stretched a flat section 23 on which clamps 24 are also arranged. If a container 5 is stacked up (Figure 1), then (as indicated by broken lines 5 in Figure 2) the container 5c comes to rest on this flat section 23 by its section 15g of the base frame 15, and can be secured by the clamps 24.

A further possibility for securing of the container 5 is illustrated in Figure 3. In that case a groove 26 10 which is parallel to the floor is formed in the transverse section 15g of the base frame 15, so that a socket strip 27 is formed.

The socket strip 27 has recesses 28, into which the shaft 29 of a hammer-shaped locking element 30 can be 15 inserted. A hammer-shaped head 30 joined to the shaft 29 rests, in the clamping position indicated by broken lines, on shoulder-like ledges 31 formed by the recess 28, and thus secures the container 5.

The clamping element 30 is, as a rule, hinged onto the 20 floor 4, or the strip 23 by means of a pin, not shown, passed through a hole 33, around which it can turn in direction z. The hole 33 has preferably the shape of a hole elongated in the direction parallel to the axis A of the shaft, in which the pin is likewise movable parallel to the 25 axis of the shaft. The clamping element 30, when in vertical position, i.e. on engaging the groove 26, can be moved against the force of a means of storing energy - not shown - through the dimension d of the elongated hole 33.

A trough - not shown - in which the end of the shaft 30 remote from the hammer head 32 can move is, if necessary, provided in the floor 4 or strip 23.

The light metal frame 7 is covered over on the side walls 11 and 12 and a backwall 22, for example by a flexible covering 8, which is held in place by a network of belts 10 35 running parallel and perpendicular to the container base 9.

A roll door 35 is arranged between the two roof sections 18, which can be pulled down progressively in the corner posts 19 and in the struts 36 connecting the corner posts 19 to the roof section 18, right down to the transverse 5 section 15g of the base frame 15.

The roll door 35 can be rolled up on a drum 37, which is journaled to rotate about an axis M between two opposite vertical struts 16 near the back wall 22.

As shown in Figure 4 the roof sections 18 are hollow 10 sections each provided with a slot 40, in each of which are arranged two rollers 41 with opposed running surfaces 42, between which the roll door 35 is guided.

The drum 37 can house a means - not shown - for storing energy, against the action of which the roll door 15 can be opened or closed.

C L A I M S

1. A freight container, in particular for air transport, having a supporting frame made of profiled sections, the supporting frame having two parallel longer sides constituted by respective polygonal frames, the upper edges of which form roof sections and which rest on a base frame and are joined by transverse sections, the polygonal frames being reinforced by vertical struts extending between the base frame and the roof sections characterised by
5. a flat member extending between the roof sections of the supporting frames and provided with clamping members for securing a superimposed like container in position.
10. 2. A freight container according to claim 1, in which the polygonal frames are symmetrical and include two vertical struts a distance apart which corresponds to double the distance between one of the vertical struts and the end of the frame.
15. 3. A freight container according to claim 1 or claim 2 in which the clamping members are claw-like for engagement with a groove in a flange projecting out from one transverse section of the base frame of a second, identical container.
20. 4. A freight container according to claim 1 or claim 2 in which at least one transverse section of the base frame has a laterally opening groove parallel to the floor, in which the clamping members engage, the lower wall of the groove being
25. formed with recesses each defining a pair of shoulder-
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like ledges and each clamping member is hammer-shaped, the shaft passing through a respective recess and the head engaging the corresponding ledges.

5. 5. A freight container according to claim 4 in which the shaft of each clamping member is journaled on a pin passing through a hole in the shaft transverse to the axis of the shaft.
10. 6. A freight container according to claim 5 in which each hole is elongated in a direction parallel to the shaft axis to permit axial movement of the clamping member against the force of a means for storing energy.
15. 7. A freight container according to any one of the preceding claims in which the roof sections are hollow and house sliding devices to guide closure means for the container and the hollow roof sections have opposed slots to accommodate the closure means.
20. 8. A freight container according to claim 7, in which the roof sections are joined to corner posts by connecting sections, the connecting sections and corner posts also being hollow and having opposed slots, the slots in each roof section, connecting section and corner post being continuous with one another.
25. 9. A freight container according to claim 7 or claim 8 in which the closure means are in the form of a roll door engaging in the respective slots.
30. 10. A freight container according to claim 9 in which rollers supporting the door are arranged in the respective hollow sections.



11. A freight container according to claim 9 or claim 10 in which a drum for rolling up the roll door is arranged between two opposed vertical struts.
5. 12. A freight container according to claim 11, in which the rolling up drum has a means of storing energy against the force of which the roll door has to be opened or closed.
10. 13. A freight container according to claim 1 substantially as described with reference to Figure 2 of the accompanying drawings, or modified as described with reference to Figure 3.

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