Title: TRAY AND MODULE

Abstract: A module for carrying food items for heating in an aircraft oven, the module including a tower of stacked trays and a casing with end sections designed to open and allow delivery of the tower of trays into an oven. The invention also relates to a tray for use in the module, the tray including a platform for holding an item of food and an array of hollow posts projecting from the platform to space the platform from a platform of an adjacent stacked tray, wherein the posts are arrayed across the platform with an offset to allow the tray to be reversed and stacked in a tower.
Published:

— with amended claims and statement (Art. 19(1))

— with international search report (Art. 21(3))
TRAY AND MODULE

FIELD OF THE INVENTION

[0001] The present invention relates to a tray and module particularly, but not exclusively, for use in an aircraft galley.

BACKGROUND OF THE INVENTION

[0002] An oven insert is known for use in an aircraft galley oven. The insert is in the form of a frame that carries a multiple trays or skids that are loaded with meals to be cooked in the oven. The insert is designed to be lifted and inserted directly in the oven. Once the meals are cooked, they are lifted off the skids individually or, where a service cart allows, the insert can be pulled out of the oven as a unit and placed in the cart, where the meals can then be delivered to passengers.

[0003] After use, when an aircraft has reached its destination, the insert needs to be removed from the aircraft, cleaned and disinfected, which is a time and labour intensive exercise.

[0004] The insert is of a metallic structure that is sufficiently robust to withstand continued use over an extended period of time. The insert includes a generally box shaped frame formed from a solid heat-treated aluminium extrusion. A top of the insert includes a recessed carry handle. Oven tray runners are provided along the internal sides of the insert and a rear panel is formed with a cut-out that accommodates an oven fan, to allow hot air to circulate through the insert.

[0005] As such, the insert is quite heavy and is of a reasonably complex and expensive design for manufacturing purposes.

[0006] Available space on an aircraft can be limited and in the close confines of a galley, hot metallic objects can present an occupational hazard for crew working in the
Further, the insert occupies valuable space in the aircraft, regardless of whether the insert is fully loaded or empty. Lastly, the insert may present a hazard in the galley as the metallic structure of the insert, when hot, may cause burns to crew working within the close confines of the galley.

OBJECT OF THE INVENTION

The present invention seeks to provide an alternative tray and module.

SUMMARY OF THE INVENTION

In accordance with the invention, there is provided a module for carrying food items for heating in an oven, the module including a tower of stacked trays and a casing with end sections designed to open and allow delivery of the tower of trays into an oven.

Preferably, the end sections include removable panels of the casing.

Preferably, the casing includes a push panel that allows the tower to be engaged and forced out through one of the end sections into the oven.

Preferably, the casing is formed of a collapsible and biodegradable material.

Preferably, the module includes a strap to hold the trays together during transfer into the oven.

Preferably, the module includes a lid fitted to an upper most tray of the stack.

Preferably, the tower is formed of a plurality of trays mounted on top of each other, each with a support platform for food items and posts to space an adjacent stacked tray.
Preferably, the posts of each tray tapered and recessed to receive a post of an adjacent tray in order to allow the trays to be collapsed into a compact stacked condition when not in use.

Preferably, the posts are offset and the trays are reversible so that the platform of an upper tray is supported on the posts of a lower tray.

Preferably, the posts of each tray are arranged in a row along each lateral side of the tray.

Preferably, indents are provided between each post, to locate the post of an adjacent tray when the trays are stacked in the tower.

Preferably, the trays include through holes to facilitated circulation of air between the trays.

Preferably, the trays are formed from a biodegradable material. Preferably, the material is a sugarcane composite material. Alternatively, the trays are formed of a suitable polymeric material.

In another aspect, there is provided a tray for use in the above described module including a platform for holding an item of food and an array of hollow posts projecting from the platform to space the platform from a platform of an adjacent stacked tray, wherein the posts are arrayed across the platform with an offset to allow the tray to be reversed and stacked in a tower.

Preferably, the posts are provided in rows along side rails of the tray.

Preferably, the posts are hollow and recessed, with a tapered external profile, to receive aligned posts of an adjacent tray whereby to allow the trays to be collapsed into a compact stacked condition.

Preferably, the platform includes one or more through holes to allow air flow through the tray.
Preferably, the tray includes indents provided between adjacent posts to register with and locate the posts of the adjacent tray to lock the trays against slip.

Preferably, the tray includes a ledge along at least one end of the platform.

Preferably, the tray is molded as a unitary item.

Preferably, the tray is molded from a sugarcane composite material.

In another aspect, there is provided a tower formed of a plurality of stacked trays, as described above, alternately arranged in a reverse configuration so the posts of one tray support and space the platform of an adjacent tray.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is described, by way of non-limiting example only, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a module;

Figure 2 is a perspective view of the module, indicating tear lines for opening;

Figure 3 is a perspective view of the module, with end panels removed;

Figure 4 is a perspective view of the module illustrating a tower of stacked trays being removed from the module;

Figure 5 is a plan view of a tray;

Figure 6 is a side view of the tray;

Figure 7 is a sectional view taken on the line D-D shown in Figure 5;

Figure 8 is an end view of the tray;
Figure 9 is a perspective view of the tray;

Figure 10 is perspective view showing a tower of stacked trays;

Figure 11 is a perspective view illustrating containers positioned on a top tray;

Figure 12 is a perspective view illustrating an alternative arrangement of containers;

Figures 13a to 13c illustrate a tower of stacked trays being loaded into an oven;

Figure 14 illustrates a tower of stacked trays with a lid and strap; and

Figure 15 illustrates the trays in a compact stacked condition.

DETAILED DESCRIPTION OF THE DRAWINGS

[0032] Referring firstly to Figure 1, a module 1 is shown as including a casing 2 with front and back end panels 3, 4 and side panels 5, formed of cardboard or similar lightweight material. Each side panel 5 has a handle 6 for ease of carrying. A score line 7 is provided around the front and back end panels 3, 4.

[0033] Referring to Figures 2 and 3, the front and back end panels 3, 4 are separated from the casing 2 by tearing along the score line 7, such as in a direction indicated by arrow 8. Once the panels 3, 4 are removed, side flaps 9 are opened to allow access to a tower 10 of stacked trays 11 inside the casing 2.

[0034] With reference to Figure 4, the side flaps 9 are aligned with an over opening (not shown) and a pushing force is applied against an internal push panel 12 of the module 1 to slide the tower 10 out of the casing 2 and into the oven.

[0035] The casing 2 is formed of collapsible material so that the casing 2 can be
crushed and compacted for storage prior to being disposed of. The casing 2 is also biodegradable in the event the casing 2 ends up as land fill.

[0036] Referring now to Figure 5, one of the trays 11 is shown in more detail in plan view. The tray 11 includes a generally rectangular platform 13 with through holes 14 to allow air to circulate through the platform 13. Crossed ribs 15 are molded into the platform 12 for additional strength.

[0037] A ledge 16 is formed along either end 17 of the platform and a series of posts 18 are arrayed along the length and width of the tray. In particular, the posts 18 are provided in two rows 19, 20, with a space 21 between each post 18. The posts 18 project upwardly from side rails 22 of the tray 11 and the posts 18 in first row 19 are offset relative to the posts 18 in the other row 20.

[0038] Indents 23 are formed in the rails 22 of the tray 11, between the posts 18 of each row 19, 20.

[0039] Referring to Figure 6, when the tray 11 is viewed side-on, the posts 18 of each row 19, 20 align in a regular sequence. Each post 18 is wedge-shaped with an external profile 24 that tapers from a base portion 25 connected to the platform 13 to a support portion 26 located remotely of the platform 13.

[0040] Referring to Figure 7, a cross section through the tray 11 clearly shows the spaces 21 between the posts 18 in the row 18. The depth dimension of the indents 23 is also apparent.

[0041] By way of example only, the depth dimension of the indents 23 is in the order of 5 mm, the length dimension of the tray 11 is in the of 397 mm, the width dimension of the tray 11 is in the order of 228 mm, while the height dimension of the posts 18 is in the order of 53.5 mm. The diameter of the through holes 14 is in the order of 15 mm.

[0042] Referring now to Figure 8, the posts 18 are more clearly shown as being aligned in the two rows 19, 20 that project from lateral edges 27 of the tray 11, along side rails 22. Each post 18 is hollow so as to define tapered recesses 28.
[0043] Referring to Figure 9, a perspective view of the tray 11 illustrates the offset of the posts 18 in each row 19, 20. As may be appreciated, if the orientation of the tray 11 is reversed, by spinning the tray 180 degrees, the resultant post configuration would be offset by one space 21. As such, the posts 18 in one of the rows 19, after the tray 11 is reversed, would exactly align with the location of the space 21 provided between the posts 18 of the other row 20, prior to the tray 11 being reversed.

[0044] Referring now to Figure 10, the tower 10 of trays 11 is illustrated, where each successive stacked tray 11 is in a reversed orientation, so that the posts 18 of a lower tray 29 sit immediately underneath the space 21 between the posts 18 of an upper tray 30.

[0045] Indeed, the posts 18 of the lower tray 29 are received in the indents 23 in the side rails 22 of the upper tray 30 so that the support portions 26 of the posts 18 support an underside 31 of the upper tray 30. As such, the support portions 26 not only serve to provide integrated support to the upper tray 30 but also serve to lock the trays 29, 30 from relative slippage. This allows the tower 10 to be formed as a structurally rigid unit by simply reversing and stacking trays 11 one on top of the other.

[0046] As each tray 11 is stacked, it can be loaded with food containers or the like. Figure 11 illustrates one such configuration of containers 32, while Figure 12 shows an alternative configuration of the containers 32.

[0047] Once fully loaded, the tower 10 can be introduced into an oven 33, as shown in Figure 13, where the trays 11 are inserted into an open oven door 34. The tower 10 can be inserted after the trays 11 have been individually loaded with containers 32 and stacked, in situ. Alternatively, the tower 10 can be loaded directly from the module 1 described with reference to Figures 1 to 4.

[0048] The trays 11 have a degree of resistance to separation as a result of the engagement of posts 18 of one tray 11 into the indents 23 formed in the rails 22 of an adjacent tray 11 and are thereby reasonable easy to handle as a unit. The ledge 16 provided on the platform 13 may, for example, be gripped and pulled to slide a stack
of trays along a surface or remove the entire tower 10 from the oven 32.

[0049] Alternatively, or additionally, an oven proof strap 35 may be provided to assist in securing the trays 11 of the tower 10 together, as illustrated in Figure 14, which also shows a lid 36 as part of the tower 10 which is used to cap off the top most tray 37.

[0050] With reference now to Figure 15, it will be appreciated the trays 11, when in the same orientation are ideal for compact stacking since the posts 18 are hollow and tapered. As such, the posts 18 of a lower tray 28 will slide into the associated recesses 28 of the posts 18 in the upper tray 30. This allows the trays 11 to be collapsed into a compact stacked condition, which means that after use the trays 11 can be compacted to a minimal sized stack for storage as trash.

[0051] The compact storage of the trays 11 is particularly advantageous on aircraft where space is limited and trash can otherwise occupy a substantial portion of the available space.

[0052] Alternatively, since the material is relatively thin and light weight the trays can be readily compacted after use, if required, such as by being compressed in an on-board trash compactor, which is particularly advantageous in circumstances where additional on-board space is required.

[0053] The trays 11 are preferably formed of a light weight sugar cane composite material so the trays can be readily incinerated with minimal environmental impact or simple used as land fill to biodegrade relatively quickly. Alternatively, the trays 11 can be formed of a suitable polymeric material.

[0054] As may be appreciated from the above, the module 1, tower 10 and trays 11 provide a light weight solution for delivery of meals into a galley of an aircraft. The material of the trays 11 ensures burn hazards in the galley are reduced. The environmental impact of disposing of the casing 2 and trays 11 has also been minimized and, importantly, both the casing and trays can be compacted down to a collapsed condition after use, increasing available space in the aircraft.
[0055] The reference in this specification to any prior publication (or information derived from it), or to any matter which is known, is not, and should not be taken as, an acknowledgement or admission or any form of suggestion that that prior publication (or information derived from it) or known matter forms part of the common general knowledge in the field of endeavour to which this specification relates.

[0056] The invention has been described by way of non-limiting example only and many modifications and variations may be made without departing from the spirit and scope of the invention described.
LIST OF PARTS

1. Module
2. Casing
3. End panel
4. End panel
5. Side panel
6. Handle
7. Score line
8. Arrow
9. Side flaps
10. Tower
11. Trays
12. Push panel
13. Platform
14. Through holes
15. Ribs
16. Ledge
17. End
18. Post
19. Row
20. Row
21. Space
22. Rail
23. Indent
24. Profile
25. Base portion
26. Support portion
27. Edges
28. Recesses
29. Lower tray
30. Upper tray
31. Underside
32. Containers
33. Oven
34. Oven door
35. Strap
36. Lid
Claims

1. A module for carrying food items for heating in an oven, the module including a tower of stacked trays and a Casing with end sections designed to open and allow delivery of the tower of trays into an oven.

2. The module of claim 1, wherein the end sections include removable panels of the casing.

3. The module of claim 1 or 2, wherein the casing includes a push panel that allows the tower to be engaged and forced out through one of the end sections into the oven.

4. The module of any one of claims 1 to 3, wherein the casing is formed of a collapsible and biodegradable material.

5. The module of any one of claims 1 to 4, further including a strap to hold the trays together during transfer into the oven.

6. The module of any one of claims 1 to 5, further including a lid fitted to an upper most tray of the stack.

7. The module of any one of claims 1 to 6, wherein the tower is formed of a plurality of trays mounted on top of each other, each with a support platform for food items and posts to space an adjacent stacked tray.

8. The module of claim 7, wherein the posts of each tray tapered and recessed to receive a post of an adjacent tray in order to allow the trays to be collapsed into a compact stacked condition when not in use.

9. The module of claim 7 or 8, wherein the posts are offset and the trays are, reversible so that the platform of an upper tray is supported on the posts of a lower tray.
10. The module of any one of claims 7 to 9, wherein the posts of each tray are arranged in a row along each lateral side of the tray.

11. The module of any one of claims 7 to 10, wherein indents are provided between each post, to locate the post of an adjacent tray when the trays are stacked in the tower.

12. The module of any one of claims 7 to 11, wherein the trays include through holes to facilitate circulation of air between the trays.

13. The module of any one of claims 7 to 12, wherein the trays are formed from a biodegradable material.

14. The module of claim 13, wherein the material is a sugarcane composite or suitable polymeric material.

15. A tray for use in the module of claim 1, including a platform for holding an item of food and an array of hollow posts projecting from the platform to space the platform from a platform of an adjacent stacked tray, wherein the posts are arrayed across the platform with an offset to allow the tray to be reversed and stacked in a tower.

16. The tray of claim 15, wherein the posts are provided in rows along side rails of the tray.

17. The tray of claim 16, wherein the posts are hollow and recessed, with a tapered external profile, to receive aligned posts of an adjacent tray whereby to allow the trays to be collapsed into a compact stacked condition.

18. The tray of any one of claims 15 to 17, wherein the platform includes one or more through holes to allow air flow through the tray.

19. The tray of any one of claims 15 to 18, further including indents provided between adjacent posts to register with and locate the posts of the adjacent tray to lock the trays against slip.
20. The tray of any one of claims 15 to 19, further including a ledge along at least one end of the platform

21. The tray of any one of claims 15 to 20, wherein the tray is molded as a unitary item.

22. The tray of claim 21, wherein the tray is molded from a sugarcane composite material.

23. A tower formed of a plurality of stacked trays, as defined in any one of claims 15 to 22, alternately arranged in a reverse configuration so the posts of one tray support and space the platform of an adjacent tray.
Claims

1. A module for carrying food items for heating in an oven, the module
   including a tower of stacked trays and a casing with end sections designed
   to open and allow delivery of the tower of trays into an oven: wherein
   the tower is formed of a plurality of trays mounted on top of each other,
   each with a support platform for food items and posts to space an adjacent stacked
   tray; and wherein
   the posts are offset) and the trays are reversible so that the platform of an
   upper tray is supported on the posts of a lower tray.

2. The module of claim 1, wherein the end sections include removable panels of
   the casing.

3. The module of claim 1 or 2, wherein the casing includes a push panel that
   allows the tower to be engaged and forced out through one of the end sections into
   the oven.

4. The module of any one of claims 1 to 3, wherein the casing is formed of a
   collapsible and biodegradable material.

5. The module of any one of claims 1 to 4, further including a strap to hold the
   trays together during transfer into the oven.

6. The module of any one of claims 1 to 5, further including a lid fitted to an
   upper most tray of the stack,

7. The module of claim 1, wherein the posts of each tray are tapered and
   recessed to receive a post of an adjacent tray in order to allow the trays to be collapsed
   into a compact stacked condition when not in use.

8. The module of any one of claims 1 to 7, wherein the posts of each tray are
   arranged in a row along each lateral side of the tray.
9. The module of any one of claims 1 to 8, wherein indents are provided between each post, to locatei the post of an adjacent tray when the trays are stacked in the tower.

10. The module of any one of claims 1 to 9, wherein the trays include through holes to facilitate circulation of air between the trays.

11. The module of any one of claims 1 to 10, wherein the trays are formed from a biodegradable material.

12. The module of claim 11, wherein the material is a sugarcane composite or suitable polymeric material.

13. A tray for use in the module of claim 1, including a platform for holding an item of food and an array of hollow posts projecting from the platform to space the platform from a platform of an adjacent stacked tray, wherein the posts are arrayed across the platform with an offset to allow the tray to be reversed and stacked in a tower.

14. The tray of claim 13, wherein the posts are provided in rows along side rails of the tray.

15. The tray of claim 14, wherein the posts are hollow and recessed, with a tapered external profile, to receive aligned posts of an adjacent tray whereby to allow the trays to be collapsed into a compact stacked condition,

16. The tray of any one of claims 13 to 15, wherein the platform includes one or more through holes to allow airflow through the tray.

17. The tray of any one of claims 13 to 16, further including indents provided between adjacent posts to register with and locate the posts of the adjacent tray to lock the trays against slip.
18. The tray of any one of claims 13 to 17, further including a ledge along at least one end of the platform

19. The tray of any one of claims 13 to 18, wherein the tray is molded as a unitary Item.

20. The tray of claim 19, wherein the tray is molded from a sugarcane composite material.

21. A tower formed of a plurality of stacked trays, as defined in any one of claims 13 to 20, alternately arranged in a reverse configuration so the posts of one tray support and space the platform of an adjacent tray.
1. Delete claim set present on file and insert new claim pages 12, 13 and 14 attached hereto in duplicate, one copy indicating the nature and location of the proposed amendments.

20 December, 2013
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

B65D 21/04 (2006.01)  B64D 11/04 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Epodoc, WPI: IPC, CPC; B65D 21/-, 11/04 and keywords( Food, Tray, Stack, Nest, Box, Module, Post, Offset, Hollow and similar keywords)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<td>&quot;O&quot;</td>
<td>document defining the general state of the art which is not considered to be of particular relevance</td>
<td>&quot;T&quot; later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td>
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<td>&quot;E&quot;</td>
<td>earlier application or patent but published on or after the international filing date</td>
<td>&quot;X&quot; document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td>
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<td>&quot;P&quot;</td>
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Date of the actual completion of the international search: 30 May 2013
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Name and mailing address of the ISA/All

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
Email address: pct@ipaustralia.gov.au
Facsimile No.: +61 2 6283 7999

Authorised officer

Mark Olley
AUSTRALIAN PATENT OFFICE
(ISO 9001 Quality Certified Service)
Telephone No. 0262832143

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<td>X</td>
<td>WO 2003/086882 A1 (Societe des Produits Nestle S.A.) 23 October 2003 fig 2-4, 10, page 3 lines 21-35, page 5 lines 2-5 &amp; page 8 lines 8-21</td>
<td>1-4, 7-8, 12-14</td>
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<td>X</td>
<td>WO 2011/116171 A2 (Mag Aerospace Industries Inc.) 22 September 2011 Fig 6-8, page 7 line 30-31, page 8 lines 3-5</td>
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This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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