PTO/AIA/80 (07-12)
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

☒ Practitioners associated with Customer Number: 24201

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

☐ The address associated with Customer Number:

OR

☐	Firm or Individual Name			
	Address			
	City		State	Zip
	Country			
	Telephone		Email	

Assignee Name and Address: B/E Aerospace, Inc.
1400 Corporate Center Way
Wellington, FL 33414

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	[signature]	Date	12/9/14
Name	ALEXANDER KIM	Telephone	
Title	Assistant Secretary		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Don Cook, et al.

Application No./Patent No.: 14/043,500 Filed/Issue Date: October 1, 2013

Titled: AIRCRAFT INTERIOR LAVATORY

B/E Aerospace, Inc., a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Don Cook, Liberty Harrington, Philipp and Steiner, Robert K. Brauer To: BE Intellectual Property, Inc.

   The document was recorded in the United States Patent and Trademark Office at
   Reel 026145, Frame 0191, or for which a copy thereof is attached.

2. From: Trevor Skelly To: BE Intellectual Property, Inc.

   The document was recorded in the United States Patent and Trademark Office at
   Reel 027067, Frame 0864, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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STATEMENT UNDER 37 CFR 3.73(c)

3. From: BE Intellectual Property, Inc. To: B/E Aerospace, Inc.

The document was recorded in the United States Patent and Trademark Office at
Reel 031366, Frame 0932, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

Signature	Date 12/9/14
ALEXANDER KIM	Assistant Secretary
Printed or Typed Name	Title or Registration Number

PTO/AIA/14 (12-13)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEALCI-94515
	Application Number	
Title of Invention	AIRCRAFT INTERIOR LAVATORY	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Donald	F.	Cook	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Arlington	State/Province	WA	Country of Residence i	US

Mailing Address of Inventor:

Address 1	7229 Hawksview Drive		
Address 2			
City	Arlington	State/Province	WA
Postal Code	98223	Country i	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Liberty		Harrington	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Seattle	State/Province	WA	Country of Residence i	US

Mailing Address of Inventor:

Address 1	2621 22nd Avenue South		
Address 2			
City	Seattle	State/Province	WA
Postal Code	98144	Country i	US

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Philipp		Steiner	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

PTO/AIA/14 (12-13)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEALCI-94515
	Application Number	
Title of Invention	AIRCRAFT INTERIOR LAVATORY	

City	Seattle	State/Province	WA	Country of Residence i	US

Mailing Address of Inventor:

Address 1	2383 NW 89th Place		
Address 2			
City	Seattle	State/Province	WA
Postal Code	98117	Country i	US

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Robert	K.	Brauer	

Residence Information (Select One) (•) US Residency ( ) Non US Residency ( ) Active US Military Service

City	Seattle	State/Province	WA	Country of Residence i	US

Mailing Address of Inventor:

Address 1	2305 13th Ave. E		
Address 2			
City	Seattle	State/Province	WA
Postal Code	98102-4018	Country i	US

Inventor 5 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Trevor		Skelly	

Residence Information (Select One) (•) US Residency ( ) Non US Residency ( ) Active US Military Service

City	Mercer Island	State/Province	WA	Country of Residence i	US

Mailing Address of Inventor:

Address 1	7425 81st Place SE		
Address 2			
City	Mercer Island	State/Province	WA
Postal Code	98040	Country i	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEALCI-94515
	Application Number	
Title of Invention	AIRCRAFT INTERIOR LAVATORY	

Customer Number	119984		
Email Address	docketla@fulpat.com	Add Email	Remove Email

Application Information:

Title of the Invention	AIRCRAFT INTERIOR LAVATORY		
Attorney Docket Number	BEALCI-94515	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	1	Suggested Figure for Publication (if any)	

Filing By Reference :

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	119984		

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEALCI-94515
	Application Number	
Title of Invention	AIRCRAFT INTERIOR LAVATORY	

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the application number blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation of	14/043500	2013-10-01

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14/043500	Continuation of	13/089063	2011-04-18	8590838	2013-11-26

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
13/089063	Claims benefit of provisional	61/346835	2010-05-20

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
13/089063	Claims benefit of provisional	61/326198	2010-04-20

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) [i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country [i]	Filing Date (YYYY-MM-DD)	Access Code [i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

PTO/AIA/14 (12-13)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEALCI-94515
	Application Number	
Title of Invention	AIRCRAFT INTERIOR LAVATORY	

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEALCI-94515
	Application Number	
Title of Invention	AIRCRAFT INTERIOR LAVATORY	

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☒

Organization Name	B/E Aerospace, Inc.		
Mailing Address Information:			
Address 1	1400 Corporate Center Way		
Address 2			
City	Wellington	**State/Province**	FL
Country [i]	US	Postal Code	33414
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication . An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEALCI-94515
	Application Number	
Title of Invention	AIRCRAFT INTERIOR LAVATORY	

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications

Signature	/James W. Paul/			Date (YYYY-MM-DD)	2015-05-11
First Name	James	Last Name	Paul	Registration Number	29967

Additional Signature may be generated within this form by selecting the Add button. Add

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal	
Application Number:	
Filing Date:	
Title of Invention:	AIRCRAFT INTERIOR LAVATORY
First Named Inventor/Applicant Name:	Donald F. Cook
Filer:	James Warren Paul/Laura Martinez
Attorney Docket Number:	BEALCI-94515

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1600**

Electronic Acknowledgement Receipt	
EFS ID:	22315358
Application Number:	14709409
International Application Number:	
Confirmation Number:	1803
Title of Invention:	AIRCRAFT INTERIOR LAVATORY
First Named Inventor/Applicant Name:	Donald F. Cook
Customer Number:	119984
Filer:	James Warren Paul/Laura Martinez
Filer Authorized By:	James Warren Paul
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1		Specification.pdf	58930 51859eae71e1bd8a5094ce608ab6e455569adab8	yes	10

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Document Description	Start	End
Specification	1	7
Claims	8	9
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2	Drawings-only black and white line drawings	Formal_Drawing.pdf	29619 6361bf7886f00130066918eb85ff9f3173d0f05b	no	1
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10	Application Data Sheet	ADS.pdf	1561944 8dd51c9603e02d7df013e70564f5a5e1426560ef	no	8
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AIRCRAFT INTERIOR LAVATORY

CROSS-REFERENCES TO RELATED APPLICATIONS

[0001] This continuation application is based upon USSN 14/043,500, filed on October 1, 2013, which is a continuation of USSN 13/089,063, filed on April 18, 2011, USPN 8,590,838, issue date November 26, 2013, which claims priority from Provisional Application No. 61/326,198, filed April 20, 2010, and Provisional Application No. 61/346,835, filed May 20, 2010, which are incorporated by reference in their entirety herein.

BACKGROUND OF THE INVENTION

[0002] The present invention relates generally to aircraft enclosures, and more particularly relates to an aircraft cabin enclosure, such as a lavatory, an aircraft closet, or an aircraft galley, for example, including an aircraft cabin structure having an aft portion with a substantially vertically extending exterior aft surface that is substantially not flat in a vertical plane.

[0003] Aircraft lavatories, closets and other full height enclosures commonly have forward walls that are flat in a vertical plane. Structures such as passenger seats installed forward of such aircraft lavatories, closets and similar full height enclosures often have shapes that are contoured in the vertical plane. The juxtaposition of these flat walled enclosures and contoured structures renders significant volumes unusable to both the function of the flat walled lavatory or enclosure and the function of the contoured seat or other structure. Additionally, due to the lack of a provision for structural load sharing, conventional aircraft lavatories require a gap between the lavatory enclosures and adjacent structures, resulting in a further inefficiency in the use of space.

[0004] Aircraft bulkheads, typically separating passenger cabin areas or classes of passenger service, are in common use, and typically have a contour permitting passengers seated behind the bulkhead to extend their feet modestly under the premium seats immediately forward of the bulkhead. These provide a comfort advantage to passengers seated behind the bulkhead, but provide no increased efficiency in the use of space, in

that they do not enable the seats fore and aft of the bulkhead to be placed more closely together. Short, floor-mounted stowage boxes, typically no taller than the bottom cushion of a passenger seat, are often positioned between the flat wall of current lavatories or other enclosures and passenger seats. These provide no improvement to the utility or spatial efficiency of the lavatory or other enclosure. While they do provide some useful stowage for miscellaneous items, they do not provide sufficient additional stowage to provide more space for passenger seating.

[0005] It would be desirable to provide an aircraft lavatory or other enclosure that can reduce or eliminate the gaps and volumes of space previously required between lavatory enclosures and adjacent structures to allow an adjacent structure such as passenger seating installed forward of the lavatory or other enclosure to be installed further aft, providing more space forward of the lavatory or enclosure for passenger seating or other features than has been possible in the prior art. Alternatively, the present invention can provide a more spacious lavatory or other enclosure with no need to move adjacent seats or other structures forward.

[0006] It would also be desirable to provide an aircraft lavatory or other enclosure with a wall to bear loads from an adjacent passenger seating or other structure, permitting elimination of a required gap between the lavatory or other enclosure and the adjacent passenger seating or other structure, making more space available for other uses. In addition, enabling a lavatory or other enclosure to bear loads from an adjacent structure can reduce the combined weight of the lavatory or other enclosure and the adjacent structure.

[0007] It also would be desirable to provide an aircraft lavatory or other enclosure that can reduce or eliminate the gaps and volumes of space previously required between lavatory enclosures and adjacent structures, to allow the installation of an increased number of passenger seats, to increase the value of the aircraft. The present invention meets these and other needs.

SUMMARY OF THE INVENTION

[0008] Briefly, and in general terms, the present invention provides for an enclosure, such as a lavatory, an aircraft closet, or an aircraft galley, for example, for a cabin of an aircraft including a structure having an aft portion with a substantially vertically extending exterior aft surface that is substantially not flat in a vertical plane. The enclosure structure permits a combination of the enclosure with the structure in a manner that permits significant saving of space in the aircraft, which in turn permits more seats to be installed, or more space to be offered per seat, increasing the value of the aircraft.

[0009] Accordingly, in one presently preferred aspect, the present invention provides for an enclosure unit for a cabin of an aircraft including an aircraft cabin structure having an aft portion with an exterior aft surface that is substantially not flat in a vertical plane. The enclosure unit can be a lavatory, an aircraft closet, or an aircraft galley, for example. In one presently preferred aspect, the enclosure unit includes one or more walls that are taller than an adjacent aircraft cabin structure, the one or more walls defining an interior enclosure space and having a forward wall portion. The forward wall portion is configured to be disposed immediately aft of and adjacent to or abutting the exterior aft surface of the aircraft cabin structure, and the forward wall portion is shaped to substantially conform to the shape of the exterior aft surface of the aircraft cabin structure.

[0010] In another presently preferred aspect, the enclosure unit includes an enclosure stall unit, and the aircraft cabin structure is a passenger seat installed immediately forward of the enclosure stall unit. In another presently preferred aspect, the forward wall portion of the enclosure unit is configured to accept loads from the aircraft passenger seat. In another presently preferred aspect, the forward wall portion includes a forward projection configured to project over an aft portion of the adjacent passenger seat immediately forward of the enclosure stall unit.

[0011] In another presently preferred aspect, the enclosure is a lavatory, including a lavatory stall unit with one or more walls having a forward wall portion. The one or more walls define an interior lavatory space, and the forward wall portion is configured

to be disposed immediately aft of and adjacent to or abutting an aircraft cabin structure having an exterior aft surface having a shape that is substantially not flat in a vertical plane. In a presently preferred aspect, the forward wall portion is shaped to substantially conform to the shape of the exterior aft surface of the aircraft cabin structure.

[0012] In another presently preferred aspect, the aircraft cabin structure is a passenger seat installed immediately forward of the lavatory stall unit, and the forward wall portion of the lavatory stall unit is configured to accept loads from the passenger seat. In another presently preferred aspect, the forward wall portion includes a forward projection configured to project over an aft portion of the adjacent passenger seat immediately forward of the lavatory stall unit. In another presently preferred aspect, the forward wall portion defines a secondary space in the interior lavatory space in an area forward of an aft-most portion of the forward wall portion. The secondary space can provide an amenity stowage space inside the lavatory stall unit in the area forward of an aft-most portion of the forward wall portion, and can include design elements providing visual space inside the lavatory in the area forward of an aft-most portion of the forward wall portion.

[0013] In another presently preferred aspect, the present invention provides for an assembly of an aircraft enclosure unit and an aircraft cabin structure for an aircraft cabin, the assembly in combination including an aircraft cabin structure having an exterior aft surface having a shape that is substantially not flat in a vertical plane, and an aircraft enclosure unit including at least one wall having a forward wall portion. The one or more walls define an interior enclosure space, the forward wall portion is disposed immediately aft of and adjacent to the aircraft cabin structure, and the forward wall portion is shaped to substantially conform to the shape of the exterior aft surface of the aircraft cabin structure. In another presently preferred aspect, the aircraft cabin structure is a passenger seat installed immediately forward of the aircraft enclosure unit. In another presently preferred aspect, the forward wall portion is configured to accept loads from the aircraft passenger seat. In another presently preferred aspect, the forward wall portion includes a forward projection configured to project over an aft portion of the adjacent passenger seat immediately forward of the aircraft enclosure unit.

[0014] In another presently preferred aspect, the aircraft enclosure unit is a lavatory stall, and the one or more walls define an interior lavatory space. In another presently preferred aspect, the forward wall portion defines a secondary space in the interior lavatory space in an area forward of an aft-most portion of the forward wall portion.

[0015] In another presently preferred aspect, the present invention provides for an assembly of an aircraft lavatory unit and an aircraft cabin structure for an aircraft cabin, in which the assembly in combination includes an aircraft cabin structure having an exterior aft surface having a shape that is substantially not flat in a vertical plane, and an aircraft lavatory stall unit including one or more walls having a forward wall portion. In another presently preferred aspect, the one or more walls define an interior lavatory space, the forward wall portion is disposed immediately aft of and adjacent to the aircraft cabin structure, and the forward wall portion is shaped to substantially conform to the shape of the exterior aft surface of the aircraft cabin structure. In another presently preferred aspect, the aircraft cabin structure is a passenger seat installed immediately forward of the aircraft lavatory stall unit, and wherein the forward wall portion of the aircraft lavatory stall unit is configured to accept loads from the passenger seat. In another presently preferred aspect, the forward wall portion includes a forward projection configured to project over an aft portion of the adjacent passenger seat immediately forward of the aircraft lavatory stall unit. In another presently preferred aspect, the forward wall portion defines a secondary space in the interior lavatory space in an area forward of an aft-most portion of the forward wall portion.

[0016] These and other aspects and advantages of the invention will become apparent from the following detailed description and the accompanying drawings, which illustrate by way of example the features of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] Figure 1 is a schematic diagram of a prior art installation of a lavatory immediately aft of and adjacent to an aircraft passenger seat.

[0018] Fig. 2 is a schematic diagram of an installation of a lavatory according to the present invention immediately aft of and adjacent to or abutting an aircraft cabin passenger seat.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0019] Referring to the drawings, which are provided by way of example, and not by way of limitation, the present invention provides for an enclosure 10, such as a lavatory for a cabin 12 of an aircraft (not shown), although the enclosure may also be an aircraft closet, or an aircraft galley, or similar enclosed or structurally defined spaces, for example. As is illustrated in Fig. 2, the cabin includes a structure 14, and the enclosure may be taller than the cabin structure. The cabin structure can be a passenger seat 16, for example, installed immediately forward of the enclosure and having an aft portion 18 with and exterior aft surface 20 that is substantially not flat in a vertical plane 22. The lavatory includes a lavatory stall unit 24 having one or more walls 26 having a forward wall portion 28. The one or more walls define an interior lavatory space 30, and the forward wall portion is configured to be disposed immediately aft of and adjacent to or abutting the exterior aft surface of the aircraft cabin structure. The forward wall portion has a shape that is substantially not flat in the vertical plane, and preferably is shaped to include a recess 34 such that the forward wall portion substantially conforms to the shape of the exterior aft surface of the aircraft cabin structure. In a presently preferred aspect, the forward wall portion of the lavatory stall unit is configured to accept loads from the passenger seat. As shown in Fig. 2, the forward wall portion 28 can be configured to provide a lower recess 100 formed between the forward wall portion 28 and the cabin deck 102. As also shown in Fig. 2, the lower recess 100 can be configured to receive at least a portion of an aft-extending seat support 17 therein. As can be seen by comparing Fig. 1 and Fig. 2, the recess 34 and the lower recess 100 combine to permit the passenger seat 16 to be positioned farther aft in the cabin than would be possible if the lavatory enclosure 10 included a conventional flat and vertical forward wall without recesses like that shown in Fig. 1, or included a forward wall that did not include both recesses 34, 100.

[0020] In another presently preferred aspect, the forward wall portion defines a secondary space 36 in the interior lavatory space in an area 38 forward of an aft-most portion 40 of the forward wall portion, and the forward wall portion includes a forward projection 42 configured to project over the aft portion of the adjacent passenger seat back 44 immediately forward of the lavatory stall unit. The secondary space can include an amenity stowage space 46 inside the lavatory stall unit in the area forward of the aft-most portion of the forward wall portion, and the secondary space can include design elements providing visual space, such as a visual perception of space, inside the lavatory in the area forward of an aft-most portion of the forward wall portion.

[0021] It will be apparent from the foregoing that while particular forms of the invention have been illustrated and described, various modifications can be made without departing from the spirit and scope of the invention. Accordingly, it is not intended that the invention be limited, except as by the appended claims.

We Claim:

1. A method of retrofitting an aircraft to provide additional passenger seating in the cabin of said aircraft, the cabin including a passenger seat having an exterior aft surface that is substantially not flat, comprising the steps of:

installing an aircraft enclosure unit comprising:

a forward wall, said forward wall being part of an outer boundary defining a single enclosed space that includes a toilet, said forward wall configured to receive a portion of the exterior aft surface of the passenger seat;

wherein said forward wall is adapted to provide more space forward of the enclosure unit such that the passenger seat can be positioned further aft in the cabin than if the cabin included another enclosure unit having a substantially flat front wall located in substantially the same position in the cabin as the forward wall; and

wherein said enclosed space is taller than the passenger seat; and

positioning said aircraft passenger seat further aft in said aircraft cabin than an initial position of said aircraft passenger seat prior to retrofitting said aircraft.

2. A method of providing an aircraft with more passenger seats in the aircraft's cabin, the method comprising the steps of:

installing a combination of an enclosure unit and a passenger seat in the aircraft, the combination comprising:

a passenger seat located forward of and proximate to the enclosure unit and having an exterior aft surface that is substantially not flat;

an enclosure unit located aft of the passenger seat, the enclosure unit having a forward wall, said forward wall being part of an outer boundary defining a single enclosed space that includes a toilet, said forward wall configured to receive a portion of the exterior aft surface of the passenger seat;

wherein said forward wall is adapted to provide more space forward of the enclosure unit such that the passenger seat can be positioned further aft in the aircraft cabin than if the cabin included another enclosure unit having a front wall that is

substantially flat and is located in substantially the same position in the aircraft cabin as the forward wall; and

wherein said enclosed space is taller than the passenger seat; and

whereby said aircraft passenger seat can be installed further aft in said aircraft cabin than would be possible if the substantially flat front wall of the other enclosure unit was located in substantially the same position in the aircraft cabin as the forward wall.

AIRCRAFT INTERIOR LAVATORY

ABSTRACT OF THE DISCLOSURE

A lavatory for an aircraft cabin includes a wall having a forward wall portion disposed immediately aft of and substantially conforming to an exterior aft surface of an aircraft cabin structure, such as a passenger seat, that is substantially not flat in a vertical plane. The forward wall portion includes a forward projection over an aft portion of the adjacent passenger seat. The forward wall portion can define a secondary space in the interior lavatory space, which can provide an amenity stowage space, and can include design elements providing visual space.

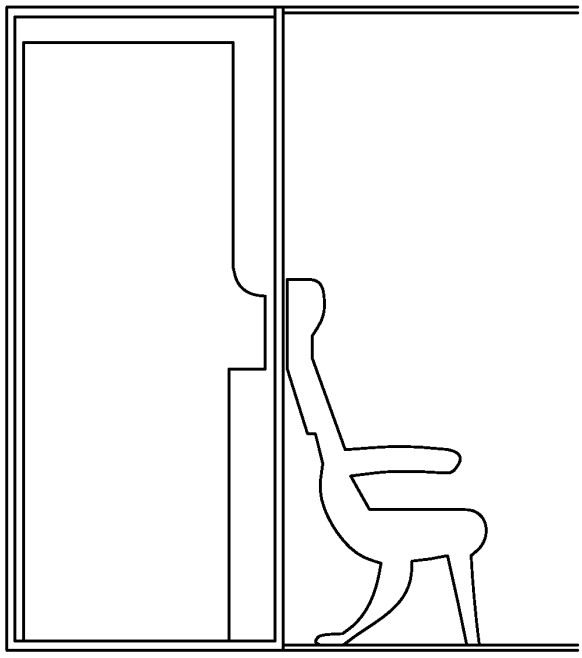

FIG. 1
(Prior Art)

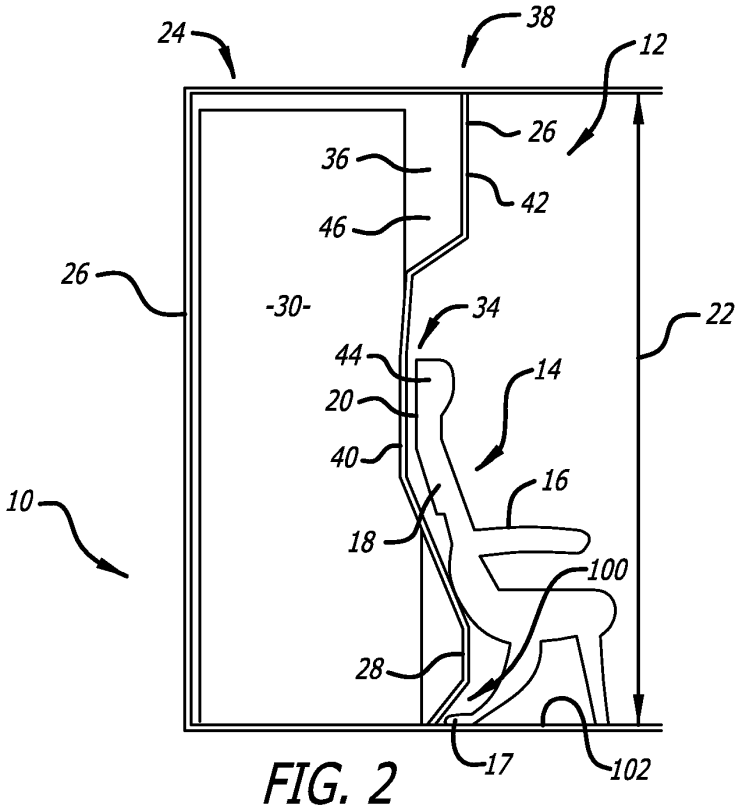

FIG. 2

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Title of Invention	AIRCRAFT INTERIOR LAVATORY

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This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 14/043,500

filed on October 1, 2013.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

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LEGAL NAME OF INVENTOR

Inventor: Donald F. Cook Date (Optional): _____

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LEGAL NAME OF INVENTOR

Inventor: Liberty Harrington Date (Optional): 4/9/2015

Signature: [signature]

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I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

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Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Philipp Steiner Date (Optional): 4/9/2015

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/01 (06-12)
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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	AIRCRAFT INTERIOR LAVATORY

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

■ United States application or PCT international application number 14/043,500

filed on October 1, 2013.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

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LEGAL NAME OF INVENTOR

Inventor: Robert K. Brauer Date (Optional) :

Signature:

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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■ United States application or PCT international application number 14/043,500 filed on October 1, 2013.

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LEGAL NAME OF INVENTOR

Inventor: Trevor Skelly Date (Optional): _____

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/709,409

APPLICATION AS FILED - PART I

	(Column 1)	(Column 2)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE($)	FEE($)		RATE($)	FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	2 minus 20 =	*			OR	x 80 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*				x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1600

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/709,409	05/11/2015	3644	1600	BEALCI-94515	2	2

CONFIRMATION NO. 1803

FILING RECEIPT

119984
FULWIDER PATTON, LLP
Howard Hughes Center
6060 Center Drive
Tenth Floor
Los Angeles, CA 90045

OC00000007289707

Date Mailed: 05/21/2015

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Donald F. Cook, Arlington, WA;
Liberty Harrington, Seattle, WA;
Philipp Steiner, Seattle, WA;
Robert K. Brauer, Seattle, WA;
Trevor Skelly, Mercer Island, WA;

Applicant(s)

B/E Aerospace, Inc., Wellington, FL;

Power of Attorney: The patent practitioners associated with Customer Number 24201

Domestic Priority data as claimed by applicant

This application is a CON of 14/043,500 10/01/2013
which is a CON of 13/089,063 04/18/2011 PAT 8590838
which claims benefit of 61/346,835 05/20/2010
and claims benefit of 61/326,198 04/20/2010

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 05/20/2015

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/709,409**

Projected Publication Date: 08/27/2015

Non-Publication Request: No

Early Publication Request: No
Title

AIRCRAFT INTERIOR LAVATORY

Preliminary Class

244

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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NOT GRANTED

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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/709,409	05/11/2015	Donald F. Cook	BEALCI-94515	1803

119984 7590 06/10/2015

FULWIDER PATTON, LLP
Howard Hughes Center
6060 Center Drive
Tenth Floor
Los Angeles, CA 90045

EXAMINER	
LEE, BENJAMIN P	

ART UNIT	PAPER NUMBER
3641	

NOTIFICATION DATE	DELIVERY MODE
06/10/2015	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketla@fulpat.com
eOfficeAction@fulpat.com

Office Action Summary	Application No. 14/709,409	Applicant(s) COOK ET AL.	
	Examiner BENJAMIN P. LEE	Art Unit 3641	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1 and 2* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1,2* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of 35 U.S.C. 112(b):
(b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 1 and 2 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention. Applicant requires that the “said passenger seat configured to be located forward of and proximate to the aircraft enclosure unit and having an exterior aft surface that is substantially not flat”. This language appears to indicate that the seat includes an exterior aft surface that is substantially not flat. Examiner assumes that the enclosure, and not the seat, includes the substantially not flat surface.

Claim Rejections - 35 USC § 103

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under pre-AIA 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

1. Claim 1 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Betts et al. (U.S. Patent 3,738,497) in view of Bar-Levav et al. (U.S. Patent 6,237,872) and in further view of Breuer et al. (U.S. Patent 8,109,469).

2. In regards to claim 1, Betts et al (henceforth referred to as Betts) disclose a method of providing additional passenger seating in the cabin of said aircraft;

Betts fails to explicitly teach retrofitting an aircraft to provide the seats. However, Bar-Levav et al (henceforth referred to as Bar-Levav) teaches redesigning or retrofitting an existing aircraft to accommodate a new seating arrangement (new seat designs for 747 aircraft). It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to utilize the seat and cabin arrangement of Betts in existing aircraft (retrofitting) as taught by Bar-Levav, for cost efficiency;

the cabin including a passenger seat having an exterior aft surface that is substantially not flat. Betts teaches an aircraft cabin with a seat and also an exterior aft surface that is not flat (see figure 1), comprising the steps of:

installing an aircraft enclosure unit (Betts teaches an enclosure that is installed) comprising:

a forward wall (items 30 and 40);

said forward wall being part of an outer boundary defining a single enclosed space (see figure 1);

Betts fails to teach that the space includes a toilet. However, Breuer et al (henceforth referred to as Breuer) teaches an enclosure that functions as a lavatory with a toilet. It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to provide the enclosure of Betts in various known capacities including a lavatory as taught by prior art Breuer et al (henceforth referred to as Breuer), since lavatories on aircraft are commonly provided in compact enclosures;

said forward wall configured to receive a portion of the exterior aft surface of the passenger seat. The wall receives a portion of the seat back when reclined;

wherein said forward wall is adapted to provide more space forward of the enclosure unit such that the passenger seat can be positioned further aft in the cabin than if the cabin included another enclosure unit having a substantially flat front wall located in substantially the same position in the cabin as the forward wall. The recess in figure 5 of Betts allows the seat to be positioned further back in the aircraft cabin while still being able to recline the seat back; and

wherein said enclosed space is taller than the passenger seat (see figures of Betts); and

positioning said aircraft passenger seat further aft in said aircraft cabin than an initial position of said aircraft passenger seat prior to retrofitting said aircraft.

Betts as modified by Bar-Levav teaches implementing the arrangement of Betts in an existing aircraft which includes movement of the seats (creating more space by seat position is the purpose and motivation of Betts).

3. Claim 2 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Betts et al. (U.S. Patent 3,738,497) in view Breuer et al. (U.S. Patent 8,109,469).

4. In regards to claim 2, Betts discloses a method of providing an aircraft with more passenger seats in the aircraft's cabin (note that Betts objective/purpose is to increase space and number of potential seats), the method comprising the steps of:

installing a combination of an enclosure unit and a passenger seat in the aircraft. Betts teaches installing a seat and an enclosure as depicted in figure 1, the combination comprising:

a passenger seat located forward of and proximate to the enclosure unit and having an exterior aft surface that is substantially not flat. Betts teaches a seat that is located forward of an enclosure with an exterior surface that is not flat (see items 30 and 40 of figure 1);

an enclosure unit located aft of the passenger seat. Betts teaches an enclosed area located aft of a seat as depicted;

the enclosure unit having a forward wall. Items 30 and 40;

said forward wall being part of an outer boundary defining a single enclosed space (see figure 1);

Betts fails to teach that the space includes a toilet. However, Breuer teaches an enclosure that functions as a lavatory with a toilet. It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to provide the enclosure of Betts in various known capacities including a lavatory as taught by prior art Breuer et al (henceforth referred to as Breuer), since lavatories on aircraft are commonly provided in compact enclosures;

said forward wall configured to receive a portion of the exterior aft surface of the passenger seat. The wall receives a portion of the seat back when reclined;;

wherein said forward wall is adapted to provide more space forward of the enclosure unit such that the passenger seat can be positioned further aft in the

aircraft cabin than if the cabin included another enclosure unit having a front wall that is substantially flat and is located in substantially the same position in the aircraft cabin as the forward wall. Betts inherently describes this, since the arrangement and construction of the seat and forward wall of the enclosure is to make more space; and

wherein said enclosed space is taller than the passenger seat (see figure 1); and whereby said aircraft passenger seat can be installed further aft in said aircraft cabin than would be possible if the substantially flat front wall of the other enclosure unit was located in substantially the same position in the aircraft cabin as the forward wall. This situation is inherently intended in the Betts design, since Betts teaches that the design of the front wall of the space allows the closest seat to be set back closer to the space.

Summary/Conclusion

5. Claims 1 and 2 are rejected.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Benjamin P. Lee whose telephone number is 571-272-8968. The examiner can normally be reached between the hours of 8:30am and 5:00pm on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Troy Chambers can be reached on 571-272-6874. The fax phone number

for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/BENJAMIN P LEE/

Primary Examiner, Art Unit 3641

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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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	K	US-			
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	M	US-			

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	Examiner	Art Unit
	BENJAMIN P LEE	3641

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Symbol	Date	Examiner
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CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
244	1r,118.5,118.6,129.1,117r	6/5/2015	LEE
114	116	6/5/2015	LEE

SEARCH NOTES		
Search Notes	Date	Examiner
Text search	6/5/2015	LEE
Inventor search	6/5/2015	LEE

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	4464	((244/1r,118.5,118.6,129.1,117r) or (114/116)).CCLS.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2015/06/05 13:50
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L4	12	L2 and modifying same (space or room)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2015/06/05 13:51
L5	0	("2013/0320139").URPN.	USPAT	OR	OFF	2015/06/05 13:52
L6	1	l2 and retro-fit	USPAT	OR	OFF	2015/06/05 13:53
L7	1	l2 and retro-fitting	USPAT	OR	OFF	2015/06/05 13:53
L8	23	l2 and redesign	USPAT	OR	OFF	2015/06/05 13:53
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S2	1867	S1 and (wall or seat or contour or lavatory or bathroom or head)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/01/10 14:19
S14	2	("20090050738" | "7222820").PN.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/01/10 15:12
S15	12	("1731531" | "1905389" | "20020145080" | "2817091" | "4884767" | "5309146" | "5474260").PN. OR ("7222820").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/10 15:13
S16	51	("2743683" | "2882835" | "4100857" | "4645145" | "D155335" | "D155363").PN. OR ("4884767").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/10 15:14
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S18	19	S1 and (bulkhead or wall or partition) with (angled or contour or recessed) with (seat or back)	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/10 15:24
S19	12	S1 and (lavatory or bathroom or head) with (contour$3 or angled or recessed) with (wall or bulkhead or partition)	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/10 15:29
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S21	29	S20 and (wall or bulkhead or divider) with (inclin$3)	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/10 21:06
S22	44	S20 and (lavatory or bathroom or head or wash) with (inclin$3 or recessed)	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/10 21:09
S23	114	S20 and (wall or bulkhead or divider) with (recessed or recess or indentation or coutour)	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/10 21:15
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S34	501	wall with conform with seat	US-PGPUB; USPAT; USOCR	OR	OFF	2013/06/19 11:14
S35	19	wall with conform with seat and aircraft	US-PGPUB; USPAT; USOCR	OR	OFF	2013/06/19 11:14
S36	153	wall with recess with seat and aircraft	US-PGPUB; USPAT; USOCR	OR	OFF	2013/06/19 11:15
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S44	41	recess with wall with passenger with seat	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/25 15:46

S46	50	hawkins.inv. adj aaron	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2014/03/06 11:37
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S49	376	S48 and wall with recess	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2014/03/06 11:46
S50	114	S48 and wall with recess and seat	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2014/03/06 11:46
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S57	52	S55 and recess$3 with (wall or bulkhead) with (seat or chair)	US-PGPUB; USPAT; EPO;	OR	OFF	2014/03/06 15:19

			JPO			
S58	0	seat with recline with recess with wall	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2014/03/06 16:19
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S65	522	114/116	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2014/03/07 15:32
S66	2236	b64d11/00.cpc. or b64d2011/0046.cpc. or b64d11/0023.cpc. or b64d11/06.cpc. or b64d2011/0617.cpc. or b64d2011/0665.cpc. or b63b11/00.cpc. or b63b11/02.cpc.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2014/03/07 15:35
S67	2469	b64d11/00.cpc. or b64d2011/0046.cpc. or b64d11/0023.cpc. or b64d11/06.cpc. or b64d2011/0617.cpc. or b64d2011/0665.cpc. or b63b11/00.cpc. or b63b11/02.cpc. or b63b29/00.cpc. or b63b29/02.cpc.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2014/03/07 15:36
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S69	79	a47k3/00.cpc. or a47k11/00.cpc.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2014/03/07 15:42
S70	1	("8590838").PN.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2014/09/25 12:43
S72	1	("3738497").PN.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2014/12/27 21:04
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S76	17	("20070170310" | "20110210205" | "20130206906" | "20140014774" | "20140027572" | "2650368" | "3738497" | "5150863" | "5333416" | "5340059" | "5482230" | "5529265" | "6615421" | "7934679" | "8096502" | "8177163").PN.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2015/02/10 12:53
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S78	2	(("3738497") or ("8109469")).PN.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2015/03/06 12:18
S79	3	(("3738497") or ("8109469") or ("5577358")).PN.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2015/03/06 12:25

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	14709409
Filing Date	2015-05-11
First Named Inventor	Donald F. Cook
Art Unit	3641
Examiner Name	LEE, BENJAMIN P
Attorney Docket Number	BEALCI-94515

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	D 705909	S	2014-05-27	Koyama et al.	
	2	2650368	A	1953-09-01	EVANS RANDOLPH	
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	1	20060192050	A1	2006-08-31	Cheung et al.	

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	First Named Inventor	Donald F. Cook
	Art Unit	3641
	Examiner Name	LEE, BENJAMIN P
	Attorney Docket Number	BEALCI-94515

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] ¡	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	1281614	EP	A1	2005-03-30	Farnsworth		☐
	2	WO2003026495	WO	A2	2003-04-03	Marvin Keogh		☐
	3	2005014395	WO	A1	2005-02-17	THOMPSON		☐
	4	2005080196	WO	A1	2005-09-01	BOCK		☐
	5	2007006938	WO	A1	2007-01-18	BOCK		☐

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	1	International Search Report, September 15, 2011, 8 pages	☐
	2	MCDONNELL DOUGLAS, DC-10 Customer Configuration, October 1978, 177 pages	☐
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	Examiner Name	LEE, BENJAMIN P
	Attorney Docket Number	BEALCI-94515

	4	C&D Zodiac, Inc.'s drawings with a leading page entitled "MD90," 27 pages	☐
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	Examiner Name	LEE, BENJAMIN P
	Attorney Docket Number	BEALCI-94515

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/JAMES W. PAUL/	Date (YYYY-MM-DD)	2015-06-10
Name/Print	James W. Paul	Registration Number	29,967

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(19) Europäisches Patentamt
European Patent Office
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(11) EP 1 281 614 A1

(12) EUROPEAN PATENT APPLICATION

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05.02.2003 Bulletin 2003/06

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(21) Application number: **02077954.2**

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(30) Priority: **02.08.2001 US 921212**

(71) Applicant: **THE BOEING COMPANY**
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Marysville, Washington 98270 (US)

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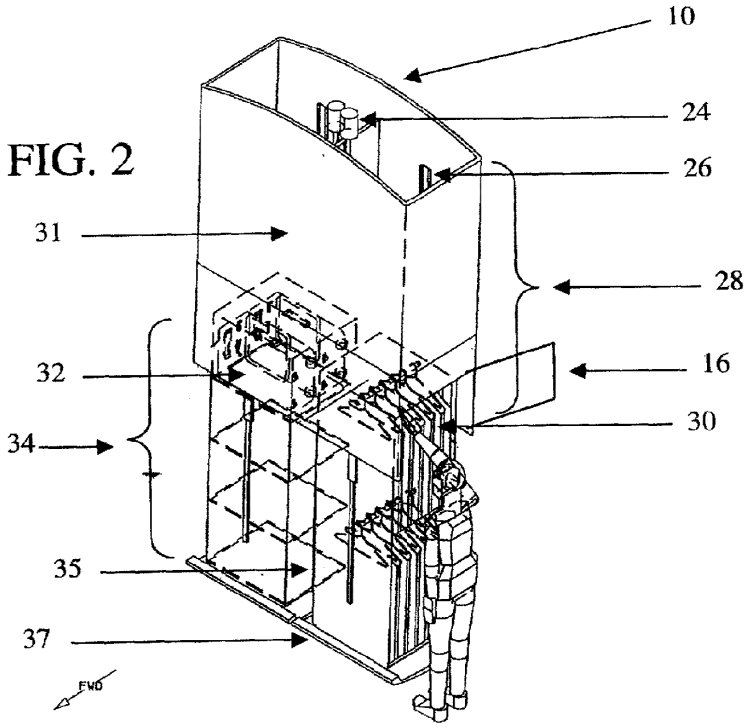
2517 GK Den Haag (NL)

(54) Retractable closet

(57) A moveable closet (10) for storing articles in an aircraft includes a fixed outer housing (31) and a moveable inner housing (34) capable of being displaced from a loading position for articles to be placed within a storage compartment to a stowed position, which allows for additional cabin space during taxiing and flight. The storage compartment defined by the inner housing (34) may be further sub-divided by shelves (32) for storing articles of various sizes and may also be fitted with bars (30) in order to accommodate hanging items.

FIG. 2



EP 1 281 614 A1

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to closets, such as the closets onboard an aircraft or the like and, more particularly, a moveable closet for increasing available cabin space.

BACKGROUND OF THE INVENTION

[0002] Airlines are continually looking for new ways to better utilize the cabin space inside their aircraft, balancing the desire to carry as many passengers as possible in as comfortable a manner as possible with the need for adequate storage space. By minimizing the amount of space that is required to store carry-on luggage and other items, the cabin space available for passengers is maximized. As such, extra rows of seats may be added and/or additional seat recline or additional leg room may be provided.

[0003] Each passenger is allowed carry-on luggage, which may be stowed under the seats or in the overhead compartments. Some luggage is too bulky to fit in these areas or, as is the case with an overcoat or jacket, may not be the type of article that a passenger would feel comfortable stuffing into an overhead bin or under the seat in front of them. One solution to this problem is the addition of a relatively large closet typically located in the vicinity of the galley and/or lavatories in the aircraft cabin. These closets are generally large enough to stow coats, hanging bags, larger carry-on luggage. Unfortunately, while these closets do solve problems with storage, they also occupy space on the aircraft that may otherwise be taken-by additional seats or allowances for leg room. This problem is further complicated by the necessity of an aisle or walkway that allows flight attendants to access the closet.

[0004] A storage system that offers one solution to this conflict between the need for storage and the desire for more seating space is found on some MD-11™ and DC-10™ aircraft. While the storage system onboard these models of aircraft solved some of the storage difficulties that airlines were having, the storage system did not completely resolve all of these problems, and in fact raised some new issues. The storage system consisted primarily of a bar, which was lowered prior to and following a flight to allow a flight attendant to remove and add hanging items. Once the bar was loaded, it could be raised into a space located at least partially above the cabin during flight. The storage system also included doors that could be closed to prevent access to the hanging items once the bar was raised. The storage system of the MD-11™ and DC-10™ aircraft was located proximate a cross aisle that extended between two lengthwise extending aisles. The bar also extended laterally or crosswise such that, hanging items could, as a practical matter, only be hung on or removed from the bar while standing in the cross aisle.

[0005] While the MD-11™ and DC-10™ storage system did allow for the storage of items like clothing, the storage system still took up additional room on the aircraft. In this regard, the raising bar was capable of moving a number of items up and out of the way during flight, but the storage system still had a relatively large footprint on the aircraft and required a cross aisle, which was needed to load the bar. Further, there could be problems with the storage of the clothing itself. When the clothes were pulled up into the storage space they were pushed tightly together, which led to the wadding and wrinkling of the items. In some instances, where the bar was heavily loaded, it was necessary for a flight attendant to push items into the storage space in order to permit the bar to be fully raised. While this closet did begin to address the difficulties raised by the need for proper storage and the importance of cabin space, it did not fully solve the problem. For these reasons it could be desirable to provide proper storage of items while maximizing the cabin space available for seating during transit.

SUMMARY OF THE INVENTION

[0006] An interior assembly, such as for an aircraft, is therefore provided that includes a moveable closet which allows for storage of articles while maximizing cabin space. As a result of the design of the moveable closet, the closet protects items placed into its storage compartment so as to avoid wadding of the items as the closet is moved to a stowed position during flight. In addition, the moveable closet can be loaded from the lengthwise extending aisle of an aircraft and, as such, need not be placed adjacent a cross aisle.

[0007] According to the present invention, a moveable closet is therefore provided that includes an outer housing which is typically fixed in position and an inner housing. The inner housing defines an opening for accessing a storage compartment, and is capable of being moved between a loading position and a stowed position. When the inner housing is in the loading position, such as prior to and following the flight, articles are inserted through the opening and into the storage compartment. Advantageously, the opening defined by the inner housing faces a lengthwise extending aisle such that articles may be inserted into the storage compartment while standing in the lengthwise extending aisle.

[0008] The outer housing generally includes at least one door for closing an uppermost portion of the opening, and each door is capable of being opened to access the top portion of the storage compartment when the inner housing is in the loading position. The inner housing may also include shelves for dividing the storage compartment and/or bars for hanging articles.

[0009] The moveable closet preferably also includes an actuation mechanism for moving the inner housing between the loading and stowed positions. This actua-

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tion mechanism may include a motor capable of moving the inner housing between the loading and stowed positions. The moveable closet may also include at least one track for guiding the inner housing between the loading and stowed positions. As such, in the loading position, the inner housing is genreally readily accessible to facilitate loading and unloading of articles, such as prior to and following flight. In order to provide additional cabin space during flight, however, the inner housing may be stowed. When the inner housing is in the stowed position, the inner housing is at least partialy disposed within the outer housing.

[0010] In one preferred embodiment, the moveable closet is a portion of an interior assembly on an aircraft. In addition to the moveable closet, the interior assembly will include a structure fixed in position within the aircraft cabin. The structure includes at least one wall defining a region of the aircraft, and be, for example, a lavatory, galley or fixed closet. The moveable closet will be disposed immediately adjacent to the fixed structure, such that the structure blocks access to a portion of the moveable closet.

[0011] The interior assembly of one preferred embodiment will include a moveable closet that is capable of being vertically displaced between the loading and stowed positions, such as by being adapted to be raised upwardly from the loading to the stowed position. This interior assembly may also include a seat proximate to the moveable closet. This seat is preferrably capable of being reclined partially under the moveable closet once the moveable closet was in the stowed position.

[0012] Accordingly, the moveable closet of the present invention allows a flight attendant to load items into the moveable closet while the aircraft is on the ground, and then move the closet into its stowed position, creating additional cabin space on the aircraft. Additionally, cabin space is maximized by accessing the closet from the lengthwise extending aisle rather than requiring a space-consuming cross aisle. The additional cabin-space on the aircraft provided by the moveable closet, may be used for additional seats and/or seat recline or leg room. However, the design of the moveable closet protects articles placed therein.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] Having thus described the invention in general terms, reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

FIG. **1** is a schematic plan view of the cabin of an aircraft according to an embodiment of the present invention which includes a moveable closet disposed immediately adjacent to a fixed structure, such as a galley or a lavatory;

FIG. **1a** is a perspective view of the moveable closet of FIG. 1 in the stowed position in which the moveable closet is only partially within the interior of the cabin with the remainder of the moveable closet being in the space above the aircraft ceiling;

FIG. **2** is a perspective view of a moveable closet in the loading position according to an embodiment of the present invention; and

FIG. **3** is a schematic side view of a moveable closet disposed between a fixed structure and an airline seat according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0014] Various embodiments of the invention are set forth below. While the invention is described with reference to specific embodiments, such as its use in conjunction with aircraft, it will be understood that the invention is not intended to be so limited. To the contrary, the invention includes numerous alternatives, modifications and equivalents as will become apparent from consideration of the present specification including the drawings. Specifically, it should be apparent that this closet could be used in numerous situations where floor space is critical such as a cruise ship, train or movie theater.

[0015] Referring now to FIG. **1**, the cabin **14** of an aircraft **18** is illustrated. The cabin **14** includes several fixed structures **22** such as galleys, lavatories, fixed closets or the like. The cabin **14** also includes at least one lengthwise extending aisle **20** running the length of the cabin and, in the illustrated embodiment, generally includes a pair of lengthwise extending aisles on opposite sides of the fixed structures **22**. As will be apparent, the cabin also includes a plurality of passenger seats, which seats have been omitted from the illustrations for purposes of clarity.

[0016] According to the present invention, the cabin **14** also includes a moveable closet **10**. The moveable closet **10** may be disposed immediately adjacent a fixed structure **22** in the aircraft cabin **14**, and in one instance the moveable closet **10** is placed between two immediately adjacent fixed structures **22**. For example, the moveable closet **10** may be adjacent to a lavatory or galley on an aircraft or a state room on a cruise ship or train. As described below, the moveable closet **10** is particularly well adapted to being adjacent a fixed structure **22** since the moveable closet **10** is accessible from one lengthwise extending aisle **20** such that access is not required from either the front or rear of the closet.

[0017] As shown in more detail in the perspective view in FIG. **1a**, the moveable closet **10** is capable of being at least partially displaced out of the cabin **14** and into the crown **12** of the aircraft, i.e., the space above the cabin ceiling, while the aircraft is in flight to provide additional cabin space. As further illustrated in FIG. **2** and **3**, the moveable closet **10** consists of an inner housing **34** and an outer housing **28.** The inner housing **34** is capable of being moved from a loading position as depicted in FIG. **2** to the stowed position of FIG **1a.** The

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moveable closet **10** will generally be in the loading position while passengers are embarking and disembarking for the purpose of receiving articles for storage during flight, or for permitting articles to be removed as passengers exit the plane. In contrast, the moveable closet **10** is generally in the stowed position when the plane is taxiing on the runway and in flight, in order to provide additional cabin space.

[0018] The inner housing **34** generally has a floor panel **37** that defines the bottom of the closet, and side walls **35** that extend upwardly from the floor panel to define the storage compartment. The storage compartment is preferably open on at least one and, more preferably, both ends to permit insertion and removal of articles by a person standing in a lengthwise extending aisle **20**. The inner housing **34** may be used as one large storage compartment, ideal for stowing large pieces of luggage, compressed garbage blocks or the like. As can be seen from the illustrated embodiment, the inner housing **34** may also contain shelves **32** for sub-dividing the storage compartment. These shelves **32** can be used to further divide the inner housing **34** and allow for the storage of a number of smaller articles. Additionally or alternatively, the inner housing **34** may contain bars **30** for hanging articles, such as garment bags, coats or any other type of hanging luggage. Hanging items and pieces of luggage would generally be placed in the storage compartment defined by the inner housing **34** as passengers brought these items onto the plane. The inner housing would then preferably be displaced into the outer housing **28,** to allow additional cabin space during the flight. When the plane reaches its destination, the inner housing would be lowered, and passengers could retrieve their items as they disembark.

[0019] Once the inner housing **34** has been loaded, it is moved to the stowed position, preferably fitting snuggly into the outer housing **28.** As shown in FIG. **1a,** the outer housing **28** is at least partially disposed within the crown of the aircraft so as to be removed from the cabin area. While the outer housing 28 may be completely disposed within the crown, the lowermost portion of the outer housing **28** of the illustrated embodiment is positioned within the cabin, albeit proximate the ceiling. The portion, if any, of the outer housing **28** that is positioned within the cabin is typically determined by the space available in the crown of the aircraft and the length of the inner housing **34.** In this regard, in instances in which the length of the inner housing **34** is greater than the space available for the outer housing in the crown, lower portions of the outer housing **28** will extend into the cabin **14** in order to permit the inner housing **28** to be completely withdrawn into the outer housing **28.**

[0020] The outer housing **28** of the moveable closet **10** may be secured in position, such as within the crown of an aircraft, in various manners, only a few of which will be described hereinbelow for purposes of example. As illustrated in FIG. **1a**, the outer housing **28** of the moveable closet **10** may be attached to and therefore supported by lengthwise extending frame members **15**, as well as crosswise frame members **13** extending between the lengthwise extending frame members **15**. Alternatively, a support structure could extend directly down from upper portions of the crown **12** of the aircraft for securing the moveable closet therein. Still further, the moveable closet **10** may be directly attached to upper portions of the crown so as to extend downwardly therefrom.

[0021] The outer housing **28,** of the illustrated embodiment has side walls **31** on four sides to truly define a volume that is preferably sized to snuggly receive the inner housing **34.** As shown, these side walls **31** serve to cover the openings to the storage compartment of the inner housing **34,** thereby protecting the articles stored within the storage compartment within crumpling or wadding the articles as in some conventional designs. In embodiments in which the side walls **31** of the outer housing **28** extend partially into the cabin **14** of the aircraft, the outer housing **28** contains at least one door **16** for accessing the top part of the inner housing **34,** when the inner housing **34** is in the loading position, since the top part of the inner housing **34** will generally remain within the outer housing **28**. When the inner housing **34** is in the stowed position, the floor panel **37** of the inner housing **34** serves as the bottom panel of the outer housing **28,** thereby closing the closet from any access from the cabin **14**. The outer housing **28** may also include a top panel **11** as illustrated in FIG. **1a.**

[0022] The moveable closet **10** is also preferably fitted with at least one and, more typically a plurality of tracks **26** for guiding the inner housing **34** between the loading and stowed positions. For example, as illustrated in FIG. **2**, a plurality of tracks extend vertically along the interior of the side walls **31** of the outer housing **28** for engaging corresponding tracks extending vertically along the side walls of the inner housing **34.** While tracks are useful for guiding movement of the inner housing **34** with respect to the outer housing **28,** it should be understood that a number of various alternative mechanisms for guiding the inner housing **34** may be utilized. Alternatively, the inner housing **34** and the outer housing **28** may be sized tightly enough and may be constructed of material(s) having a sufficiently low coefficient of friction to permit the snugness of the fit of the inner housing **34** within the outer housing **28** to guide the movement therebetween.

[0023] Although the moveable closet **10** may be manually moved, the moveable closet **10** is typically moved through the use of an actuation mechanism. Various actuation mechanisms may be utilized. For example, the actuation mechanism may include a motor **24,** such as a stepper motor, capable of moving the inner housing **34** between the loading and stowed positions. Although not shown in the figures, there would generally be a control mechanism, such as a switch or button, that the flight attendant could actuate to move the inner housing **34** between the loading and stowed positions.

[0024] As shown in FIG. **3**, since the moveable closet

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10 does not require a cross aisle for accessing the articles contained within it, the moveable closet **10** can be placed immediately adjacent to a fixed structure **22.** This fixed structure **22** could be any of a number of necessary structures, but on an aircraft would most likely be a lavatory, galley or an additional fixed closet.

[0025] Another advantage of the moveable closet **10,** as illustrated in FIG. **3,** is the additional space it allows for passenger seats **40.** Since the moveable closet **10** can be displaced after it has been loaded, allowing for additional floor space within the cabin, passenger seats **40** can be placed much closer to the moveable closet **10** and still allow the passenger to move the seat **40** to the reclined position **38** once the closet has been displaced, such as while in transit. While the moveable closet **10** is in the loading position, which generally occurs while passengers are embarking and disembarking, the passenger seat **40** would need to be in the upright position **36.** When the inner housing **34** of the moveable closet **10** is in the stowed position inside the outer housing **28,** it is possible for a passenger to move the seat to the reclined position **38.** As shown in FIG. **3,** the inner housing **34** is preferably capable of raising high enough into the outer housing **28** to allow for adequate head clearance for the passenger and prevent the passenger from feeling claustrophobic once reclined beneath the moveable closet **10.**

[0026] Many modifications and other embodiments of the invention will come to mind to one skilled in the art to which this invention pertains having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the invention is not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

Claims

1. A moveable closet comprising:

an outer housing;
an inner housing defining a storage compartment and further defining an opening for accessing the storage compartment, said inner housing capable of being moved between a loading position in which articles are inserted through the opening into the storage compartment and a stowed position in which said inner housing is at least partially disposed within said outer housing; and
an actuation mechanism for moving said inner housing between the loading and stowed positions.

2. A moveable closet for an aircraft having at least one lengthwise extending aisle, the moveable closet comprising:

an outer housing; and
an inner housing defining a storage compartment and further defining an opening facing the lengthwise extending aisle for accessing the storage compartment, said inner housing capable of being moved between a loading position in which articles are inserted from the lengthwise extending aisle through the opening into the storage compartment and a stowed position in which said inner housing is at least partially disposed within said outer housing.

3. A moveable closet according to claim 1 or 2 wherein said outer housing is fixed in position.

4. A moveable closet according to the claims 1,2 or 3 wherein said inner housing comprises shelves for dividing the storage compartment.

5. A moveable closet according to any of the claims 1-4 wherein said inner housing comprises bars for hanging articles.

6. A moveable closet according to any of the claims 1-5 wherein said outer housing contains at least one door for closing a portion of the opening, each door capable of being opened to access the top portion of the storage compartment when said inner housing is in loading position.

7. A moveable closet according to any of claims 1-6 further comprising at least one track for guiding said inner housing between loading and stowed positions.

8. A moveable closet according to any of the claims 2-7 wherein said movable closet contains an actuation mechanism for moving said inner housing between loading and stowed positions.

9. A moveable closet according to any of the claims 2-8 further comprising an actuation mechanism for moving said inner housing between loading and stowed positions.

10. A moveable closet according to any of the claims 1-9 wherein said actuation mechanism comprises a motor capable of moving said inner housing between loading and stowed positions.

11. An interior assembly for an aircraft comprising:

a structure fixed in position within an aircraft cabin, said structure comprising at least one

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wall defining a region of the aircraft cabin; and a moveable closet disposed immediately adjacent said structure such that said structure blocks access to a portion of said moveable closet, said moveable closet defining a storage compartment and further defining an opening for accessing the storage compartment, said moveable closet capable of being moved between a loading position in which articles are inserted through the opening into the storage compartment and a stowed position in which said moveable closet is displaced relative to said structure.

12. An interior assembly according to claim 11 wherein said structure is at least one of a galley, a lavatory and a fixed closet.

13. An interior assembly according to claim 12 comprising a moveable closet according to any of the claims 1-10.

14. An interior assembly according to claim 13 wherein said moveable closet is raised upwardly from the loading to the stowed position.

15. An interior assembly according to claim 13 or 14 further comprising a seat proximate to said moveable closet, said seat capable of being reclined to a position partially underneath said moveable closet once said moveable closet is raised to the stowed position.

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FIG. 1a

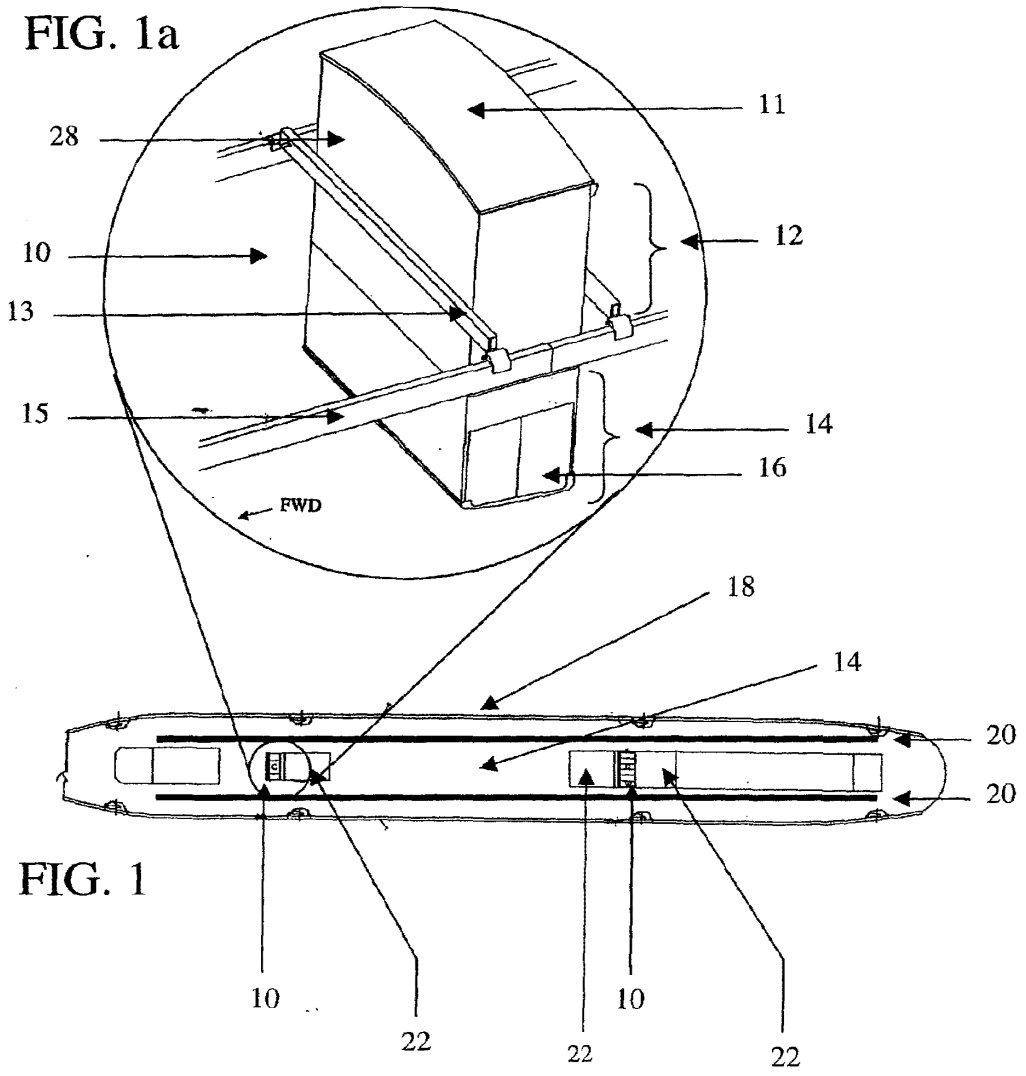

FIG. 1

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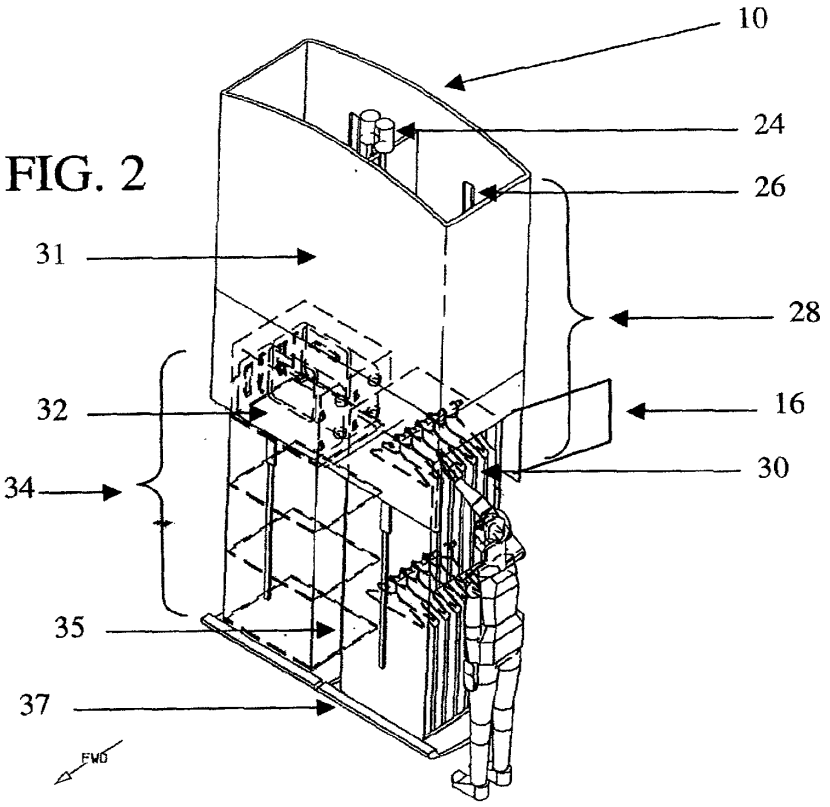
FIG. 2



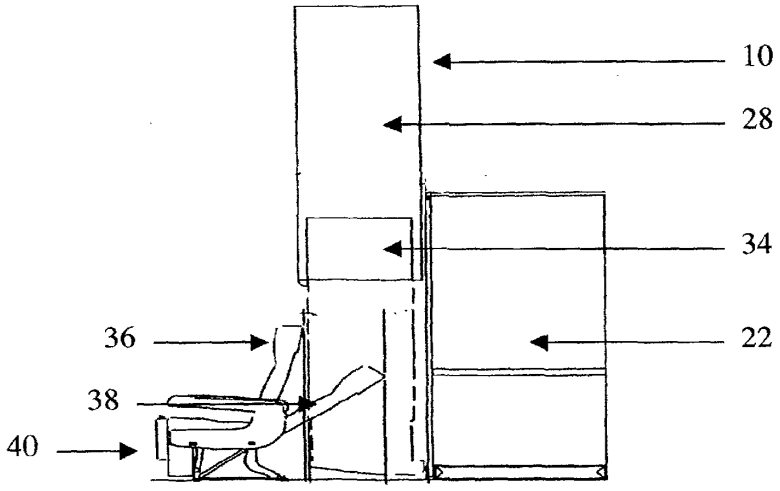


FIG. 3

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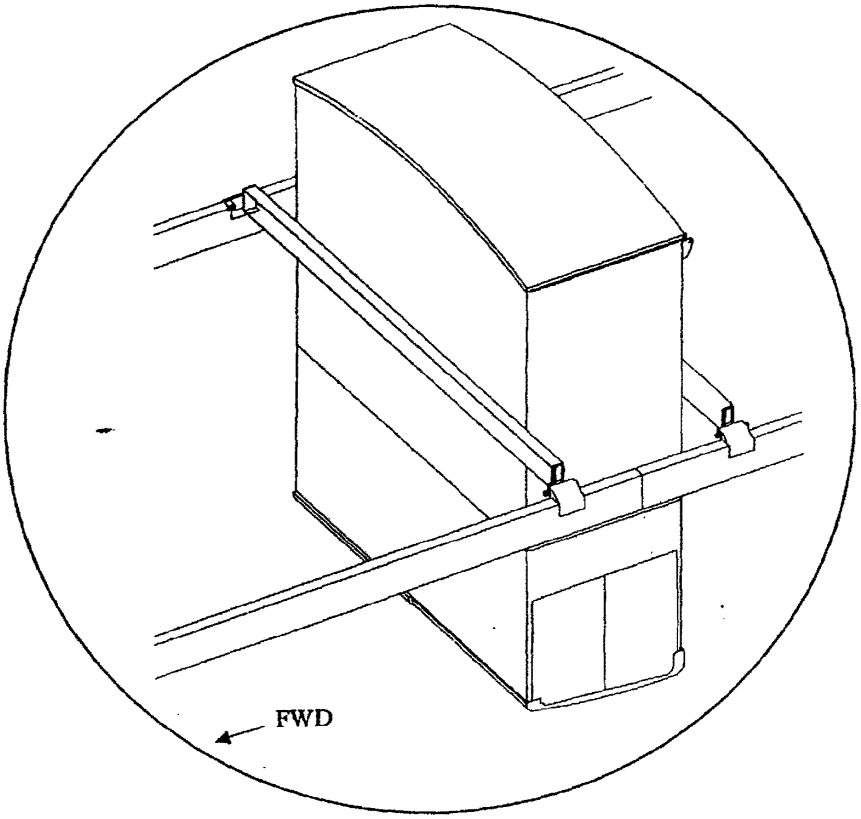

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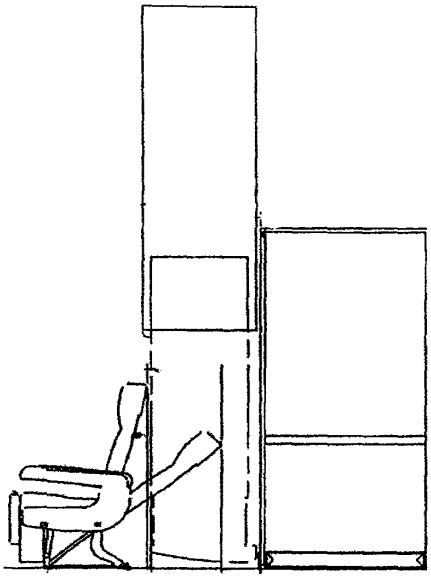

Left Side View

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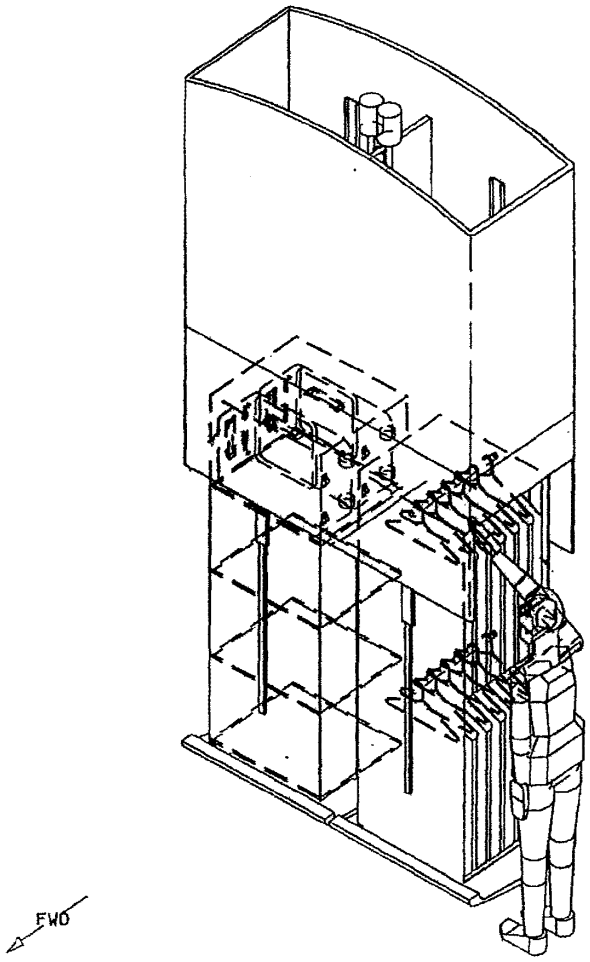

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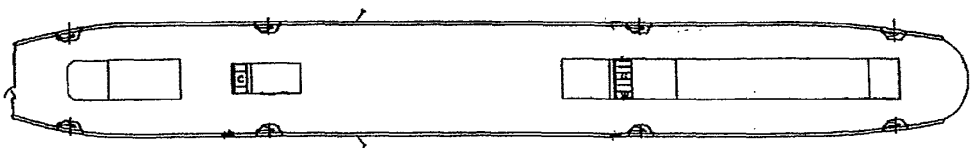

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European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 07 7954

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	16 October 2002	Salentiny, G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 02 07 7954

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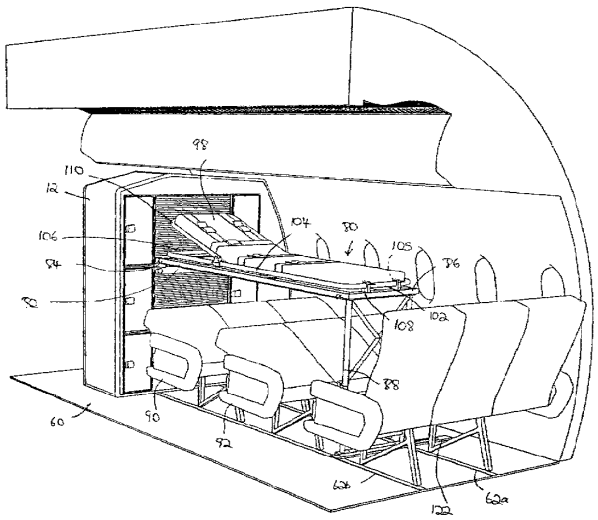
(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: AIRCRAFT MEDICAL UNIT



(57) Abstract: An aircraft medical unit comprises a front panel configured to fit in an aircraft cabin so as to form a divider inside the cabin and a spaced rear panel of substantially the same shape as that of the front panel. A side panel is constructed between the front and rear panels, and the front, rear and side panels defines a chamber. An access opening is formed in the front panel. A stretcher frame is provided and is movable between a folded and stowed position in the chamber and an unfolded and extended position to the outside of the chamber. The aircraft medical unit further includes at least one item of medical equipment used in the treatment of a patient.

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AIRCRAFT MEDICAL UNIT

Field and Background of the Invention

This invention relates to medical units for use in aircraft. More particularly, the invention is for modular units which can be attached within the cabin of an aircraft, and especially in large commercial airliners configured for passenger transportation.

In this specification, the term "medical units" should be broadly interpreted to mean medical equipment and machinery typically used in the treatment of patients. All of this equipment and machinery is, in accordance with the invention, housed within a modular unit which can be placed in the cabin of an aircraft, or other convenient location in an aircraft, so that the contents are generally hidden from view, and the modular unit occupies as little space as possible, until needed. The equipment and machinery which may comprise the medical unit includes, but is not limited to, stretchers which can be folded out and retracted in relation to the medical unit, power systems and power adaptation units, incubators, refrigerators, appropriate lighting mechanisms, communication systems for use by personnel operating the medical unit to communicate with either other crew members within the aircraft or medical and health professionals in remote ground locations, various body-function monitoring devices, and the like. These are representative examples only, and the scope of the invention is such that the extent and use of such equipment can be varied according to the situation. Other types of equipment which may be incorporated into the medical unit of the invention will be discussed during the course of this specification.

Air transportation is, of course, a major industry for the conveyance, on a large scale, of substantial numbers of people between many locations. Depending upon the size of the jet liner, commercial air liners during flight may be transporting anywhere from about 50 to nearly 500 passengers. While it is not unusual for some aircraft, particularly the larger aircraft with substantial numbers of passengers, to carry certain medical equipment to treat onboard medical emergencies, such equipment found on board is typically very limited in scope, and only capable of treating some of the most basic medical problems.

Furthermore, the issue of space in an aircraft cabin is critical in commercial airliners, and compacting galleys, storage areas and other components/compartments to an optimal degree allows more passengers to be accommodated within the aircraft.

The typical layout in an aircraft cabin consists of both rows and lines of seats extending

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down the length of the cabin. At certain intervals, walls or dividers are formed between rows of seats, and these have the effect, amongst other things, of separating the aircraft cabin into preselected and desired areas. The dividers, may, therefore, divide a large cabin into different classes of passenger travel, such as first class, business class and economy class. They also typically define one or more galley areas where flight attendants are able to prepare food and drinks.

As an example of the limited nature of any relevant prior art, U.S. Patent No. 4,115,884 (Keogh) discloses a carrier for medical stretchers on aircraft. The installation consists of two frames with vertical and diagonal members supporting a horizontal rack, which has clamps with which to attach the stretcher to a top surface.

One of the purposes of the present invention is therefore to provide an aircraft medical unit to include a plurality of modern devices used in health care treatment, especially configured for optimum use inside the cabin of an aircraft.

Summary of the Invention

In one aspect, the present invention utilizes an adaptation of a wall or divider within the cabin of an aircraft. The divider of the present invention may comprise a pair of spaced walls defining a chamber or space which, as will be discussed in greater detail below, is designed to compactly house various forms of medical equipment. Particularly, this medical unit of the invention comprises a module, which, in the normal course, partitions off areas within the cabin. However, the spaced-apart walls form a closet or space between them, in which medical equipment may be stored and easily accessed when needed. An important component of the medical unit, in modular form as described above, would be the presence of a stretcher, located within the space between the walls, which can be unfolded out of the space, and formed into a substantially horizontally positioned bed for use by a person requiring medical treatment.

The present invention thus takes advantage of typical cabin layout which utilizes partitions or dividers between sections of the aircraft cabin. Presently, these dividers may consist of nothing more than panels, which of course divide sections of the aircraft so that one section cannot be seen by passengers in an adjacent section. In most instances, the dividers may be no more than 4-8 inches thick, serving as they do, as physical dividers and nothing more. The invention, in one aspect, slightly expands these dividers so as to form a double-paneled unit, defining a space, and

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placing within the space a potentially vast array of sophisticated medical equipment, in addition to a stow-away stretcher. Compacting all this equipment into such an area, termed herein a medical unit, not only has the advantage of optimal space utilization, but also serves to keep medical equipment generally out of sight of passengers, but at the same time providing very easy access to such stored equipment should it be needed.

The medical unit of the invention would, in a preferred form, comprise various doors to chambers which may house various forms of medical equipment and supplies, ranging from simple first aid and/or trauma kit supplies to sophisticated medical equipment, including respirators, suction apparatus, oxygen equipment, defibrillators and the like. Thus, the space in the medical unit of the invention may be further divided into cupboards, chambers, accessible recesses etc., all of which are configured to best accommodate the different forms of equipment being stored.

The medical unit may further comprise a monitor, global positioning system (GPS), and cameras which may allow personnel and passengers on board to communicate, when necessary, with a doctor in a land-based hospital, contacted to provide guidance and information for on-board medical treatment. Preferably, the medical unit will be constructed as a modular unit, manufactured in an appropriate facility, and designed to be rolled in and installed in a specific aircraft. Therefore, the unit would typically have a vertical edge, a horizontal edge for mounting on the floor, and a contoured edge which would be custom-shaped to fit within the body of a specific commercial airliner, such as a Boeing 747, Airbus 320, or the like.

In a preferred form, the modular medical unit would easily attach to existing structural fasteners already located in the aircraft, so that they may be easily installed and removed as desired. Further, larger aircraft may be designed to accommodate more than one modular medical unit. In yet another form, a plurality of modular medical units of the invention may be lined up and installed within an aircraft cabin or cargo bay for transportation to remote sites where emergency workers may require temporary hospital facilities.

A significant advantage on the present invention is its compactness. The medical unit of the invention facilitates storage of a significant number of medical devices and pieces of equipment within a very small area, some of which may be folded out for use when needed. The invention thus would meet the needs and requirements of commercial carriers, which would be able to install sophisticated medical equipment capable of treating a wide range of conditions, but, when not needed, would take up very little space, and further be invisible to passengers. In other

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words, the medical unit of the invention may not even be recognizable as such when in a closed or unused position, and would merely appear to the casual observer to be a wall or divider separating the cabin into conventional and recognizable segments.

According to one aspect of the invention, there is provided an aircraft medical unit comprising a front panel configured to fit in an aircraft cabin so as to form a divider inside the cabin; a rear panel of substantially the same shape as that of the front panel and spaced therefrom; a side panel between the front and rear panels, the front, rear and side panels defining a chamber; an access opening in the front panel; and a stretcher frame, movable between a folded and stowed position in the chamber and an unfolded and extended position to the outside of the chamber. Preferably, the front panel is configured so as to fit in the aircraft cabin between rows of seats, the front, rear and side panels following the contour of the shape of at least a portion of the aircraft cabin, the medical unit comprises at least one item of medical equipment used in the treatment of a patient.

The equipment may be selected from amongst the following: a monitor, a camera, a refrigerator, an incubator, a defibrillator, a respirator, an oxygen supply, and an autoclave.

Preferably, the access opening can be opened and closed by doors, which may comprise a pair of slidable shutters which run in tracks formed within the chamber of the medical unit. The aircraft medical unit may further comprise a plurality of cupboards, each cupboard accommodating selected medical equipment or machinery.

In one embodiment, the stretcher frame comprises a head end portion, a foot end portion and a foot end support leg, wherein the head end portion and foot end portions, and the foot end support leg are pivotally connected to each other so as to fold for stowage within the chamber, the head end portion and foot end portion unfolding in the extended position to form a substantially rectangular stretcher frame, and the foot end support leg being attached to the foot end portion and unfoldable with respect thereto, the head end portion being securely fastened to a clamp within the chamber when in the extended position, and the foot end support leg being unfolded to fasten to the aircraft cabin when in the extended position.

Preferably, the aircraft medical unit further comprises a mattress frame and an associated mattress connectable to the stretcher frame. Adjustable lighting for positioning over the stretcher may also be provided.

Preferably, the aircraft medical unit further comprises a power unit. Also, a power

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converter for converting aircraft power into a power source usable by the medical equipment may be provided.

The stretcher frame may be spring-mounted within the chamber to facilitate movement thereof between the folded and the stowed position on the one hand, and the unfolded and extended position on the other. Further, a clamping member for attaching an item of medical equipment to the stretcher frame at a desired location may be provided.

In one form, attachment members are provided for securing the medical unit to tracks constructed in the cabin of the aircraft.

Brief Description of the Drawings

Figure 1 is a perspective rear view of a medical unit in accordance with the invention;

Figure 2 is a front view of the medical unit of the invention as shown in Figure 1 of the drawings, generally in the closed or unused position;

Figure 3 is a rear perspective view of the medical unit of the invention, when installed within the cabin of an aircraft, shown generally with the stretcher in the unfolded position and the appropriate seat backs down;

Figure 4 is a front perspective view of the medical unit of the invention, showing the stretcher in the unfolded or in-use position, and the appropriate seats in the seat-back down position;

Figure 5 is a side view of the medical unit of the invention, with the stretcher in the unfolded position;

Figure 6 is a side cross-sectional view through the medical unit of the invention, showing the position of the stretcher in both the folded and the unfolded positions (only one of the positions being possible at a time);

Figure 7 is a front view of the medical unit of the invention, with the stretcher in the unfolded position;

Figure 8 is a detailed cross-sectional view of the stretcher in the medical unit, shown in the folded or non-use position; and

Figure 9 is front view of the medical unit of the invention illustrating some of the equipment and machinery associated therewith.

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Detailed Description of the Invention

Reference is now made to the accompanying drawings which show different applications and conditions of the medical unit, in accordance with the present invention.

With reference to Figure 1, there is shown a medical unit 12, from a rear view perspective, which generally comprises a rear panel 14, a front panel 16, and side wall, indicated generally by reference numeral 18. The front and rear panels 16 and 14, and the side wall 18, define a chamber 20 for housing various items of medical equipment and machinery, as will be described. The side wall 18 comprises a base wall 21, including a mechanism for fastening the medical unit 12 to existing tracks in an aircraft, as will be described below. Additionally, there is provided a contoured wall 22, a top wall 24 and an aisle wall 26, all of which constitute the side wall 18. The rear panel 14 further includes an access door 28, which can be opened and closed as appropriate for the purposes of installing, maintaining and servicing components of the medical unit.

Figure 2 of the drawings shows the medical unit 12, and particularly a front view thereof. The front panel 16 is clearly shown, and comprises a central portion 30, and lateral portions 32 and 34. The central portion 30 includes an upper slidable shutter 36 and a lower slidable shutter 38 which may be moved upwardly and downwardly respectively in order to gain access to the chamber 20, and its contents. Below the lower slidable shutter 38 is a fixed panel 40.

The lateral portion 32 comprises three stacked cupboards 40a, 40b and 40c, each of which has its own door 42, and each door 42, which may be mounted on hinges, can be opened or closed by manipulating the handle 44 associated therewith. Likewise, the lateral portion 34 also has three stacked cupboards 46a, 46b and 46c, each of which has a door 42, preferably mounted on hinges, which open and close using handle 44.

As a general rule, the central portion 30 of the medical unit 12 provides access to a stretcher contained within the chamber 20, to be described more fully below, by opening and closing the upper and lower slidable shutters 36 and 38 respectively. The slidable shutters 36 and 38 may be easily moved within rails, to be discussed, using the handles 50 and 52. Once the stretcher has been unfolded from within the chamber 20, the slidable shutters 36 and 38 can be substantially closed, with the stretcher extending outwardly from the chamber 20 through a space between the edges of the upper and lower slidable shutters 36 and 38 respectively.

While the stretcher access through the upper and lower slidable shutters 36 and 38 is generally shown in the somewhat centered position in Figure 2 of the drawings (as well as other

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drawings in this application), there is nothing in this invention which should be seen as limiting the location of the stretcher to this central area. Indeed, the stretcher can be appropriately placed laterally, centered, or anywhere in-between, and the optimal position may be determined by the exigencies of the particular aircraft in which the medical unit 12 is located.

The stacked cupboards in the lateral portion 32, as well as the stacked cupboards in lateral portion 34, may be individually designed to contain various forms of equipment. As an example only, the cupboard 40c may contain special lighting equipment which can be pulled out and adjusted over the stretcher. The cupboard 40a may contain first aid materials and the like. As a matter of practicality, it may be advantageous to place in the stacked cupboards 46a, 46b and 46c heavier equipment, or equipment which may be more infrequently used, or can be adjusted from a distance. It will be appreciated that the stacked cupboards in the lateral portion 34 may be just slightly less accessible than those stacked cupboards on the lateral portion 32, and the placement of different types of medical equipment will, of course, be made according to this and other criteria.

Figure 3 of the drawings shows a rear perspective view of the medical unit 12 when installed within the cabin of an aircraft. Only a small representative section of the cabin is shown, and comprises a floor 60, having a pair of seat tracks 62a and 62b. Further, there is provided an inner wall 64, and an outer wall or skin of the aircraft 66. A space 68 is formed between the inner wall 64 and the skin 66, and is conventionally used for electrical wiring, piping and the like, and the importance of these will be discussed further below in describing how the medical unit 12 of the invention may tap into certain aircraft systems and resources in order function more effectively.

In Figure 3, it can be seen that a cabin ceiling 70 is provided, and to one side thereof conventional rows of baggage compartments 72 are installed. Like conventional dividers in aircraft cabins, the medical unit 12 of the invention is designed to properly fit within existing cabin structures, and in fact resembles from the outside in large part a simple divider.

It will thus be noted that the base wall 21 of the medical unit 12 rests firmly on the cabin floor 60. The medical unit 12 is secured on the floor 60 by attaching it with appropriate bolts, or other conventional hardware, to existing seat tracks 62a and 62b, which are present as part of the construction in an airliner cabin.

The contoured wall 22 of the medical unit 12 is constructed so as to properly engage with

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the contoured inner wall 64. The top wall 24 of the medical unit 12 fits in below the baggage compartments 72, while the aisle wall 26 of the medical unit 12 is generally exposed and, with other structures in the cabin, forms a passage through which access from one portion of the cabin to another is secured. It will be seen that the door 28, as shown in Figure 3, provides enlarged access to the chamber 20 of the medical unit 12, so that personnel may have better access to the contents of the chamber 20 in order to effect installation and maintenance, as may be necessary.

Reference is now made to Figure 4 of the drawings which shows a front perspective view of the medical unit 12 of the invention, with the stretcher 80 in the unfolded or usable position. One aspect of the invention comprises the availability of a stretcher, generally designated by the reference numeral 80, which can be, for the most part, in a stowed position when it is not needed. Most of the time, of course, the stretcher is not needed, and, in this regard, the medical unit 12 provides a very compact space in which the stretcher 80 can be stored. While the availability of the stowed stretcher 80 is an important aspect of the invention, another aspect of the invention relates to the provision of essential medical equipment and machinery in the vicinity of the stretcher 80, so that such equipment can be available for use on an as needed basis. The unfolding and setting up of the stretcher 80 enables the patient to be properly and comfortably positioned, an important factor which must be established before appropriate medical treatment can be provided.

The stretcher 80 in Figure 4 of the drawings generally comprises a base frame 82, the base frame 82 having a fixed end 84, and an unsecured end 86. The fixed end 84 is attached to components within the chamber 20 of the medical unit 12, while the unsecured end 86 is fixed to a rear support 88. The base frame 82 is thus supported at both ends. At its fixed end 84 it is attached to components within the chamber 20, and at its unsecured end 86, the rear support 88 extends between the base frame 82 and the floor 60, and preferably connects to the seat tracks 62a and 62b, so that the base frame 82 of the stretcher 80 is very firmly and stably fixed. This proper fixing of the stretcher 80 within the cabin is of considerable importance in view of the significant forces which may be placed on the stretcher 80 by virtue of the aircraft movement including take-offs and landings.

As will be seen in Figure 4 of the drawings, two rows of seats 90 and 92 are adjusted so that their seat backs are folded forwards, to thus create the vertical clearance necessary for the positioning of the stretcher 80.

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Once the base frame 82 of the stretcher 80 has been unfolded from the medical unit 12, a mattress frame 96, and mattress 98 are connected to the base frame 82. The mattress frame 96 has a head end 100, a foot end 102, and a pair of side portions 104 and 105 respectively. The head end 100 is secured within a pair of top clamps 106, while the foot end 102 is secured within a pair of bottom clamps 108. The mattress 98 is firmly held within the mattress frame 96, and an elevator frame 110 may be provided so that the patient may be placed with his or her head elevated or inclined, as may be necessary for comfort or treatment. It will be noted that the mattress 98 has a series of straps and clamps, which will not be discussed in any further detail, all or some of which may be used to secure the patient to the mattress 98, as may be required.

The rear support 88 folds away from the base frame 82 so as to preferably be at right angles thereto. The rear support 88 comprises a pair of fixed legs 116, in each of which is located a telescoping leg 118, the telescoping leg 118 being adjustable with respect to the fixed leg 116 so as to place the base frame 82 in a substantially horizontal position, or slightly inclined, as may be required. The telescoping legs 118 are joined by a base plate 120 which has the necessary structure and hardware to enable the rear support 88 to be fastened to the seat tracks 62a and 62b. Furthermore, the aircraft may be provided with a special stretcher-fastening track 122, shown in Figure 4 of the drawings, the fastening track 122 being substantially at right angles to the seat tracks 62a and 62b, and designed to receive at least a portion of the base plate 120.

Although not specifically shown in Figure 4 of the drawings, the stretcher 80 may further comprise one or more straps or belts, having one end fixed to the stretcher 80, and the other end peg to a connecting portion in the cabin, such as the seat tracks 62a and 62b. In certain circumstances, such belts may provide additional stability to the stretcher 80 so that its relative movement is reduced in response to the natural flying motions of the aircraft.

Reference is now made to Figure 6 of the drawings which shows a cross-sectional side view, similar to the view shown in Figure 4 and Figure 5, but also showing the stretcher in the folded position within the chamber 20 of the medical unit 12. The stored/stowed position of the stretcher 80, as shown in Figure 6 of the drawings will be described in further detail with reference to Figure 8 of the drawings. However, it can be seen in Figure 6 that the top clamp 106a is held in a fixed position when the stretcher 80 is in the unfolded position, and is designed to be at the appropriate height when the stretcher 80 is in the unfolded position. Figure 7 of the drawings shows a view of the medical unit and unstowed stretcher when looking towards the

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front thereof, also showing the various cupboards and/or compartments designed to house various items of equipment and machinery. As has been mentioned, the medical unit 12 of the invention may comprise any one or more of a fairly wide range of equipment and machinery, and many of these items require power. Other pieces of equipment may require oxygen, wiring for various forms of communication, and the like, and to the extent possible, the medical unit 12 of the invention taps into existing power and other systems in the aircraft.

The power lines, oxygen conduits, electrical and communication wirings and the like, may be conveyed in different forms and locations, depending on the type of aircraft. Thus, these sources may be contained in the space 68 formed between the outer skin or the aircraft and the inner wall 64. Alternatively, these sources may run under the floor 60 of the cabin, or above the ceiling 70. For the purposes of this invention, it does not really matter where the sources are located, but a medical unit 12 designed for a specific aircraft would, of course, take these factors into account so that appropriate connectors to power, oxygen and communication systems can be readily achieved. As an example only, Figure 7 shows an oxygen supply line 130 and an electrical supply line 132 running in the space 68. The oxygen supply is tapped by means of a connector 134, so that aircraft oxygen can be used, where necessary, by equipment contained within the medical unit 12 for patient treatment. Likewise, a connector 136 taps into the electrical supply of the aircraft so as to power the various pieces of equipment and systems which may form part of the medical unit 12. Also shown running through the space 68 are communication lines 138, which are tapped by connector 140 and directed to appropriate equipment within the medical unit 12 for use as needed, so that personnel operating the medical unit 12 can establish the desired lines of communication both within the aircraft, and with land-based resources.

Reference is now made to Figure 8 of the drawings, which shows a detailed view of one embodiment of the stowed stretcher 80, contained within the chamber 20 of the medical unit 12. The medical unit 12 is shown as comprising the components discussed above, including the base wall 21, rear panel 14, top panel 24, upper slidable shutter 36, lower slidable shutter 38, the door 28 and various other components. As will be noted from Figure 8, the base frame 82 is in a folded condition/position, and comprises a forward section 150, and a rear section 152, connected to each other by means of a hinge 154. The rear support 88 is pivotally or hingedly connected to the rear section 152 and folds out to a position essentially normal to the rear section 152 so as to provide the necessary support as shown in, for example, Figure 6 of the drawings. The base frame

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82, when in the folded position, shows one of the top clamps 106, and a bottom clamp 108, the clamps 106 and 108 being configured so as to receive the mattress frame 96. In the particular embodiment shown, the mattress frame 96, also contained within the chamber 20, is unfolded independently and positioned on the base frame 82, and thereafter clamped into position using clamps 106 and 108. In alternative embodiments, the mattress frame 96, as well as the mattress 98 may also be foldable, so that when the base frame 82 is unstowed, the mattress frame 96 and mattress 98 are already in position.

Within the chamber 20 of the medical unit 12, there is provided a track 158, and a bracket 160, attached near the fixed end 84 of the base frame 82, including a wheel, or other component, which slides up and down in the track 158 when the base frame 82 is moved between he stowed and unstowed positions. In Figure 8 of the drawings, the bracket 160, when shown near the base wall 21, illustrates its position when the base frame 82 is in the stowed position, and the illustration of the bracket 160a, extending outside the chamber 20, illustrates its position when the base frame 82 is in the unstowed or extended position.

The bracket 160 includes a reel 162, upon which a cable 164 can be wound. The cable 164 connects at one end to the reel 162, and to a winch-like or cable attachment structure 166 mounted in the chamber 20. The structure 166 may include spring-biased components so as to draw in the cable 164, and to facilitate unstowing of the base frame 82, when the stretcher 80 is required. Alternately, the spring-biasing may be in the reel 162.

In order to move the stretcher 80, and more particularly the base frame 82 thereof, from the stowed to the unstowed position, the upper slidable shutter 36 is moved upward to slide into an open position, along the tracks 170. Similarly, the lower slidable shutter 38 is moved downwardly along track 172, at which point an opening is provided to access the base frame 82. The operator then pulls the forward section 150 upwardly and outwardly, so that the bracket 160 runs along the track 158, and, at the same time, the forward section 150 moves out from the chamber 20 and into the cabin of the aircraft, as illustrated, for example in Figure 6 of the drawings. When the bracket 160 has reached the position shown as bracket 160a, the rear section 152 is unfolded by pivoting it about the hinge 154, so that the forward section 150 and the rear section 152 together make up a substantially rectangular base frame 82. The rear support 88 is then pivoted or unfolded downwardly so that the base plate 120 is on the floor 60 of the cabin, and supports the base frame 82. The base frame 82 is thus supported by the clamp 160a and the

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rear support 88. A locking mechanism may be provided to place the bracket 160a in a position so that movement thereof will be restrained, to provide additional stability to the stretcher 80 when in the unstowed position.

In order to facilitate unfolding, the user is assisted by the operation of the cable 164, which tends to raise the base frame out of the chamber 20. Reference numeral 164a shows the cable in its position when the stretcher is in the unstowed position.

It will be appreciated that only one of many embodiments of a folded and stowed stretcher 80 is shown in Figure 8 of the drawings. It is not intended that the invention in any way be limited to the specific structure and configuration of the foldable stretcher 80 shown in the various drawings. The only factor of importance in this regard is that the stretcher 80 is configured and dimensioned such that it can move in and out of an access space, which may be opened and closed in the medical unit 12. The importance of the invention is that a stretcher 80 is provided, but in normal circumstances is stowed in a relatively compact area until it is needed.

Reference is now made to Figure 9 of the drawings, which illustrates a representative example of the types of equipment and machinery which may be used in the medical unit 12 of the invention. In Figure 9, for illustrative purposes, the doors to the various enclosures have been removed. Thus, on the one side, a schematic view of the inside of stacked cupboards 40a, 40b, and 40c are shown, while on the other side, stacked cupboards 46a, 46b and 46c are shown with their interiors exposed. Within these various closets, which of course extend back into the chamber 20 and preferably utilize as much of the space as is possible, a wide variety of different types of equipment can be stored. Examples of such supplies and equipment include trauma kits and bags 182, which may include dressings, bandages 184, eye pads, antibiotic ointments, blood pressure kits 186, blankets, stethoscopes 188 and forceps, to name just a small selection of more commonly used items. These may be arranged conveniently on shelves 190, shown in this example as being contained in the closet 40c. The kits may be divided and prepared according to the type of condition being treated, so that in the case of an emergency medical treatment on board, the user could access a kit within the medical unit 12 of the invention which essentially contains all of the supplies necessary to treat that condition.

In addition to the basic medical first aid supplies, more sophisticated equipment may be provided and appropriately connected to sources of power which enable their operation. Examples of such equipment which may be included in the medical unit are respirators 192, IV

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infusion pumps 194, as well as their requisite controls, suction apparatus, defibrillators 196, blood pressure equipment 198 and resuscitators, to name but a few. Some of these items are illustrated schematically in Figure 9 of the drawings, and each may be positioned according to its size and likelihood of use. The invention is not, however, intended to be limited to any specific type or combination of equipment that may be stored in the medical unit 12, but it should be appreciated that the medical unit 12 itself can accommodate a wide variety of equipment, and combinations thereof.

In addition to the equipment for treating patients, the medical unit 12 of the invention may also comprise a monitor 200, a camera 202, communication equipment and Global Positioning Systems 204. This equipment may enable passengers or crew within the aircraft to make real-time contact with doctors, hospitals or other health providers who are able to provide relevant guidance and information to assist in the treatment process. For example, the medical unit 12 may include a camera 202 which may photograph the patient and transmit the information to a doctor or hospital which is land based. A health professional would be able to guide people treating the patient, and the land based health professional can monitor patient color or complexion, wounds, or treatment processes, and provide immediate guidance. Further, information from outside sources may be communicated to the system and displayed on the monitor, which may provide assistance to the people treating the patient.

In another form, the medical unit may also comprise lighting equipment 206 which may be stored within or outside of the chamber 20, and which can be removed and appropriately located over the patient to provide sufficient light. Clocks, timers and other basic equipment may also form part of the medical unit.

In a preferred form, the medical unit of the invention would tap into the power and oxygen supply within the aircraft generally. However, additionally, the medical unit would also have its own power supply system in the form of a battery or other component, or oxygen tanks, which could be relied upon if other systems within the aircraft failed. In addition to the power supply system, the medical unit may also comprise power interface systems so that the aircraft power can be modulated or changed to a form which can be used by any of the components within the medical unit. As an example, some aircraft may provide power at 110 volts and 400 cycles, and this may be changed by appropriate equipment to 110 volts and 60 cycles, a form which may be used by most of the equipment. Further, an inverter may be provided for changing DC power to

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AC power, or vice versa.

The medical unit may also comprise its own oxygen supply 226. In Figure 9, an auxiliary power unit or generator is shown at 228, while appropriate convertor means 230 are shown in the same Figure, and this may be used for converting the aircraft power systems to a usable form by apparatus and equipment within the medical unit.

Additionally, it should be noted that some or all of the equipment and machinery contained in any one of the closets, or surrounding the medical unit, may be removed therefrom and placed with appropriate clamps around the stretcher, preferably on the base frame 82 or the mattress frame 96. Thus, for example, a camera 202 may be removed from the closet, and clamped onto the mattress frame 96 at an appropriate location, so that the camera is directed into the desired position. The camera may be joined to power and other communication lines either by cable, or it may contain its own power unit or battery, and transmit wirelessly to the medical unit for onward transmission, as required. Similarly, lighting may be appropriately placed around the stretcher 80 by clamping it, as discussed, as may be any other of the equipment/machinery contained within or as part of the medical unit.

The medical unit 12 may further comprise other pieces of equipment such as a refrigerator 205, an autoclave 208 for sterilizing instruments, and may also include such equipment as an incubator, not specifically shown in the drawings.

In Figure 5 of the drawings, there is also illustrated a typical securing means which could optionally be installed to provide further support and integrity to the stretcher 80 when in the unfolded position. In Figure 5, the stretcher 80 has a belt 216 connected at hinge 218, or indeed at any other point along the stretcher 80, and extends obliquely down towards the floor 60 of the cabin, where it fastens to a connector 220 on the floor 60 of the craft. The purpose of this belt 216 is to counteract the natural forces which may arise due to the acceleration or deceleration of the aircraft. The aircraft moves in the direction indicated by arrow 222 in Figure 5. When accelerating, the stretcher 80 would therefore tend to move backwards, towards the rear of the aircraft due to the acceleration forces. Any such movement is significantly and substantially restrained by the belt 216 fastened to the floor 60 of the cabin. When the aircraft is decelerating, the front panel would serve to operate as a barrier, and prevent any forward movement as a result of the deceleration forces.

It will be appreciated that the medical unit of the invention is not limited to the precise

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details which have been described above. The precise shape, width and configuration of cupboards shown in the drawings and described herein may be varied depending on the type of equipment which is stored. Further, the nature of storing the stretcher, and the manner in which it unfolds, can vary. Of course, the medical equipment stored within the medical unit can vary widely, both in terms of the amount of equipment, as well as its nature.

While, for most purposes, a passenger commercial airliner may typically only require one medical unit 12 on board, there is nothing to prevent a plurality of such units from being located and spaced about the aircraft. Different units within an aircraft may be either more or less sophisticated, depending upon anticipated requirements. Further, an aircraft may be converted into a mobile hospital of sorts by installing a plurality of the medical units 12 spaced throughout the cabin, so that an aircraft can travel to an emergency area, and stretchers unfolded in each unit so as to provide multiple treatment bays on the aircraft.

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CLAIMS:

1. An aircraft medical unit comprising:

a front panel configured to fit in an aircraft cabin so as to form a divider inside the cabin;

a rear panel of substantially the same shape as that of the front panel and spaced therefrom;

a side panel between the front and rear panels, the front, rear and side panels defining a chamber;

an access opening in the front panel; and

a stretcher frame, movable between a folded and stowed position in the chamber and an unfolded and extended position to the outside of the chamber.

2. An aircraft medical unit as claimed in claim 1 wherein the front panel is configured so as to fit in the aircraft cabin between rows of seats, the front, rear and side panels following the contour of the shape of at least a portion of the aircraft cabin.

3. An aircraft medical unit as claimed in claim 1 further comprising at least one item of medical equipment used in the treatment of a patient.

4. An aircraft medical unit as claimed in claim 3 wherein the equipment is a monitor.

5. An aircraft medical unit as claimed in claim 3 wherein the equipment is a camera.

6. An aircraft medical unit as claimed in claim 3 wherein the equipment is a refrigerator.

7. An aircraft medical unit as claimed in claim 3 wherein the equipment is an incubator.

8. An aircraft medical unit as claimed in claim 3 wherein the equipment is a defibrillator.

9. An aircraft medical unit as claimed in claim 3 wherein the equipment is a respirator.

10. An aircraft medical unit as claimed in claim 3 wherein the equipment is an oxygen supply.

11. An aircraft medical unit as claimed in claim 3 wherein the equipment is an autoclave.

12. An aircraft medical unit as claimed in claim 1 wherein the access opening can be opened and closed by doors.

13. An aircraft medical unit as claimed in claim 12 wherein the doors comprise a pair of slidable shutters which run in tracks formed within the chamber of the medical unit.

14. An aircraft medical unit further comprising a plurality of cupboards, each cupboard accommodating selected medical equipment or machinery.

15. An aircraft medical unit as claimed in claim 1 further comprising an access door in the rear

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panel for providing access to the chamber for installation and maintenance.

16. An aircraft medical unit as claimed in claim 1 wherein the stretcher frame comprises a head end portion, a foot end portion and a foot end support leg, wherein the head end portion and foot end portions, and the foot end support leg are pivotally connected to each other so as to fold for stowage within the chamber, the head end portion and foot end portion unfolding in the extended position to form a substantially rectangular stretcher frame, and the foot end support leg being attached to the foot end portion and unfoldable with respect thereto, the head end portion being securely fastened to a clamp within the chamber when in the extended position, and the foot end support leg being unfolded to fasten to the aircraft cabin when in the extended position.

17. An aircraft medical unit as claimed in claim 1 further comprising a mattress frame and an associated mattress connectable to the stretcher frame.

18. An aircraft medical unit as claimed in claim 1 further comprising a belt extending between the stretcher frame at its one end, and fastenable to the cabin at its other end, to provide further stability to the stretcher frame when in the unfolded and extended position.

19. An aircraft medical unit as claimed in claim 1 further comprising adjustable lighting for positioning over the stretcher.

20. An aircraft medical unit as claimed in claim 3 further comprising a power unit.

21. An aircraft medical unit as claimed in claim 3 further comprising a power converter for converting aircraft power into a power source usable by the medical equipment.

22. An aircraft medical unit as claimed in claim 1 further comprising communication equipment to enable personnel at the medical unit to communicate within the aircraft and with land-based sources.

23. An aircraft medical unit as claimed in claim 1 wherein the stretcher frame is spring-mounted within the chamber to facilitate movement thereof between the folded and the stowed position on the one hand, and the unfolded and extended position on the other.

24. An aircraft medical unit as claimed in claim 3 further comprising at least one clamping member for attaching an item of medical equipment to the stretcher frame at a desired location.

25. An aircraft medical unit as claimed in claim 1 further comprising attachment members for securing the medical unit to tracks constructed in the cabin of the aircraft.

26. An aircraft medical unit as claimed in claim 1 further comprising an oxygen supply connector for connecting the medical unit to the oxygen supply within an aircraft.

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27. An aircraft medical unit as claimed in claim 1 further comprising communication system connector for connecting to the communication system within the aircraft.

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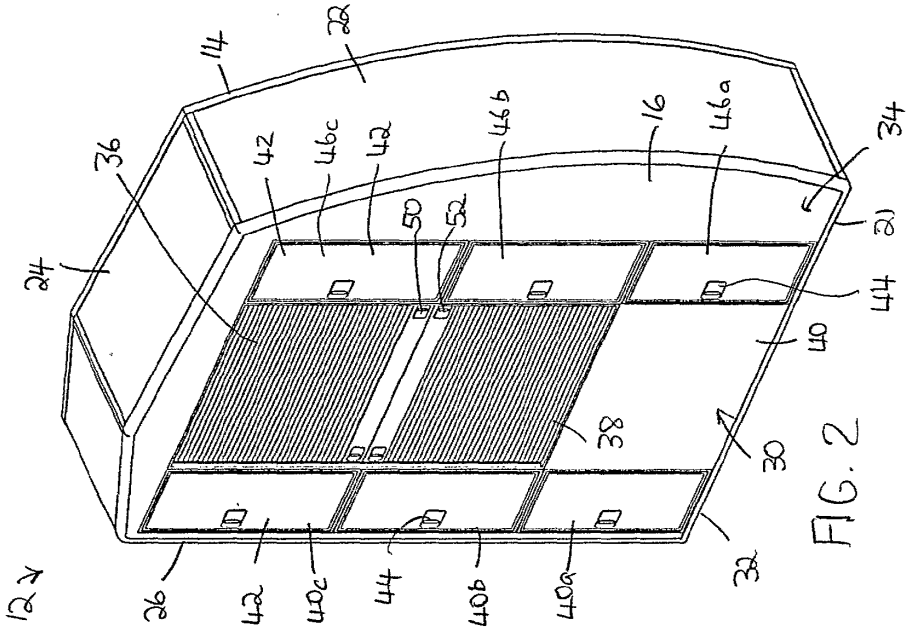

FIG. 2

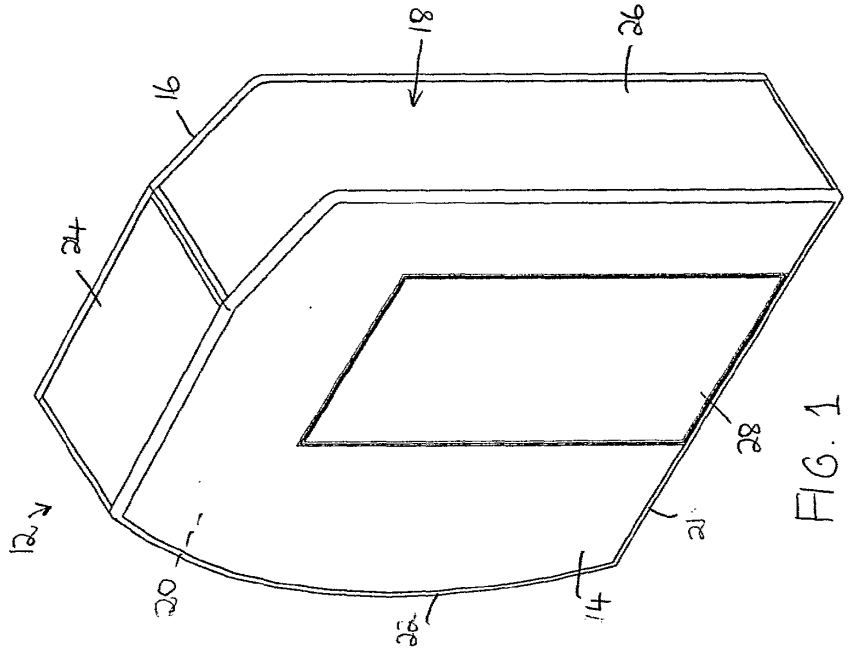

FIG. 1

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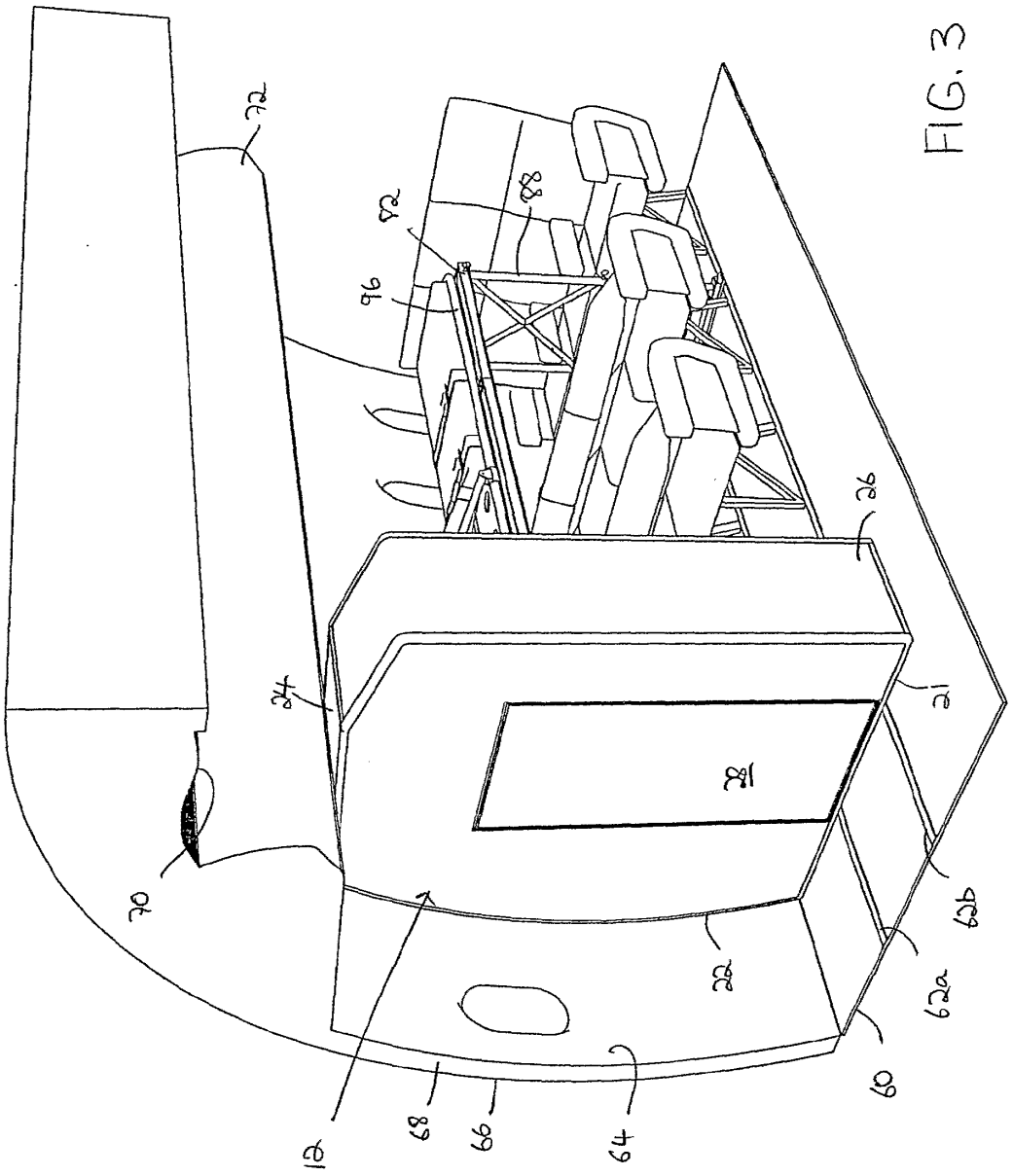

FIG. 3

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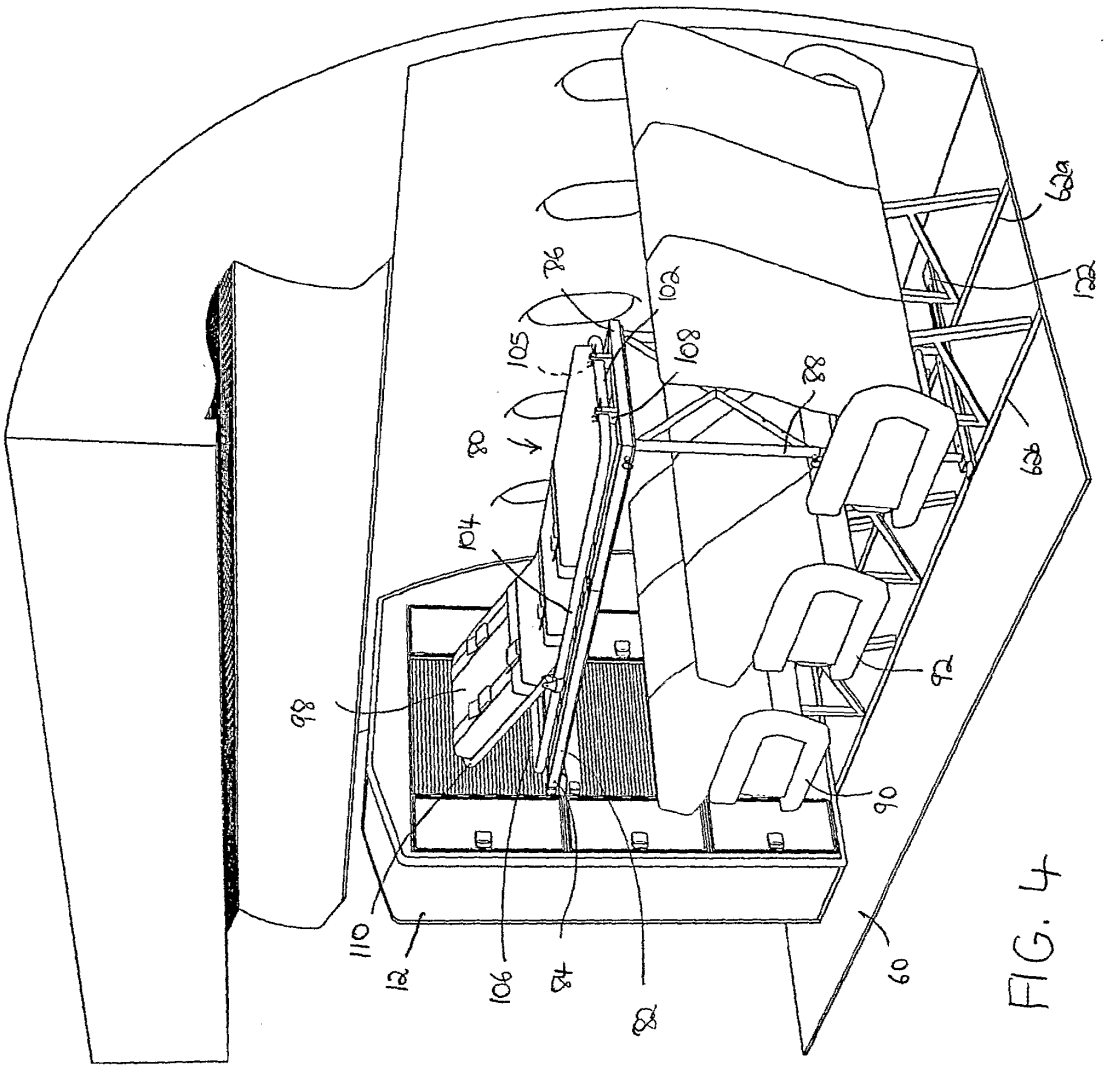

FIG. 4

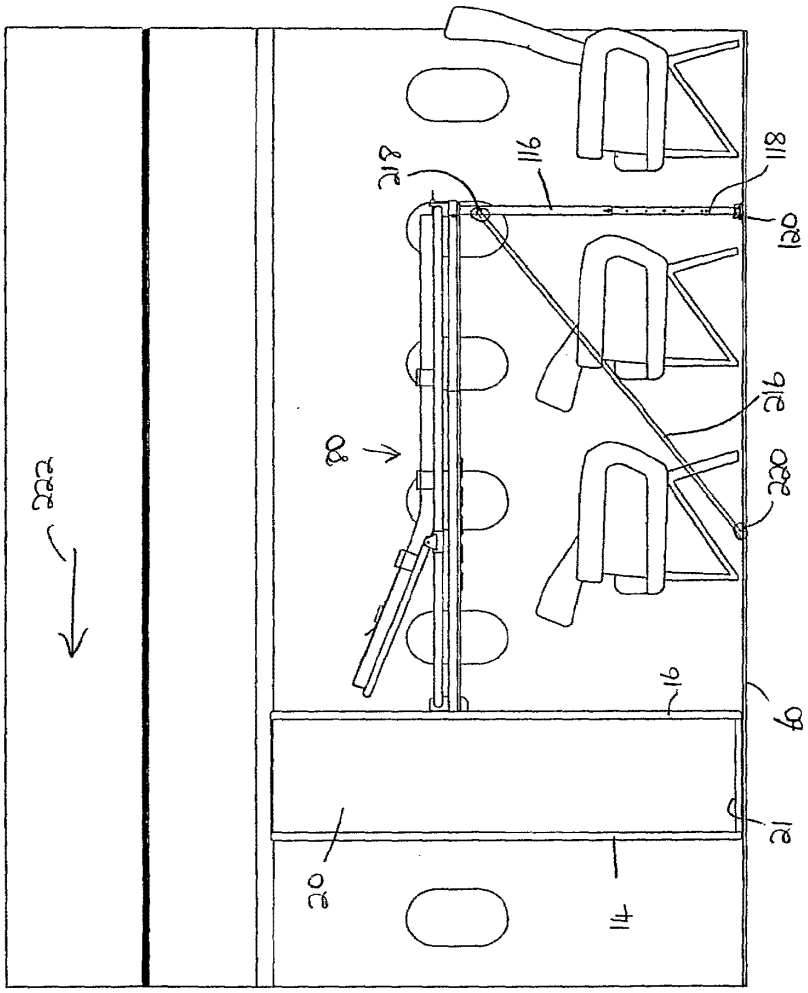

FIG. 5

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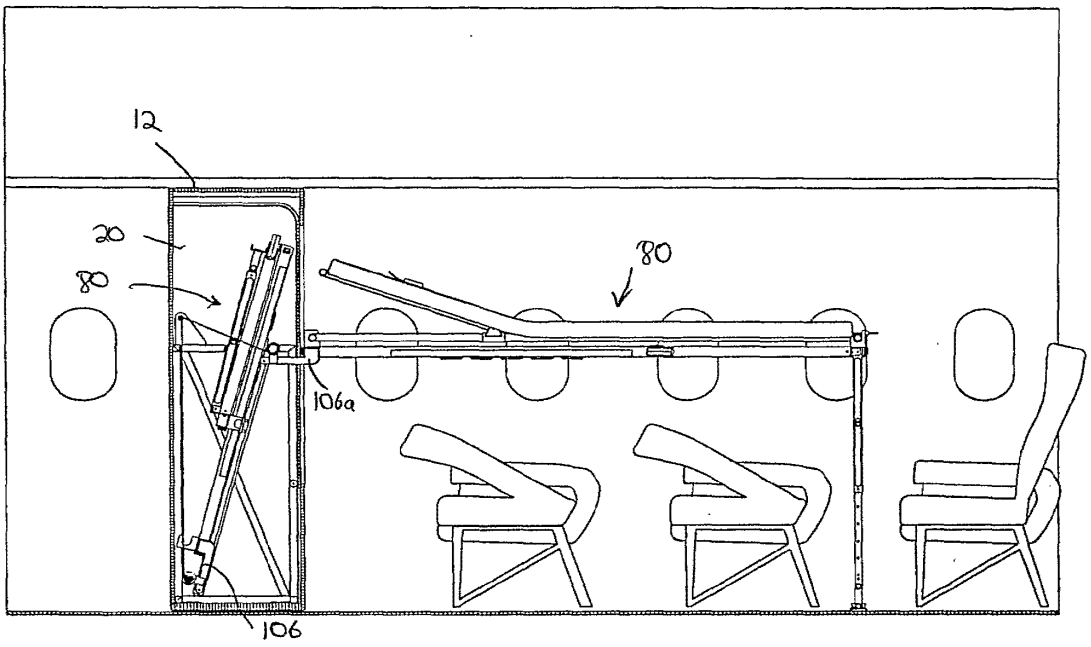

FIG. 6

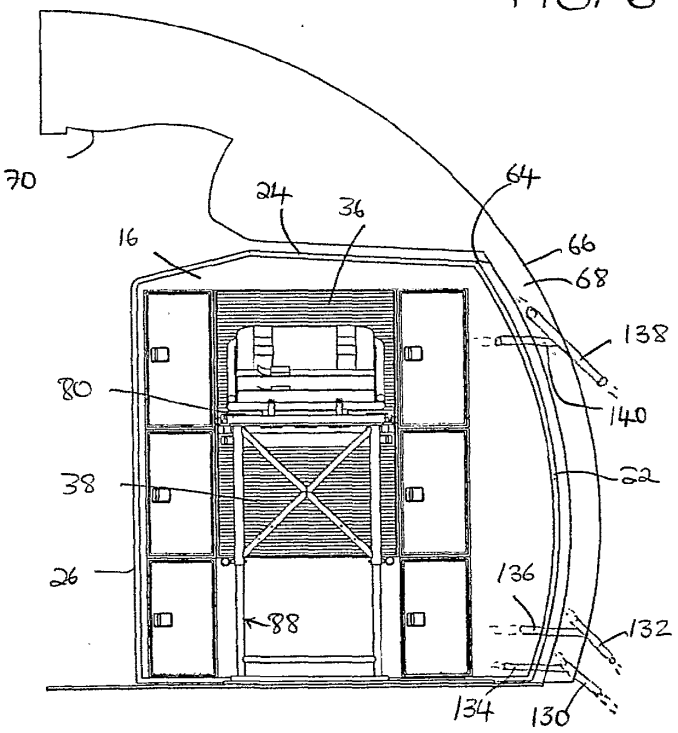

FIG. 7

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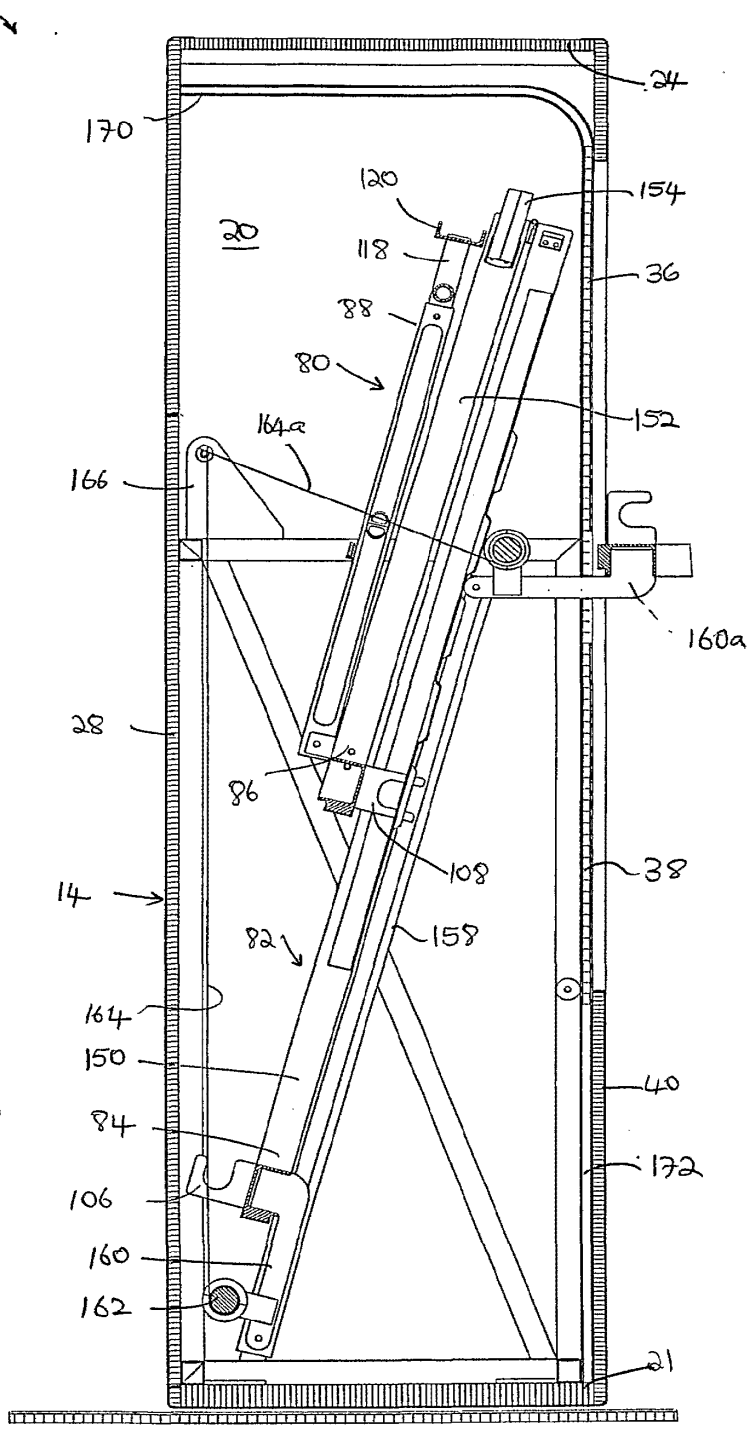

FIG. 8

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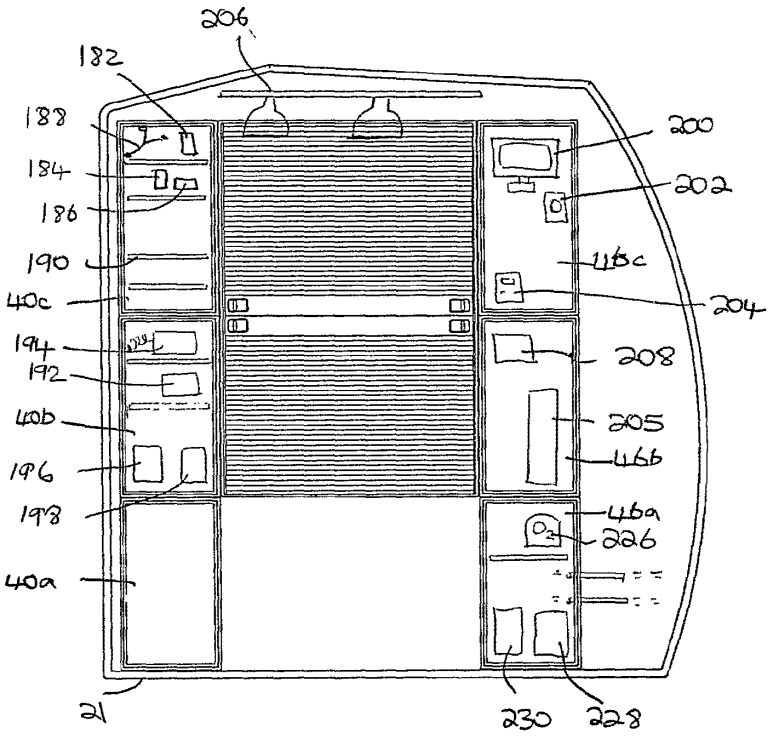

FIG. 9

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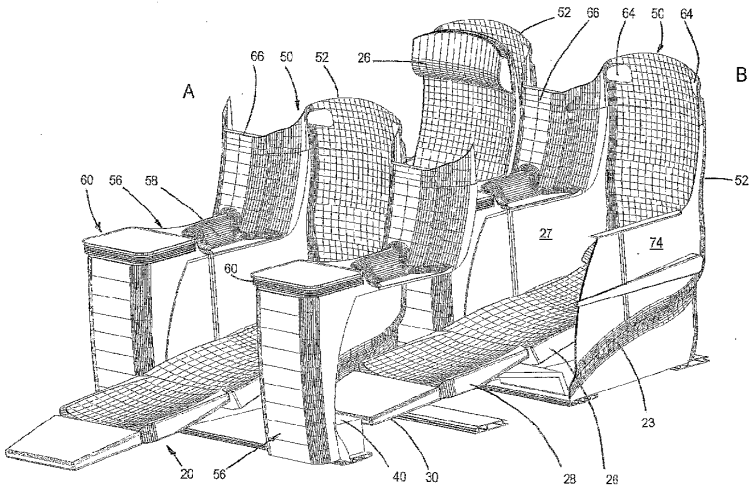

(57) Abstract: A seating arrangement for a passenger-carrying vehicle, especially aircraft. The arrangement provides a plurality of seating positions (P1, P2,P3), a seating position comprising a seat (20) and a footwell (22). The footwell (22) of a first seating position (P2, P3) is located beside the seat of a second seating position, the second seating position being located generally forward of the first seating position (P2, P3). Each seat is operable into a reclined state in which a leg-supporting component (30) of the seat projects into the associated footwell (22). The first seating position (P2, P3) and the second seating position (P1) overlap in a transverse direction.

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Seating for a passenger vehicle

Field of the Invention

This invention relates to seating for a passenger vehicle. It has particular, but not exclusive, application to seating in a passenger carrying aircraft.

Background to the Invention

There are clear economic incentives that drive aircraft designers to provide as many seats as possible in a passenger aircraft. Yet there is a conflicting demand to provide those passengers willing to pay for premium services with a feeling of space and privacy. In particular, business class and first class passengers on long air journeys may be offered seats that recline and can be converted into a bed. Such seats are very attractive to passengers because of the comfort that they offer. However, they are less attractive from the point of view of the aircraft operator because they represent an inefficient use of space within the aircraft.

Although embodiments of the invention will be described with respect to application to aircraft, it is not limited to such applications. It may, for example, find application in other forms of transport such as ships, hydrofoils, trains and coaches and so forth, as well as in other circumstances not related to transport.

Summary of the Invention

Therefore, it would be desirable to provide a seating arrangement that can be used in passenger aircraft and in other circumstances that can provide an increase in passenger-carrying capacity without reducing (and maybe increasing) an occupant's perception of space.

From a first aspect, the invention provides a seating arrangement for a passenger-carrying vehicle, the arrangement providing a plurality of seating positions, a seating position comprising a seat and a footwell, the footwell of a first seating position being located beside the seat of a second seating position, the second seating position being located generally forward of the first seating position, wherein each seat is operable into

a reclined state in which a leg-supporting component of the seat projects into the associated footwell, and wherein the first seating position and the second seating position overlap in a transverse direction.

The positioning of the footwell adjacent to a seat in front allows the seats to be arranged in rows having a pitch that is less than in a conventional arrangement. The overlap in the transverse direction partially counters the increase in transverse spacing between adjacent seats, the overall effect being to provide a passenger with more space *per* unit of floor area occupied than is possible in a conventional arrangement. For a given floor area, embodiments of the invention may allow up to 17% more seats to be provided than can a conventional arrangement.

In preferred embodiments, the second seating position overlaps the or each adjacent footwell in the transverse direction. This helps to further reduce the amount of space required in the transverse direction.

The invention has particular application to embodiments in which the seat can be reclined into a bed state to enable a user to sleep. Unlike in conventional "lie flat at an angle" reclining seats, the footwell does not need to fit below a seat, so its height can be sufficient to accommodate an occupier's feet while the occupier is fully reclined.

In a typical installation, an arrangement embodying the invention may include one or more groups in which seating positions are disposed in rows. For example, each row may be transverse to the normal direction of travel of the vehicle in which they are installed. Such groups may include rows having just one seating position. Alternatively or additionally, a group may have alternate rows having two and three seating positions respectively. In the latter case, most commonly found around the centre line of an aircraft passenger compartment a further advantage of embodiments of the invention becomes apparent. Most passengers can enter or leave their seat without disturbing any other passenger. Only occupiers within the central position of a three-seat row (or inner positions of longer rows) need disturb any other passenger, and a maximum of one other passenger need move for rows of three or four seating positions.

From a second aspect, this invention provides a seating component comprising a seat and a footwell, the footwell being located to laterally beside the seat. Such a seating

component can be used in the provision of an arrangement embodying the first aspect of the invention and within a vehicle embodying the third aspect of the invention.

From a third aspect, this invention provides a passenger-carrying vehicle comprising a seating arrangement according to the first aspect of the invention. This aspect of the invention offers particular advantages where the passenger-carrying vehicle is an aircraft.

A seating component embodying the second aspect of the invention may include a shell. The shell most typically includes a recess that constitutes the footwell.

The shell most preferably is formed as a plastic moulding. In this way, it may be provided with additional functional formations. For example, it typically includes a region to enclose a back of the seat and to enclose operating components of the seat. The shell may also include a formation (amongst other possibilities) that serves as an armrest, a tray, a table, a support for a display monitor and a holder for literature. Where a tray and/or a table is provided by a formation of the shell, it may not be necessary to provide an in-arm table. This allows the space provided to the passenger to be maximised with respect to the overall width of the seating component.

A seating component embodying this aspect of the invention may provide one, two, three or more seating positions. Embodiments that provide one seating position typically have one seat and one footwell. Embodiments that provide two seating positions may include three footwells, and these may be used in alternate rows with seating components that provide three seating positions and two footwells.

The seat provided in embodiments of the invention is movable between an upright position and a reclined position. In the reclined position, the seat may provide a substantially flat sleeping platform. This is advantageously disposed horizontal or at a shallow angle, such as a few degrees (e.g. 2°) from horizontal when in normal use. Note that an aircraft normally flies with its nose slightly high such that the floor is a few degrees (say, 3°) from horizontal. Therefore, to obtain a substantially level bed in normal flight, the sleeping platform must slope downwardly with respect to the floor in a forward direction.

From another aspect, the invention provides a seating arrangement for a passenger-carrying vehicle, the arrangement providing a plurality of sleeping compartments, a sleeping compartment comprising a footwell and a sleeping surface projecting into the footwell, the footwell of a first sleeping compartment being located beside the sleeping surface of a second sleeping compartment, the second sleeping compartment being located generally forward of the first sleeping compartment, wherein the first sleeping compartment and the second sleeping compartment overlap in a transverse direction.

Other preferred features of the invention are recited in the dependent claims provided herewith. The preferred features as described herein or as described by the dependent claims filed herewith may be combined as appropriate, and may be combined with any of the aspects of the invention as described herein above or by the independent claims filed herewith, as would be apparent to those skilled in the art.

Further advantageous aspects of the invention will become apparent to those skilled in the art upon review of the following description of a specific embodiment of the invention and with reference to the accompanying drawings.

Brief Description of the Drawings

Embodiments of the invention will now be described in detail, by way of example, and with reference to the accompanying drawings, in which:

Figure 1 is a seating plan showing a seating arrangement in Zone A of an Airbus A340-600 aircraft;

Figure 2 is a seating plan showing a seating arrangement in Zones B and C of an Airbus A380 aircraft;

Figure 3 is a transverse detailed view of seats in the embodiments of Figure 1 and Figure 2 in an upright and a reclined position;

Figure 4 is a detailed plan view of seats in the embodiments of Figure 1 and Figure 2 showing them occupied when in the reclined position;

Figure 5 and Figure 6 are cross-sectional views on, respectively, lines A-A and B-B of Figure 3;

Figure 7 and Figure 8 are part cut-away, perspective views of seats in the embodiments of Figure 1 and Figure 2 showing seats in both upright and reclined positions;

Figure 9 illustrates an arrangement of seating in the embodiment of Figure 1 or Figure 2 in the region of a cooking galley;

Figures 10, 11 and 12 illustrates an arrangement of seating in the embodiment of Figure 1 or Figure 2 in the region of a lavatory enclosure;

Figure 13 is a plan view that serves to compare a conventional seating arrangement with one embodying this invention; and

Figures 14 to 19 illustrate respective alternative seating plans comprising seating arrangements embodying the invention.

Detailed Description of the Drawings

As shown in Figure 1, seating Zone A in an Airbus A340-600 (r. t. m.) aircraft is provided with a total of fifty-nine seating positions. As shown in Figure 2, seating Zones B and C of an Airbus A380 (r. t. m.) aircraft are provided respectively with seventy-three and thirty-two seating positions. Much of the following description applies to both of these embodiments, although it will be understood that the invention is not limited to any specific aircraft or aircraft layout.

The seats are arranged in three groups, two outer groups 10, 12 and an inner group 14, separated by two aisles 16, 18. Within each group, the seats are arranged in rows that extend generally transversely of the principal longitudinal axis X of the aircraft, the rows being generally parallel with one another. In a preferred embodiment, the rows are spaced with a pitch of approximately 1016 mm (40 inches). Thus, the outer group 10 of fourteen seats in the embodiment of Figure 1 has an overall length of approximately 13208 mm (520 inches). Within each outer group 10, 12, each row includes one seating position. In the inner group 14, the rows include alternately two seating positions and three seating positions.

The immediately following description applies to a typical seating position within a group. Seating positions at the front row and rear row of each group differ, and will be described separately below.

Each seating position includes a forward-facing seat 20 and an associated footwell 22. Within the row, each seat 20 is disposed, in a transverse direction (i.e. generally perpendicular to the longitudinal axis X of the aircraft), adjacent to, or beside, a footwell 22 associated with a seating position of the row immediately behind. Hence, adjacent seating positions are displaced or staggered, but overlapping, with respect to one another in the fore-and-aft direction. The fore-and-aft direction runs forwards and rearwards generally along or parallel with the longitudinal axis of the aircraft. The "forward" direction is the direction in which the seats 20, and therefore seated passengers, face and is typically the same as the direction of travel of the aircraft during flight (and generally parallel with the longitudinal axis of the aircraft), although it need not necessarily be so. The seats 20 in successive rows are staggered, or displaced with respect to one another, in a lateral or transverse direction (i.e. across the aircraft, or other vehicle, substantially perpendicular to the forward direction) so that the footwell 22 adjacent a given seat 20 is associated with a seat 20 in the row behind and may be used by the occupier of a seat in the row behind. Moreover, as is described in more detail hereinafter, a given seating position overlaps in the transverse direction with the nearest seating position in front and or behind. The arrangement is such that at least the respective armrests of the seating positions overlap in the transverse direction. As can best be appreciated from Figures 4 and 13, when the seats 20 are reclined into a bed or sleeping state, at least a respective shoulder and/or arm-receiving region of adjacent seating positions (or sleeping compartments) overlap in the transverse direction.

As shown in Figure 3, each seat 20 can adopt a range of positions, from an upright position, or state, to a fully reclined, or bed, position, or state, (both being shown in Figure 3). The seat comprises a backrest or back 26 and a seat base or pan 28 (typically comprising a seat squab) that form the back and base, respectively, of the seat when in the upright position. The seat further includes a leg support component or pad 30. In the upright position, the leg support pad 30 extends, out of use, downwardly (i.e. generally towards the ground surface or floor 21 of the aircraft) from a front edge region

of the squab 28. The back 26 is pivotable with respect to the squab 28 to allow the seat 20 to adopt the upright state and the bed state. Similarly, the leg support 30 is pivotable with respect to the squab 28. Conveniently, a life jacket 34 can be carried on the leg support pad 30 beneath the squab 28.

The back 26, squab 28 and leg support pad 30 are carried on a linkage 32. The linkage 32 serves to control movement of the components carried upon it at the seat moves between its upright and reclined positions, the movement being driven by an electric, or other, motor (not shown). In the embodiment of Figure 3, the back 26 of the seat 20 does not move (or moves only minimally) rearwards as the seat 20 moves from its upright to its reclined position, i.e. the seat 20 moves generally forwardly from the upright state to the reclined state, and generally rearwardly when moving from the reclined state to the upright state. Movement to the reclined position is achieved by a generally downward (i.e. generally towards the aircraft floor) and generally forward pivoting movement of the back 26, a predominantly forward movement of the squab 28, and a generally upward (i.e. away from the floor) pivoting movement of the leg support pad 30. When reclined, the back 26, squab 28 and leg support pad 30 form an approximately flat sleeping platform which, in the preferred embodiment, is of length approximately 1880 mm (74 inches) and is angled at a few degrees (say, 2°) from the horizontal while the aircraft is in normal level flight. (This is achieved by its being at an angle of approximately 5° to the floor.) In such a position, the leg support pad 30 extends into the associated footwell 22. In general, it is desirable to provide a sleeping platform that is as close to horizontal as possible.

The linkage 32 may for example comprise one or more linkage members or bars 33 pivotably coupled to the floor 21 and to the back 26, and one or more linkage members or bars 35 pivotable coupled to the floor and to the squab 28. One or more of the linkage bars 33, 35 may be driven by the motor.

As may best be seen from Figures 7 and 8, within the footwell 22 there is advantageously a platform 40 having an upper surface that is generally parallel to the floor of the aircraft at a height of, for example, approximately 183 mm (7.2 inches) and width of, for example, approximately 307 mm (12.1 inches). When the seat 20 is in the reclined position, an edge of the leg support pad 30 that is furthest from the squab 28 is

adjacent to and substantially level with the platform 40, such that the platform can serve as an extension of the sleeping platform that is provided by the reclined seat. This can be used to provide a sleeping platform that is longer than that which could be provided by components of the seat alone.

Figure 4 shows three typical seating positions (shown with the respective seats in the reclined state) of the seating arrangement described above occupied by passengers. The torso and head of a person (identified as P1 in Fig. 4) occupying a seat in a first row is adjacent to the legs of passengers (P2, P3) in an immediately rearward row. The width of the footwell 22 is less than the width of the seat 20. The seat of the occupant P1 and the seats of the occupants P2, P3 overlap in said transverse direction (i.e. the lateral direction generally perpendicular with the forward direction). In particular, it will be seen that the respective regions for receiving the shoulders and arms of the seat occupants are overlapping in the transverse direction. In the preferred embodiment, the respective seat backs 26 overlap in the transverse direction. In the preferred embodiment, the footwells 22 are shaped to become generally narrower in said forward direction (and preferably in a gradual manner). Hence, the respective seat stations 19 (i.e. the respective area in which each seat is located) become correspondingly wider in said forward direction. This allows a more efficient use of space than is possible with seating arranged conventionally in transverse rows. (A comparison of an embodiment of the invention and a conventional arrangement is shown in Figure 13.)

When the respective seats 20 are in the reclined state, the respective seating positions provide a respective sleeping compartment, each sleeping compartment including the respective footwell 22 and a sleeping surface projecting into the footwell, the sleeping surface being provided at least partly by the respective seat 20 when in the reclined state. As may best be appreciated from Figure 4, adjacent sleeping compartments (e.g. the respective compartments for passengers P2 and P1 or for passengers P1 and P3) overlap in the transverse direction. In some embodiments, the sleeping surface may be entirely provided by the respective reclined seat 20. In other embodiments, the sleeping surfaces are provided mainly by the respective seats 20 although the sleeping compartment may also comprise one or more regions for receiving the passenger's

shoulders and/or arms that may be separate from the seat 20 itself. In the preferred embodiment, adjacent sleeping surfaces overlap in the transverse direction.

The preferred shapes and dimensions of the seating positions in this seating arrangement are shown in detail in Figures 5 and 6, each of which shows a sectional view taken in a generally transverse plane, i.e. a plane that is generally perpendicular to the forward direction. In Figure 5, the back 26 of one seat (in the reclined position) is shown alongside the leg support pad 30 (also in the reclined position) of an immediately rearward seat 30. It will be seen that the seat station 19 for seat 20 overlaps with the adjacent footwells 22 in the transverse direction. Moreover, it will be seen that a portion or region of the seat station 19 protrudes or projects over part of the adjacent footwell 22 with respect to the floor 21. Hence, part of the footwell 22 is located beneath the seat station 19. It may therefore be said that the seat station 19, and in particular the region of the seat station 19 that receives a passenger's arms and/or shoulders (especially in the reclined or sleeping position) overhangs part of the or each adjacent footwells 22. The region of overlap caused by the overhanging portion of the seat station 19 extends in both the transverse and longitudinal directions and so the seat station 19 and footwell(s) 22 have a respective portion or region which share a common, or overlapping, area extending in both the transverse and longitudinal direction.

The respective seats 20 of the seat positions may also overlap or overhang said footwells 22 in the manner described above. Hence, the footwells 22 become generally narrower in a direction generally upwardly, or away, from the floor 21. Preferably, the narrowing of the footwells 22 in this direction is effected by the provision of an inflected portion 23 in a respective dividing panel 27 between the seat station and adjacent footwell(s) 22. As illustrated, the dividing panel 27 may extend generally perpendicular to the floor on either side of the inflected portion 23. Advantageously, the inflected portion 23 is provided below the level of the back 26 when in the reclined state and above the level of the leg-support pad 30 when in the reclined state. The arrangement described above also provides a particularly efficient use of space and allows seats 20 to be located relatively close to one another in the transverse direction while still providing sufficient space for passengers. In the preferred embodiment, the

shoulders and/or arms of a passenger when fully reclined overlap, or overhang, with the leg support component 30 of the seat 20 behind.

In a preferred embodiment, the width of the space that is provided for each passenger in the reclined seat at shoulder height is approximately 602 mm (23.7 inches). Within the footwell, the width is approximately 307 mm (12.1 inches). The depth of the footwell is approximately 360 mm (14.2 inches). Also illustrated in these drawings are possible locations for the seat electric box (SEB) and the in-flight entertainment box (IFE).

Further details of the implementation of the invention will now be described.

Four distinct types of seating components are provided in each embodiment. Within the inner group 14, alternate rows have two seats (and three footwells) and three seats (and two footwells). An end part of each type of row is shown in Figures 7 and 8 generally indicated at A and B, respectively. Within the outer groups 10, 12, each row has one seat. Alternate rows have the seat to the left (looking forward) and to the right of the footwell of the row behind. The construction of each of these assemblies is similar, and will now be described.

In the preferred embodiment, each seating component or assembly comprises a shell 50 shaped to define the respective station 19 for one or more seats 20 and to define a respective footwell 22 on one or both sides of the or each seat station 19. Each seating row may be provided by a single shell 50. In the preferred embodiment, the shell 50 is shaped so that the or each seat station 19 overlaps with the or each adjacent footwell 22 in the transverse direction. In the preferred embodiment, the shell 50 is shaped so that the or each seat station 19 overhangs part of the or each adjacent footwell 22 in the manner described above with reference to Figures 5 and 6 (in which case the shell 50 provides the respective dividing panels 27). The shell 50 is preferably shaped so that the seat stations 19 become wider, and the footwells 22 become correspondingly narrower, in the forward direction. Each shell 50 may comprise a moulded plastics shell 50. Preferably, the shell 50 has one or more formations that constitute several functional components.

First, the shell 50 has a respective upright concave (to the front) region 52 for each seat - thus, each shell 50 may have one, two, three or more such regions. Each concave region 52, which forms part of the respective seat station 19, may have an aperture 64 formed through it at an upper part. In this embodiment, two such apertures 64 are provided on each concave region. Such an aperture 64 can be used as a hand-hold by passengers walking in the aisles or while gaining access to or exiting from the seat, and they can also contribute to the aesthetic design of the seating components. The upright concave region 52 covers the rear of the seat back 26 when it is in its upright position, and extends downwardly to enclose the linkage 32 and the motor.

When viewed from the front, the shell 50 has a forwardly-projecting abutment or buttress portion 56 between adjacent seat stations 19, or adjacent single seat stations 19. The buttress portion 56 provides a console and may, for example, have a generally rectangular cross-section. The buttress portion 56 extends adjacent to the seat pan or squab 28 of the seat 20 when it is in the upright position. An upper surface of the buttress, which in the preferred embodiment is at a height approximately 729 mm (28.7 inches) above the floor level, preferably has a longitudinally extending concave formation 58 adjacent to each of the seats 20. Each concave formation 58 provides an armrest for a person in the adjacent seat when it is upright. The armrests 58 overlap or overhang the footwell 22 defined below.

At its forward extent, the buttress 56 comprises a stowage area which, in the preferred embodiment, comprises a generally flat-topped region 57. This flat-topped region 57 carries or stows a tray or tray assembly 60 when not in use. The tray assembly 60 can provide a relatively small tray surface when disposed in a folded position upon the buttress 56 (as shown in Figure 8). Alternatively, a separate table may be provided for this purpose, the tray 60 being stowed beneath the separate table. Preferably, the tray assembly 60 comprises one or more (preferably two) tray portions or leaves 60 that can be deployed or folded out generally across the adjacent seat 20 (see 62 in Figure 7). This provides a larger tray surface, approximately 698 mm (27.5 inches) above floor level for example, for serving a meal. The tray or tray assembly 60 may therefore be stowed adjacent its associated seat and, moreover, when stowed, is disposed generally parallel with the floor 21. This is in contrast to conventional trays of business class and

first class seating which are stowed in the seat's armrest and are disposed generally perpendicularly to the floor. It is found that, in typical embodiments, by stowing the tables or trays 60 in the manner described above, each seat station 19 may be approximately 75 to 100 mm (3 to 4 inches) wider than would be possible using a conventional tray stowage arrangement. The configuration of the tray assembly 60 and its deployment mechanism may take a variety of forms. In the preferred two-leaf embodiment, the leaves a hinged to one another along a respective edge in a generally book-like manner, one leaf being pivotably connected to the buttress 56 for rotation about an axis that is generally perpendicular to the floor 21. Said one leaf is also slidably connected to the buttress 56 in the fore-and aft direction.

As may best be seen from Figures 1 and 2, in the preferred embodiment, the buttress 56, and therefore the associated footwell 22, projects beyond the foremost edge of the seat pan 28 (when upright) in the forward direction. In the preferred embodiment, the buttress 56 projects beyond the seat pan 28 by approximately 150 to 200 mm (6 to 8 inches). This allows the pitch between rows to be relatively small while still providing enough space to allow the seat, and occupying passenger, to recline fully in a substantially horizontal position. By way of example, an egress space of approximately 216 mm (8.5 inches) is provided between the front of each buttress 56 and the rear of the shell 50 in front. Since the shell 50, and in particular the rear of the shell 50 is fixed, the egress between rows is constant and is not compromised when the seats of the forward row are reclined. From another perspective, each seat 20 may move between its upright and reclined state in a fixed spaced defined by the fixed shell 50 that defines its associated seat station 19 and by the fixed shell 50 of the seat(s) in front. Accordingly, movement of the sets between the upright and reclined states dose not affect the passengers in the rows in front or behind. In an alternative embodiment (not illustrated), the rear of the shell may recline rearwardly to accommodate a seat whose back reclines rearwardly.

When viewed from the rear, the buttress 56 presents a forwardly extending recess 54 that opens rearwardly. The recess 54 provides the footwell 22 for a seating position to the rear. The height of the footwell 22 above the floor 21 is determined by the height of the upper surface of the buttress 56 and is sufficiently high to receive the legs of a

passenger on a seat in the fully reclined position. A generally flat support member 61 (Fig. 3) may extend transversely across an upper part of the recess 54 to form a storage pocket, taking the place of the pocket that is normally provided on the back of a conventional aircraft seat. The support member, which may be rigid or flexible, advantageously slopes downwards in a forward direction with respect to the floor at an angle of a few degrees. This is to resist the tendency of articles to fall from the storage pocket while the aircraft is accelerating for takeoff or when climbing.

An upright shell or web portion 66 of the shell 50 extends between adjacent concave portions 52. A corresponding upright portion 68 extends adjacent to the concave portion 52 of the one-seat seating assemblies and outwardly from outer sides of the concave regions 52 of the two-seat seating assemblies. Each such upright portion 66, 68 includes a generally flat portion 71 extending in a generally transverse direction and positioned generally in front of a respective seat 20 in the row behind. It can therefore be used to carry a display screen, or monitor 70 in a position that can be conveniently viewed by an occupier of that seat. The upright portions 66, 68 project forwardly of the concave regions 52 (and may be said to be convex to the forward direction) to define a wall or screen 69 between adjacent seat stations 19. The screen 69 preferably extends from the buttress 56 to a level substantially at or adjacent the, in use, upper edge of the back rest 26 when in the upright state, and may extends only part way along the buttress 56 in the forward direction. The screen 69 improves the privacy of occupants in adjacent seats.

Adjacent to each aisle 16, 18, the shell 50 has a forwardly extending arm portion or panel 74 that is generally disposed in a plane generally parallel with the forward direction and that extends beside the squab 28 of the seat 20 when in the upright position. An upper surface of the arm portion 74 is formed as a lip or shelf 75 that turns in above, or overhangs, the seat squab 28 (when in the upright state) to serve as an armrest. The armrest 75 is generally planar in form and is disposed in a plane generally parallel with the seat pan 28 (when upright). Hence, the seat station 19 comprises a space beneath the armrest 75. In consequence, the width of the squab 28 can be greater than the distance between the arms. For example, the squab may be 570 mm

(23.5 inches) wide, while the distance between the arms may be 554 mm (21.8 inches). Moreover, there is no in-arm table to add to the width of the seat/seat station.

This provides the occupier of the seat with width where they benefit it most – in the region of their hips when seated and shoulders and/or arms when sleeping – and provides adequate, but reduced, width where it is less important – in the footwell when the seat is reclined. As compared with a conventional arrangement, each passenger occupies less floor space, yet the transverse distance between each passenger is greater (for example, up from 150 mm to 254 mm (6 inches to 10 inches), giving the passenger an increased perception of space). The shell 50 also provides the occupier with a personal enclosed space, this further contributing to a feeling of comfort.

By way of example, the overall width of a single seat 20 and two adjacent footwells 22 in this embodiment is approximately 1458 mm (57.4 inches), and a double seat with a single intermediate footwell is approximately 1532 mm (60.3 inches). A single seat 20 and footwell 22 component has an overall width of approximately 952 mm (37.5 inches).

Special measures may be taken at the front and rear ends of each group of seats to optimise the use of space.

Figure 9 shows an arrangement that can provide an efficient arrangement for a block or group of seats that ends immediately to the rear of a transverse galley 80. This is not required in the arrangements shown in Figures 1 or 2, but may be applicable to installations embodying the invention in other aircraft. The galley 80 has a rear bulkhead wall 82. The aim of the arrangement provided in embodiments of the invention is to minimise the clear distance that must be left between the bulkhead 82 and the first row of seats adjacent thereto.

In order to provide a footwell for each of the seats in the front row, a respective recess 84 is formed in the bulkhead 82 in front of each seat. The recess 84 may be of dimensions similar to the footwell recesses described above. Within the galley 80, there is a projecting abutment corresponding to each recess 84. A display monitor 70 can be mounted on the bulkhead above the recess 84.

To minimise the intrusion into the galley space, regions between adjacent recesses 84 can be used to store galley trolleys, and the space above the abutments can be used as a genera purpose storage space, including, for example, stowage cupboards.

Likewise, when a front row approaches a lavatory enclosure, as labelled 'A' in Figures 1 and 2, or a store cupboard, particular measures can be taken to optimise the use of space. Figures 10 to 12 are views from various vantage points of one such arrangement with respect to a lavatory enclosure 86 at the front of the outer group 14. Once again, the objective is to minimise the longitudinal distance between a rear bulkhead 88 of the enclosure and the front seat of an adjacent block of seats.

As with the galley, a recess 90 is formed in the bulkhead 88 to provide a footwell. The corresponding abutment within the lavatory enclosure 86 has a top surface 87 that can provide a table-top surface for a person within the enclosure. Alternatively, the space above the abutment may be enclosed for use as stowage space or housing for equipment.

At the rear of a group, the seat can be mounted close to a bulkhead since, in the preferred embodiment, no extra space is needed to allow the seat to recline. If there is sufficient space to gain access to it, the unused rear footwell may provide additional storage space.

Figures 14 to 18 show, by way of example, respective alternative seating layouts (only part of the respective cabins are shown), the layouts being comprised of seating assemblies or components described herein before. Figure 14 shows a 3 aisle seating layout wherein, in each row, there is only one seat 20 and adjacent footwell 22 (or buttress 56) between each aisle. The layout of Figure 14 is suitable for, for example, Airbus A380 and A340 (r.t.m) aircraft or for Boeing B777 and B747 (r.t.m) aircraft. In the following examples, it will be seen that the seats 20 in alternate rows are staggered in a transverse direction with respect to one another, while seats 20 in every other row are substantially in register with one another in the transverse direction (i.e. lie on a common longitudinal axis).

Figure 15 shows a 2 aisle seating layout that is generally similar to the layout of Figure 1, except that the central group 114 of seats 20 comprises, in alternate rows, a respective

seating component comprising one seat 20 with an adjacent footwell 22 (or buttress 56) on either side, and then two seats 20 with a common adjacent footwell 22 (or buttress 56) in between the seats 20, the seats 20 in successive rows being staggered in the transverse direction in the manner illustrated above. The layout of Figure 15 is suitable for use in, for example, Boeing B767 (r.t.m) aircraft.

Figure 16 shows a single aisle layout comprising two seating groups 110, 112, one on either side of the aisle 116. Each row of each group 110, 112 comprises two seats 20 each having a respective adjacent footwell 22 (or buttress 56), the seats 20 in successive rows being staggered in the transverse direction. The layout of Figure 16 is suitable for use in, for example, Boeing B767-200 (r.t.m) and Airbus A340 (r.t.m) aircraft.

Figure 17 shows a single aisle layout comprising two seating groups 210, 212, one on either side of the aisle 216. Alternate rows of each group 210, 212, comprise one seat 20 with an adjacent footwell 22 (or buttress 56) on either side, and then two seats 20 with a common adjacent footwell 22 (or buttress 56) in between the seats 20, the seats 20 in successive rows being staggered in the transverse direction. The layout of Figure 17 is suitable for use in, for example, Boeing B737 (r.t.m) and Airbus A319 (r.t.m) aircraft.

Figure 18 shows a 2 aisle layout in which each row of each seating group comprises 3 seats 20, or seating positions, each seat having a respective adjacent footwell 22/buttress, the seats 20 in successive rows being staggered in the transverse direction. Such a layout would be suitable for, for example, a Boeing B777 or B747 (r.t.m) aircraft.

Figure 19 shows a 2 aisle layout in which each row of each seating group comprises 2 seats 20 (or seating position), each seat 20 having a respective adjacent footwell 22/buttress, the seats 20 in successive rows being staggered in the transverse direction as shown.

It will be noted that in the layouts of Figures 14, 15 and 19, each passenger has direct access to an aisle.

Conventionally, 3 seats (usually economy class seats) are sacrificed to install 1 conventional "lie flat at an angle" bed/seat, while 4 seats (usually economy class seats) are sacrificed to install 1 conventional "horizontal" bed. With the present invention, typically about 2.8 seats are sacrificed to install 1 seat 20 with its associated components. In the embodiment of Figure 16, only 2 seats are sacrificed to install 1 seat 20 with associated components. This is particularly attractive to airline operators who typically demand a "horizontal bed" ticket price that is about ten times that of an economy seat. Moreover, the efficient use of space exhibited by the present invention allows the pitch between rows to be reduced in comparison with conventional layouts to the extent that an additional row of seats can be installed in a given cabin area. A typical conventional seat pitch between rows is around 1500 mm (60 inches) whereas, with the preferred embodiments of the invention, the seat pitch between rows may be between approximately 1000 mm to 1150 mm (40 to 46 inches).

It will be understood that various advantageous aspects of the embodiments described herein may be used independently of other aspects of the embodiments. For example, the overhang of the seating position, or seat station, and adjacent footwell; the overlapping of seating stations of successive rows in the transverse direction; the overhanging armrests 75; the tray 60 location and configuration; and the shape and configuration of the shell 50, may each be employed independently of each other and of other aspects of the invention as will be apparent to a skilled person and are not limited to use in connection with seats that recline into a bed state.

The invention is not limited to the embodiments described herein which may be modified or varied without departing from the scope of the invention.

CLAIMS:

1. A seating arrangement for a passenger-carrying vehicle, the arrangement providing a plurality of seating positions, a seating position comprising a seat and a footwell, the footwell of a first seating position being located beside the seat of a second seating position, the second seating position being located generally forward of the first seating position, wherein each seat is operable into a reclined state in which a leg-supporting component of the seat projects into the associated footwell, and wherein the first seating position and the second seating position overlap in a transverse direction.

2. A seating arrangement as claimed in Claim 1, wherein each seat is associated with one or more armrests, and wherein at least a respective armrest of the first seating position and of the second seating position overlap in the transverse direction.

3. A seating arrangement as claimed in Claim 1 or 2, wherein the respective seats of the first seating position and of the second seating position overlap in the transverse direction.

4. A seating position as claimed in Claim 3, wherein each seat includes a back and a base and wherein, when the seats are in the reclined state, the respective backs of the first seating position and of the second seating position overlap in the transverse direction.

5. A seating arrangement as claimed in any preceding claim, wherein each seating position comprises a respective region for receiving a passenger's arms when lying on the seat in its reclined state, and wherein a respective arm-receiving region of the first seating position and of the second seating position overlap in the transverse direction.

6. A seating arrangement as claimed in any preceding claim, wherein said footwells are shaped to become narrower in said forward direction.

7. A seating arrangement as claimed in Claim 6 when dependent on Claim 5, wherein at least some of said arm-receiving regions become wider in said forward direction.

8. A seating arrangement as claimed in any preceding claim, further comprising a shell shaped to define a respective station for one or more of said seats and to define a respective footwell on one or both sides of the or each seat station, wherein the station for the seat of the first seating position and the station for the seat of the second seating position overlap in the transverse direction.

9. A seating arrangement as claimed in Claim 8, wherein the shell is shaped so that the or each seat station becomes wider, and the or each footwell becomes correspondingly narrower, in said forward direction.

10. A seating arrangement as claimed in any preceding claim, wherein the second seating position overlaps with the footwell of the first seating position in said transverse direction.

11. A seating arrangement as claimed in Claim 10, wherein the second seating position overhangs part of the footwell of the first seating position.

12. A seating arrangement as claimed in Claim 10 or 11 when dependent on Claim 3, wherein the seat of the second seating position overhangs part of the footwell of the first seating position.

13. A seating arrangement as claimed in any one of Claims 10 to 12 when dependent on Claim 4, wherein the back of the seat, when reclined, of the second seating position overhangs part of the footwell of the first seating position.

14. A seating arrangement as claimed in any one of Claims 10 to 13 when dependent on Claim 5, wherein an arm-receiving region of the second seating position overhangs part of the footwell of the first seating position.

15. A seating arrangement as claimed in any one of Claims 10 to 14 when dependent on Claim 8 or 9, wherein the seat station for the seat of the second seating position overlaps or overhangs part of the footwell of the first seating position.

16. A seating arrangement as claimed in any one of claims 10 to 15, wherein the footwell of the first seating position becomes narrower in a direction generally away from a ground surface on which the seating arrangement rests during use.

17. A seating arrangement as claimed in Claim 16, wherein the footwell of the first seating position narrows at an inflected portion, the inflected portion being located between the leg support component of the seat, when reclined, of the first seating position and the back of the seat, when reclined, of the seat of the second seating position.

18. A seating portion as claimed in Claim 15 or 16, when dependent on Claim 8 or 9, wherein the shell is shaped so that the or each seat station becomes wider, and the or each adjacent footwell becomes correspondingly narrower, in said direction generally away from the ground surface.

19. A seating arrangement as claimed in any preceding claim, wherein each seat comprises a back, a seat base and the leg-supporting component and, when moving from an upright state to the reclined state, the back, seat base and leg-supporting component each move in a generally forward direction.

20. A seating arrangement as claimed in any preceding claim, wherein at least one of said seating positions includes an armrest comprising a shelf overhanging the respective seating position in the transverse direction.

21. A seating arrangement as claimed in Claim 20, wherein said shelf overhangs the respective seat.

22. A seating arrangement as claimed in Claim 20 or 21, when dependent on any one of Claims 8 or 9, wherein said armrests are fixed with respect to the shell.

23. A seating arrangement as claimed in Claim 20 or 21, wherein, when the seat is in the reclined state, the or each respective armrest overhangs the back of the respective seat.

24. A seating arrangement as claimed in any preceding claim, wherein, in the reclined state, each seat provides a respective sleeping surface that is substantially horizontal with the ground surface on which the seating arrangement rests during use.

25. A seating arrangement as claimed in Claim 8 or 9, wherein the shell is shaped to define a respective station for two or more seats in a row.

26. A seating arrangement as claimed in any preceding claim when dependent on Claim 8 or 9, wherein the shell comprises a portion for accommodating the back of a seat, said portion being fixed in a fore-and-aft direction.

27. A seating arrangement as claimed in any preceding claim when dependent on Claim 8 or 9, wherein the shell comprises a portion for accommodating a back rest of a seat, said portion being movable in a fore-and-aft direction.

28. A seating arrangement as claimed in any preceding claim, wherein each footwell is partially enclosed to define a console adjacent one or both respective seats.

29. A seating arrangement as claimed in Claim 28, wherein each console is shaped to define a respective armrest adjacent the or each adjacent seat, the or each armrest overlapping with the footwell beneath the console.

30. A seating arrangement as claimed in Claim 28 or 29, wherein a table comprising one or more table leaves is associated with each console, the table being deployable

from a stowed state in or on the console in which it is disposed generally parallel with the ground surface on which the seating arrangement rests during use.

31. A seating arrangement as claimed in any preceding claim when dependent on Claim 8 or 9, wherein the shell includes a respective buttress portion extending between adjacent seats, or adjacent a single seat, the buttress portion being shaped to define a respective footwell.

32. A seating arrangement as claimed in Claim 31 when dependent on any one of claims 28 to 30, wherein the buttress portion provides said console.

33. A seating arrangement as claimed in Claim 32 when dependent on Claim 30, wherein the buttress portion includes a stowage area for said table.

34. A seating arrangement as claimed in any preceding claim when dependent on Claim 8, wherein the shell is shaped to define a respective generally upright web portion extending between adjacent seat stations, or adjacent a single seat station.

35. A seating arrangement as claimed in Claim 34, wherein said upright web portion includes a surface area disposed in a plane generally perpendicular to the forward direction, and wherein a monitor is carried by said surface area.

36. A seating arrangement as claimed in Claim 34 or 35, wherein said upright web portion is shaped to provide a screen between passengers seated in adjacent seats.

37. A seating arrangement as claimed in any preceding claim, wherein the footwell of the first seating position extends beyond the base of the seat, when upright, of the second seating position in the forward direction.

38. A seating arrangement as claimed in any preceding claim, wherein a plurality of said seating positions are arranged in rows and ranks, the rows being generally

perpendicular to the ranks and being partitioned by one or more aisles, the aisles being generally parallel with the ranks.

39. A seating arrangement as claimed in Claim 38, comprising two aisles, each row comprising a respective single seating position on the outer side of each aisle, alternate rows comprising two seating positions and then three seating positions between the aisles.

40. A seating arrangement as claimed in Claim 38, comprising two aisles, each row comprising a respective single seating position on the outer side of each aisle, alternate rows comprising two seating positions and then one seating position between the aisles.

41. A seating arrangement as claimed in Claim 38, comprising two aisles, each row comprising a respective single seating position on the outer side of each aisle, each row comprising two seating positions between the aisles.

42. A seating arrangement as claimed in Claim 38, comprising two aisles, each row comprising a respective single seating position on the outer side of each aisle, each row comprising three seating positions between the aisles.

43. A seating arrangement as claimed in Claim 38, comprising one aisle, each row comprising a respective two seating positions on either side of the aisle.

44. A seating arrangement as claimed in Claim 38, comprising one aisle, alternate rows comprising one seating position and then two seating positions on either side of the aisle.

45. A seating arrangement as claimed in Claim 38, comprising three aisles, each row comprising a respective single seating position on both sides of each aisle.

46. A seating arrangement as claimed in any preceding claim, wherein a platform is provided within each footwell, and wherein, when the associated seat is in the reclined

state, the leg-supporting component of the seat closely approaches the platform within the footwell.

47. A seating arrangement as claimed in any preceding claim, wherein each seating position provides a respective sleeping compartment when the respective seat is in the reclined state, each sleeping compartment comprising the respective footwell and a sleeping surface projecting into the footwell, the sleeping surface comprising the respective seat when in the reclined state, and wherein the sleeping compartment of the first seating position and the sleeping compartment of the second seating position overlap in a transverse direction.

48. A seating arrangement as claimed in Claim 47, wherein the sleeping compartment of the second seating position overlaps with the footwell of the sleeping compartment of the first sleeping compartment in the transverse direction.

49. A seating component for a passenger-carrying vehicle, the component comprising one or more seats or seat stations and a respective footwell beside one or both sides of the seat, and being further adapted to construct a seating arrangement as claimed in any one of Claims 1 to 48.

50. A seating component as claimed in Claim 49 wherein the seat or seat station overlaps with the or each adjacent footwell.

50. An aircraft comprising a seating arrangement as claimed in any one of claims 1 to 48.

51. A seating arrangement for a passenger-carrying vehicle, the arrangement providing a plurality of sleeping compartments, a sleeping compartment comprising a footwell and a sleeping surface projecting into the footwell, the footwell of a first sleeping compartment being located beside the sleeping surface of a second sleeping compartment, the second sleeping compartment being located generally forward of the

first sleeping compartment, wherein the first sleeping compartment and the second sleeping compartment overlap in a transverse direction.

Fig. 1

WO 2005/014395
PCT/EP2004/008006

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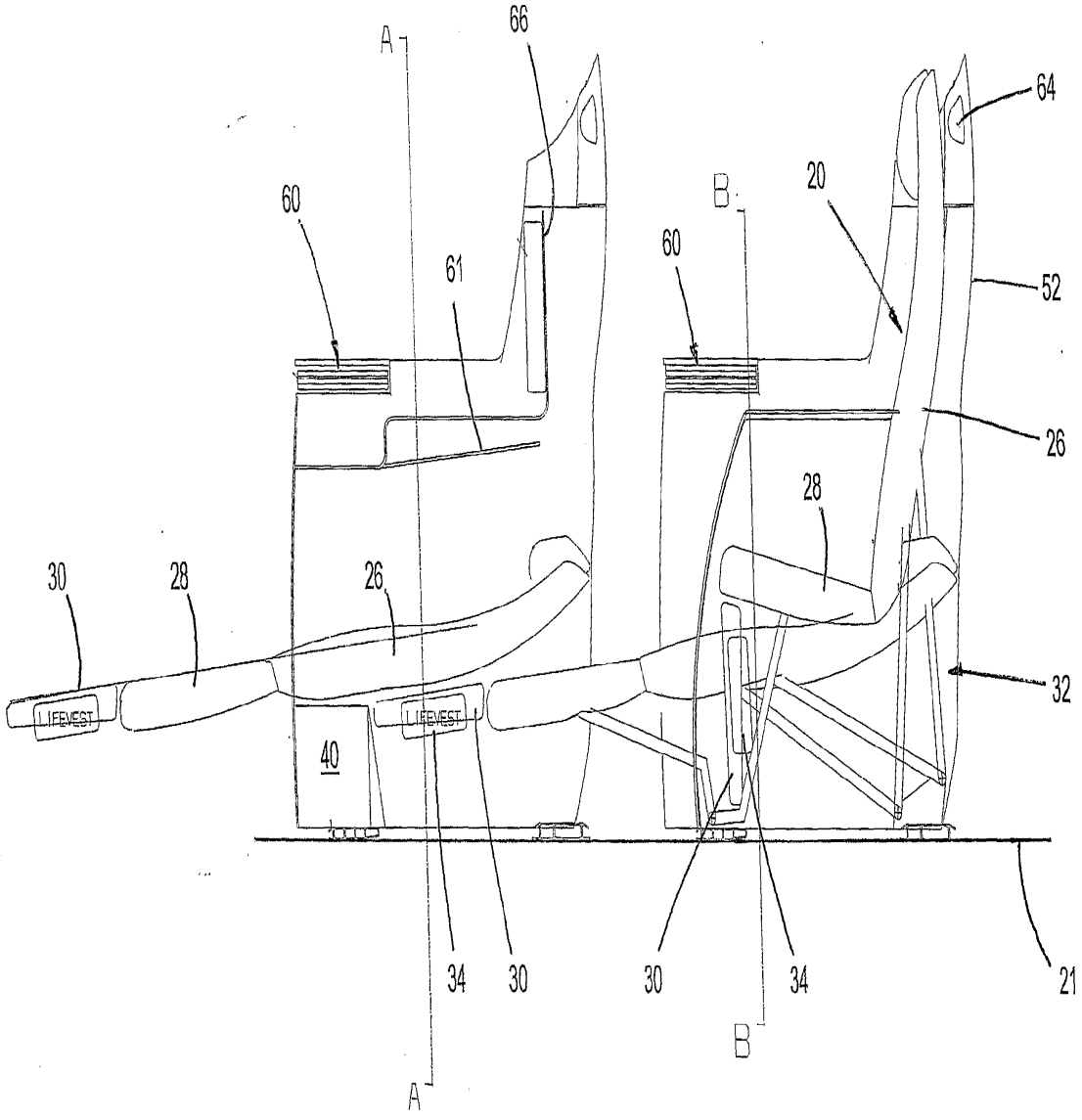
Fig. 2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60
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34
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34
21
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A

Fig. 3

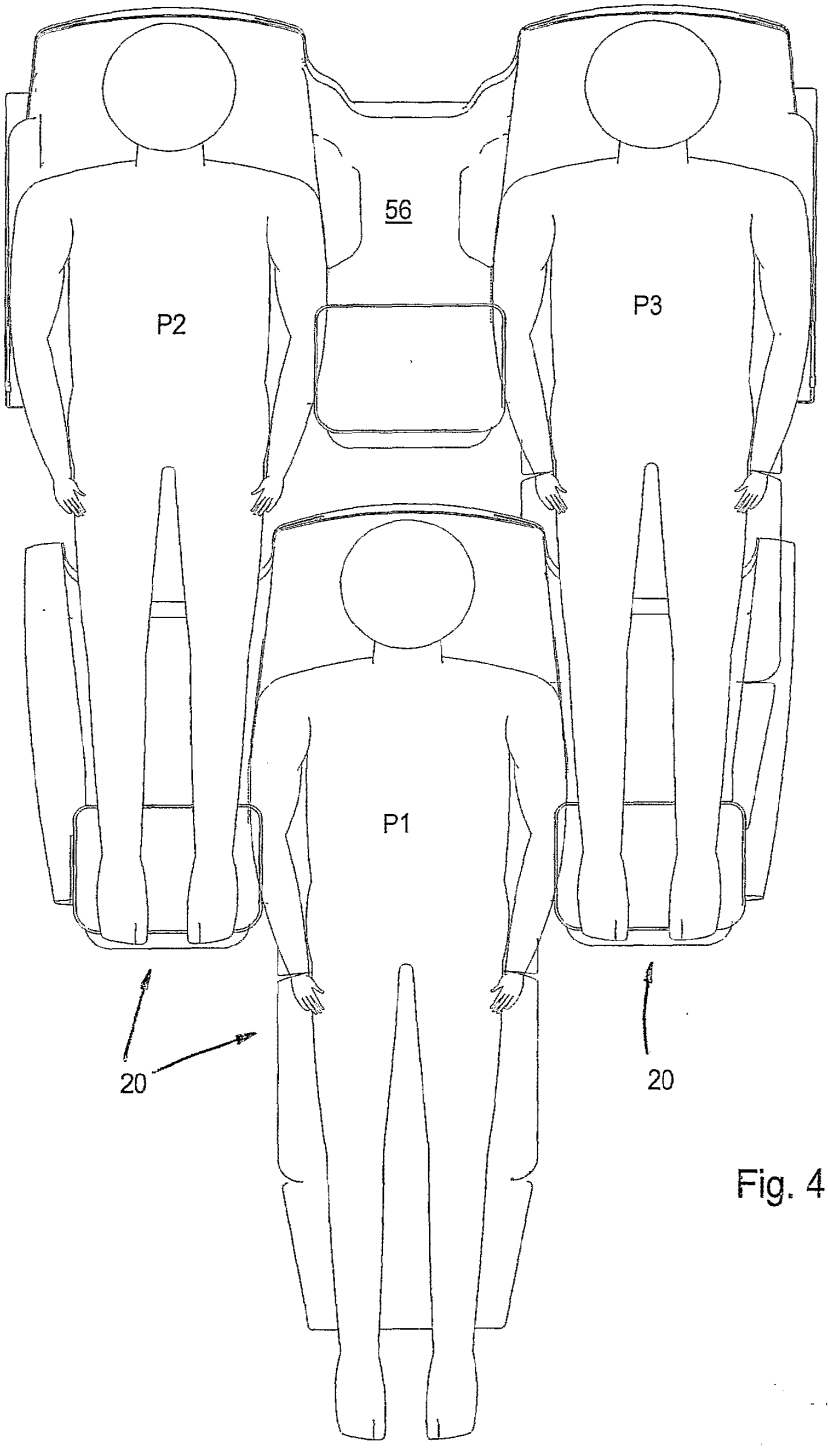

Fig. 4

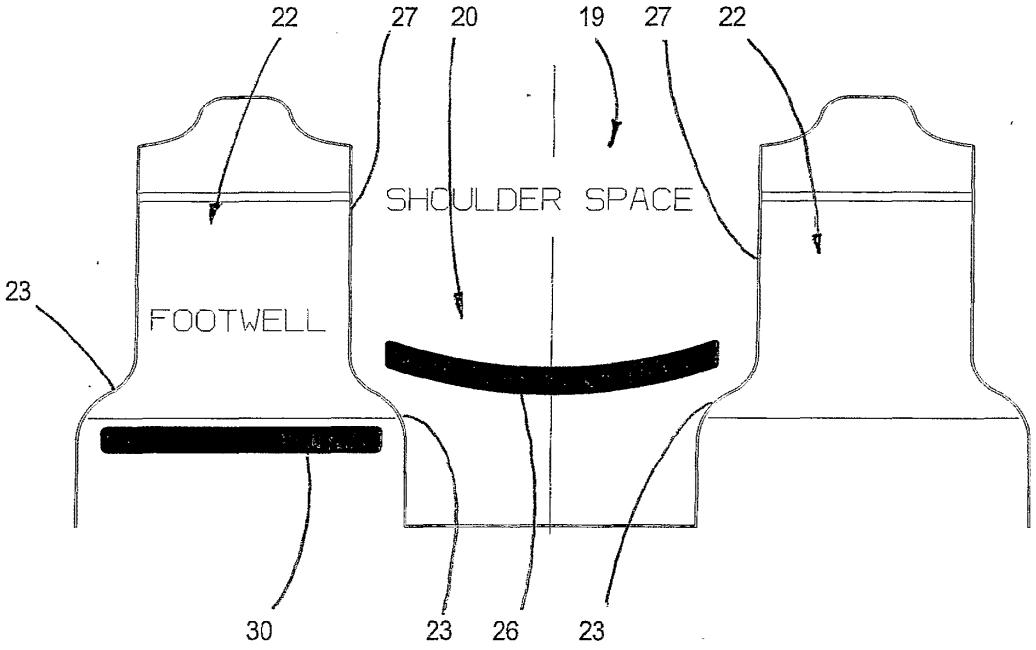

Fig. 5

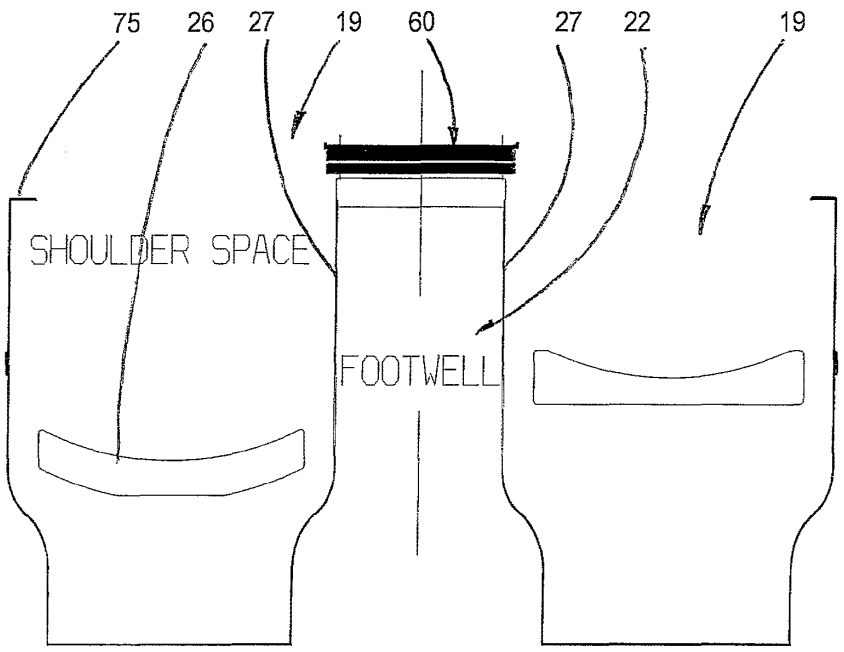

Fig. 6

62
68
52
66
50
66
A
B
OPEN LEAF
SLIDE
60
60
60
26
64
50
52
56
58
70
74
75
54
40
30
28
52
23

Fig. 7

Fig. 8.

Fig. 9

Fig. 10

Fig. 11

Fig. 12

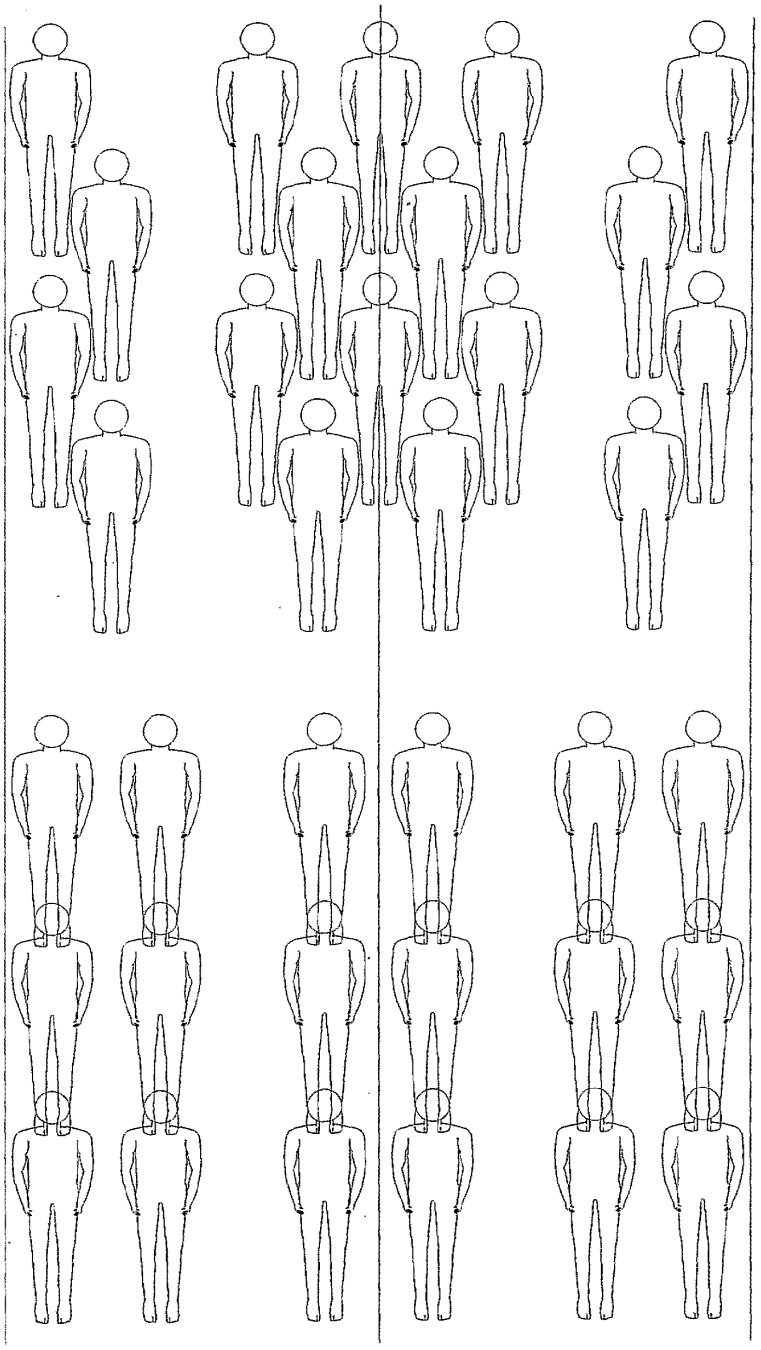

Fig. 13

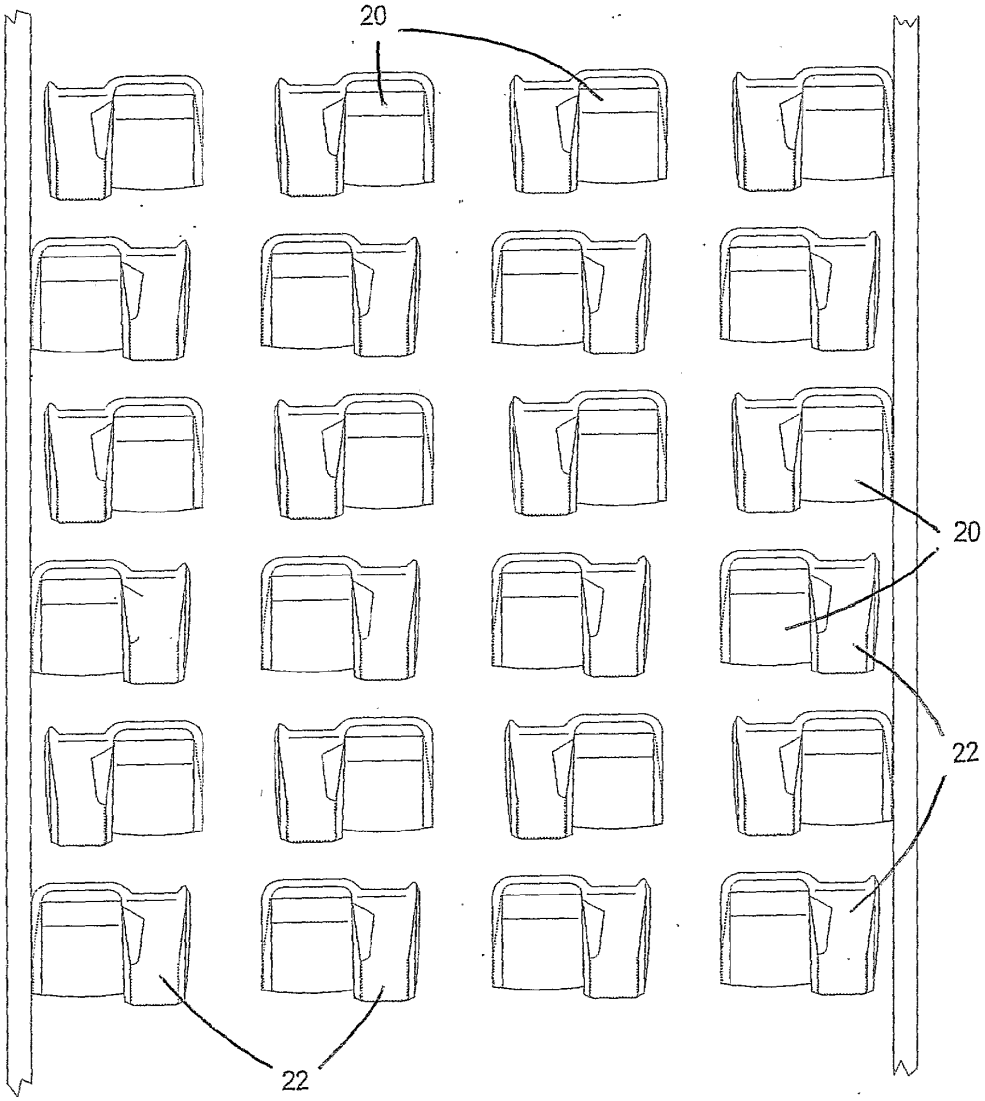

Fig. 14

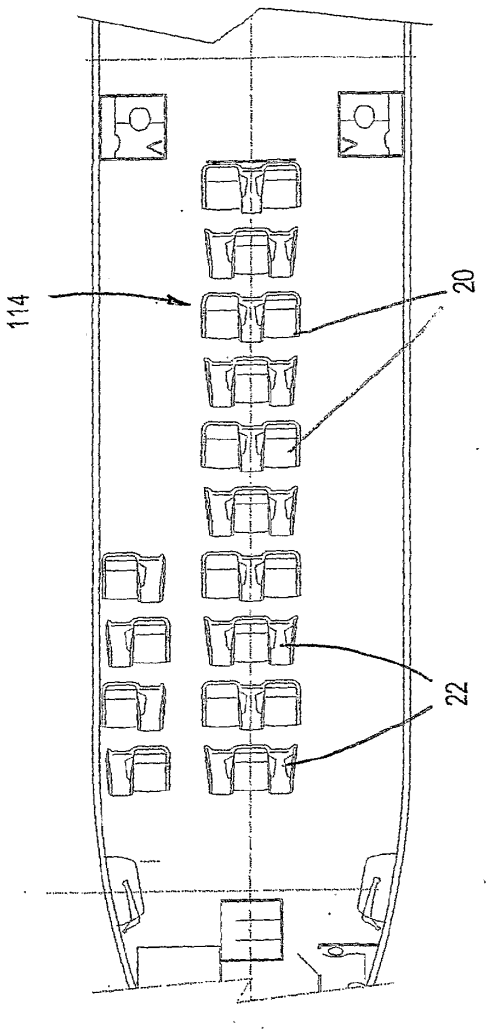

Fig. 15

Fig. 19

Fig. 16

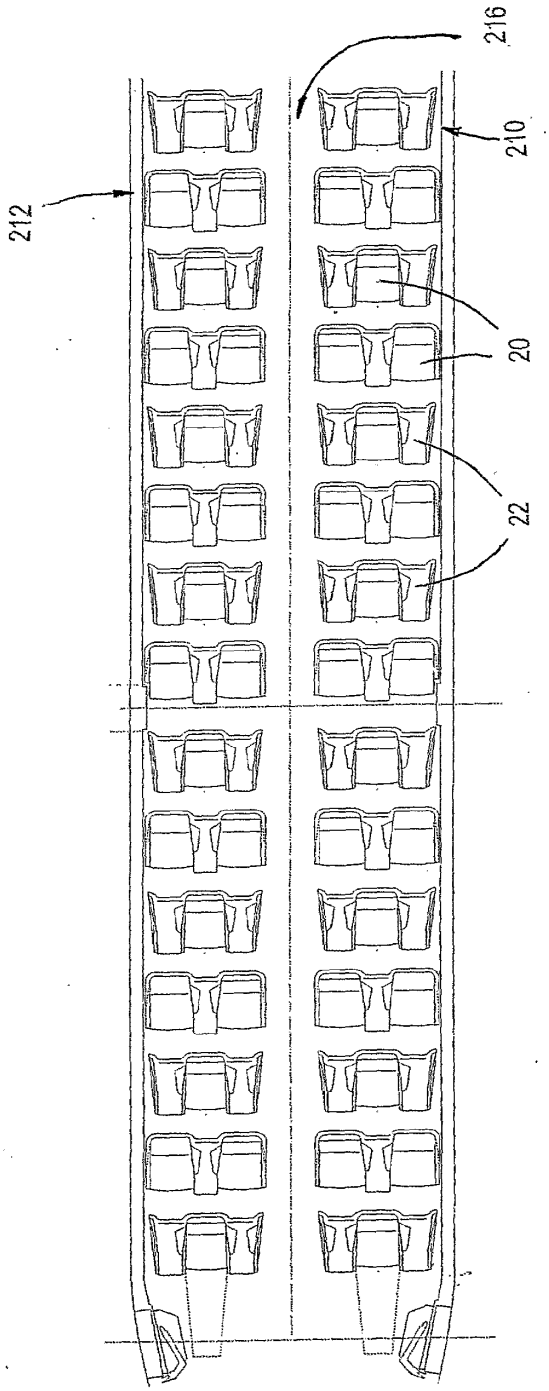

Fig. 17

Fig. 18

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP2004/008006

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B64D11/06

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)
IPC 7 B64D B60N

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 practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00/21831 A (BRITISH AIRWAYS PLC ; DARBYSHIRE MARTIN (GB); ROUND MATTHEW (GB)) 20 April 2000 (2000-04-20) page 4, line 14 - page 15, line 26; figures	1-7, 10-14, 16,20, 21,23, 24,37, 47-52
Y		8,9,15, 18,22, 25-27, 38-45

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" 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

"X" 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

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INTERNATIONAL SEARCH REPORT

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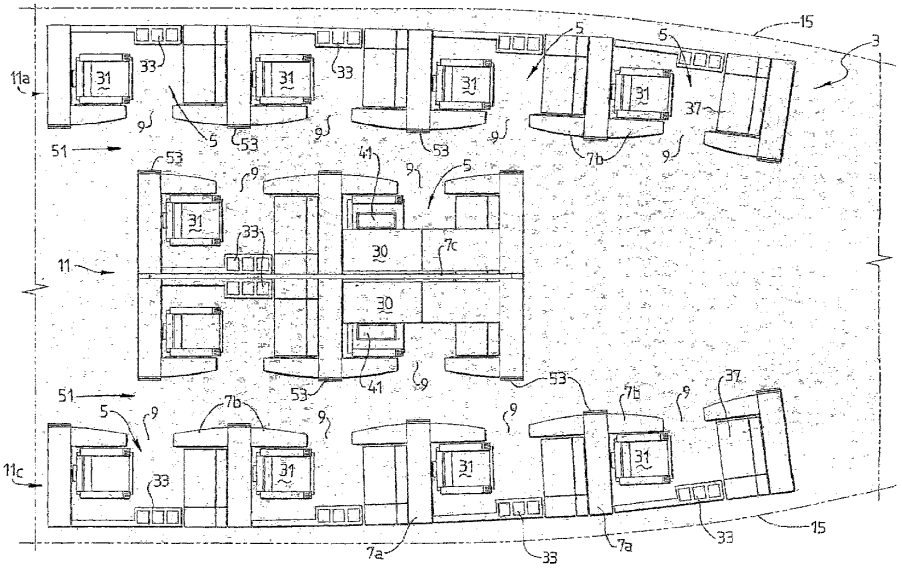

(57) Abstract: An aircraft cabin that comprises a plurality of compartments (5) for passengers each having side walls (7a, 7b, 15) and accessible via a doorway (9) in one of the side walls (7a, 7b, 15). The compartments (5) include door assemblies for closing the doorways (9) and creating enclosed spaces and chair and other furniture interactively arranged in the compartment (5).

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

AN AIRCRAFT CABIN

The present invention relates to an aircraft cabin.

In general terms, the invention is an aircraft cabin that comprises a plurality of "private" passenger compartments for passengers during an aircraft flight, with each compartment comprising walls that define a compartment space and being accessible via a doorway in one of the walls, and with each compartment at least comprising a chair for a passenger.

Preferably the cabin comprises a section of a total aircraft cabin.

Preferably the compartment walls are at least 1.5 m high.

More preferably the compartment walls are at least 1.6 m high.

The selection of the height of the compartment walls to be at least 1.5 m ensures privacy for passengers in the compartments.

Preferably the cabin comprises at least 3 rows of the compartments extending in a length-wise extending direction of the aircraft, with adjacent rows being separated by length-wise extending aisles, and with: (a) two outer rows being positioned along opposite sides of the aircraft with the aircraft side walls forming compartment walls, and (b) at least one internal row being positioned between the outer rows and separated from at least one outer row by a said length-wise extending aisle.

With this arrangement, the doorway walls define

the aisles, and the compartments are accessible from the aisles via the doorways.

Preferably the doorways divide the doorway walls into two sections, with one section on each side of each doorway.

Preferably the doorways are positioned centrally in the doorway walls.

Preferably the aisles are curved along the length thereof.

Preferably the curved aisles are formed by forming the doorway walls as curved walls, for example by being convex as viewed from the aisles, and by positioning the compartments so that the doorways of the compartments on opposite sides of the aisles are not aligned.

More preferably the compartments are positioned so that the doorways of the compartments on one side of the aisles face the doorway walls on the other side of the aisles, and vice versa.

Forming the doorway walls as curved walls as viewed from the aisles means that there is additional space in these sections of the compartments for housing furniture in the compartments. This is an advantage because it makes it possible to make more efficient use of the available space within the compartments.

Preferably the walls that form the two outer rows of the compartments comprise (a) the aircraft side walls, (b) walls that extend inwardly from the aircraft side walls, and (c) the doorway walls. With this arrangement, the aircraft side walls form length-wise extending outer side walls of the compartments, the walls that extend

inwardly from the aircraft side walls form end walls of the compartments, and the doorway walls form length-wise extending inner side walls of the compartments.

Preferably the or each interior row of the compartments comprises a plurality of pairs of length-wise extending compartments, with the doorways of the compartments of each pair providing access to the compartments from aisles on opposite sides of the interior row.

Preferably the compartments of at least one pair of compartments is separated by a length-wise extending wall that is a removable wall, whereby the pair of compartments may be converted into a double compartment by removing the removable wall.

Preferably each compartment of at least one pair of compartments comprises single beds that can be moved from storage positions to sleep positions that are in side-by-side relationship when the compartments are converted into the double compartment so as to form a double bed.

Preferably the cabin comprises a plurality of wardrobes in walls of the compartments that separate adjacent compartments in the rows of compartments.

Preferably the wardrobes include wardrobes that are mounted for sliding movement between storage positions in the walls and operative positions in which the wardrobes extend into the aisles and are accessible from the aisles.

Preferably each compartment includes doors for the doorways so that the compartments can be completely enclosed spaced when the doors are closed.

In general terms, the invention also comprises a private passenger compartment for a passenger during an aircraft flight that comprises walls that define a compartment space, a doorway in one of the walls that enables access to the compartment from an aisle, and a chair and other basic furniture located in the compartment space in an interactive way so that the furniture can be selectively arranged in a number of different configurations.

Preferably the compartment walls are at least 1.5 m high.

More preferably the compartment walls are at least 1.6 m high.

Preferably the doorway divides the doorway wall into two sections, with one section on each side of the doorway.

Preferably the doorway is positioned centrally in the doorway wall.

Preferably the sections of the doorway wall are curved, for example by being convex as viewed from the aisle, so that the compartment is wider in these sections of the compartment than in the region of the doorway.

Preferably the doorway wall includes at least one window.

More preferably the doorway wall includes at least two windows, with at least one window in each section of the doorway wall.

Preferably the windows include retractable blinds

that can be closed.

Preferably the compartment include a door assembly for closing the doorway.

The door assembly may comprise a door mounted for sliding movement from a retracted position within the doorway wall to a closed position in which the door extends across the doorway and closes the compartment.

Preferably the door assembly includes a pair of doors mounted for sliding movement inwardly towards each other from retracted positions within the sections of the doorway walls that are on opposite sides of the doorway.

Preferably the doors include transparent windows that are positioned so that the view through the windows in the doorway walls is not obscured by the doors when the doors are in the retracted positions.

Preferably the doors include retractable blinds that can be closed when the doors are in the closed positions.

Alternatively, the door assembly may comprise an upper rail and a curtain supported by the rail.

Preferably the rail is mounted for sliding movement between a retracted position within the doorway wall and an operative, ie closed, position in which the rail extends across the doorway.

Preferably the curtain is adapted to fold in a concertina fashion so that (a) the curtain folds against the doorway wall when the rail is slid into the retracted position and (b) the curtain expands and closes the doorway when the rail is in the operative position.

Preferably the configurations of the compartment comprise relaxation, work, and sleep configurations.

In addition to the chair, the other basic furniture of the compartment may comprise any one or more of a table assembly, a cadenza that houses the table assembly when the table assembly is in a folded position, a seat, and a bed.

With this selection of basic furniture, preferably the bed is foldable from a storage position in one of the compartment walls to a sleep position within the compartment.

Preferably the bed is a bi-fold bed.

Preferably the chair is foldable from an operative position in which a person can sit upright in the chair to an inoperative position in which the folded chair defines a support for the bed when the bed is in the sleep position.

Preferably the chair defines a bedside table when the chair is in the inoperative position.

Preferably the seat is adapted to define a support for the bed when the bed is in the sleep position.

Preferably the cadenza is adapted to define a support for the bed when the bed is in the sleep position.

Preferably the cadenza is movable from a raised operative position in which the cadenza can be accessed conveniently by a passenger seated in the chair to a lowered bed support position.

Preferably the table assembly is housed in the cadenza so that it can be moved, for example by being swivelled, from a stored position within the cadenza to an operative position with a table of the table assembly extending horizontally into the compartment proximate the chair.

There are a large number of possible interactive combinations of the above-described basic furniture within the compartment.

One interactive combination of the above-described furniture in the compartment space comprises: (a) the chair to one side of the doorway, (b) the seat to the other side of the doorway, (c) the cadenza against the wall opposite the doorway, and (d) the table assembly housed in the cadenza and movable between the stored position within the cadenza and the operative position with the table of the table assembly extending horizontally into the space between the chair and the seat.

In addition to the chair, the other basic furniture of the compartment may also comprise any one or more of a work desk, a table assembly, a seat, a bed and a visual display system of an entertainment system.

With this selection of basic furniture, in one embodiment the compartment comprises the following interactive combination of the above-described basic furniture in the compartment space: (a) the chair in one corner of the compartment space, (b) the work desk along at least a part of one wall of the compartment and proximate the chair, (c) the table assembly movable between a stored position adjacent one wall of the compartment and an operative position with a table of the table assembly extending horizontally proximate the chair.

Preferably the compartment comprises the bed movable between a raised storage position and a lowered sleep position on the work desk.

Preferably the compartment comprises the seat adjacent at least a part of one wall of the compartment.

Preferably the work desk and the seat are positioned adjacent different walls of the compartment.

In another embodiment the compartment comprises the following interactive combination of the above-described basic furniture in the compartment space: (a) the chair in one corner of the compartment space, (b) the seat adjacent one wall of the compartment, (c) the table assembly movable between a stored position adjacent one wall of the compartment and an operative position with a table of the table assembly extending horizontally proximate the chair.

In another embodiment the compartment comprises the following interactive combination of the above-described basic furniture in the compartment space: (a) the chair in one corner of the compartment space, (b) the bed movable between a raised storage position and a lowered sleep position, (c) the table assembly movable between a stored position adjacent one wall of the compartment and an operative position with a table of the table assembly extending horizontally proximate the chair.

In another, although not the only other, embodiment the compartment comprises the following interactive combination of the above-described basic furniture in the compartment space: (a) the chair in one corner of the compartment space, (b) the seat adjacent a wall opposite the chair when the chair is in a take-off

position, (c) the work desk adjacent a wall that is in a lengthwise-extending direction of the aircraft, (d) the table assembly movable between a stored position adjacent the same wall as the work desk and an operative position with a table of the table assembly extending horizontally in a space between the chair and the seat, and (e) the bed movable between a raised storage position and a lowered sleep position on the work desk.

The term "take-off" position is understood herein to mean a position in which a person seated in the chair is facing forward in the direction of travel of the aircraft.

Preferably the work desk and the table assembly are located adjacent the wall that is opposite the wall that defines the doorway.

Preferably the work desk defines a support platform for the bed and supports the bed when the bed is in the sleep position.

Preferably the bed is stored in a raised position in the compartment space and is moveable down to a lowered operative position on the platform and is supported by the platform in the lowered position.

Preferably the work desk and the table assembly are positioned in relation to the chair when the table assembly is in the operative position so that the chair can be swiveled between positions facing the work desk and the table assembly.

Preferably a work platform of the work desk is vertically adjustable to accommodate different requirements of different passengers. This feature makes it possible to design the passenger seat to be with a

fixed vertical position.

Preferably the stored position of the table assembly is adjacent the work desk.

In an alternative, although not the only possible alternative embodiment, the stored position of the table assembly is within the space occupied by the work desk.

Preferably the table assembly comprises: (a) a base member that can slide between the stored position adjacent the side wall and the operative position between the chair and the seat, (b) a support arm pivotally mounted to the base member and foldable between the storage position and the operative position, and (c) a table pivotally mounted to the support arm.

The above-described table assembly can be moved from the stored position to the operative position by sliding or otherwise moving the base member outwardly from the storage position, lifting the table upwardly and inwardly into the compartment space and thereby pivoting the support arm upwardly and inwardly into the compartment space until the table is in the horizontal operative position.

Preferably the support arm comprises a table support element that is positioned to support an underside of the table when the table assembly is the operative position with the table in the horizontal position.

Preferably the table comprises side wings that can be folded between an inward storage position and an outward operative position.

Preferably the base member defines a storage compartment. By way of example, the storage compartment

may be used for storing a brief case, etc.

In general terms, the present invention also comprises the above-described table assembly.

In general terms, the present invention also comprises the above-described sliding door assembly.

In general terms the present invention also comprises an aircraft that comprises the above-described cabin.

The present invention is described further by way of example with reference to the accompanying drawings of which:

Figure 1 is a general layout diagram of one embodiment of a cabin in accordance with the present invention which includes two outer rows and one interior row of one embodiment of a passenger compartment in accordance with the present invention;

Figure 2 is a perspective view of the outer row passenger compartment in the cabin shown in Figure 1 as viewed from an aisle;

Figure 3 is a perspective view similar to Figure 2 with the compartment doors closed and the retractable blinds of the doors in a closed position;

Figure 4 is a perspective view similar to Figure 2 with compartment doors closed and retractable blinds of the doors in an open position;

Figure 5 is a top plan view of the compartment shown in Figure 2 with a table assembly in a storage position;

Figure 6 is a top plan view of the compartment shown in Figure 2 with a table assembly in an operative position;

Figure 7 is a perspective view of part of the compartment shown in Figure 2 with a passenger chair in a folded position;

Figure 8 is a perspective view similar to Figure 7 which illustrate a bed in an operative position;

Figure 9 is a perspective view of the compartment shown in Figure 2 which illustrates a wardrobe in an operative position extending into a passenger aisle;

Figure 10 is a top plan view of the interior row of compartments in the cabin shown in Figure 1;

Figure 11 is perspective views of one of the pairs of the passenger compartments shown in Figure 10 illustrating the sequence of steps to convert the separate compartments into a double compartment;

Figure 12 is perspective views of a section of the compartment shown in Figure 2 which illustrates a baby bassinet in the compartment;

Figure 13 is a perspective view of a section of the compartment shown in Figure 2 which illustrates a control panel and other utilities of the compartment;

Figure 14 is a perspective view of a section of the compartment shown in Figure 2 which illustrates bed controls of the compartment;

Figures 15 and 16 are perspective views of a

section of the compartment shown in Figure 2 which illustrate a cadenza of the compartment;

Figures 17 to 19 are perspective and side and top elevation views of a service tray of the compartment shown in Figure 2.

Figure 20 is a schematic diagram that illustrates another embodiment of a cabin in accordance with the present invention;

Figure 21 is a detailed view of part of the cabin shown in Figure 20 viewed in a different direction to that of Figure 20;

Figure 22 is a further detailed view of another part of the cabin shown in Figure 20 viewed in a different direction to that of Figures 20 and 21;

Figure 23 is a top perspective view of one private passenger compartment in the cabin shown in Figure 20 in one compartment configuration;

Figure 24 is another top perspective view of the private passenger compartment shown in Figure 23 in another compartment configuration;

Figure 25 is a side view of the private passenger compartment shown in Figures 23 and 24 viewed from within the aircraft cabin;

Figure 26 is a side view of the private passenger compartment shown in Figures 23 and 24 viewed from outside the cabin compartment;

Figure 27 is a perspective view of the table of the private passenger compartment shown in Figures 23 to

26 in an operative position;

Figures 28 to 39 are a series of perspective views of the private compartment shown in Figures 23 to 26 that illustrate a sequence of operations to transform the private passenger compartment into different configurations.

Figures 1 to 19 and 20 to 39 illustrate two embodiments of an aircraft cabin 3 that forms part of a total cabin layout of the aircraft.

In each embodiment, the cabin 3 comprises a plurality of "private" passenger compartments 5 that define multi-functional compartment spaces for passengers.

The compartments 5 of each embodiment are designed so that the compartments can be completely enclosed so that passengers can have total privacy.

The compartments 5 of each embodiment are designed particularly for long-haul fights during which the passengers occupying the compartments may wish to work, relax, or sleep.

In the embodiment shown in Figures 1 to 19 the cabin comprises 3 rows 11a, 11b, 11c of compartments 5 arranged in a length-wise extending direction of the aircraft and separated by aisles 51.

The compartments 5 of each row 11a, 11b, 11c are accessible via doorways 9 in the walls 7b, hereinafter referred to as "doorway walls 7b", that define the aisles 51.

The doorways 9 are centrally positioned in the doorway walls 7b and divide the walls 7b into two equal-

sized sections, one on each side of the walls 7b.

The two outer rows 11a, 11c of compartments 5 are positioned along opposite sides of the aircraft. The aircraft side walls 15 form outer side walls of the compartments 5. The compartments 5 in each outer row 11a, 11c also include walls 7a that extend inwardly from the aircraft side walls 15. The walls 7a form end walls of the compartments 5. The doorway walls 7b extend from the end walls 7a and form interior side walls of the compartments 5.

Each end wall 7a and the sections of the walls 7b that extend in opposite directions from the end walls 7b are essentially T-shaped arrangements.

The internal row 11b of compartments 5 comprises 2 pairs of the compartments 5 in side by side relationship. The compartments 5 in each pair have doorways 9 that open into aisles 51 on opposite sides of the internal row.

The compartments 5 in the internal row 11b are identical to the compartments 5 in the outer rows 11a and 11c in terms of furniture and layout save that the compartments 5 in each pair are separated by a dividing wall 7c that can be removed so that the compartments 5 can be converted from separate single compartments into a double compartment.

With reference to Figures 10 and 11, the dividing wall 7c comprises a top rail 69 and a retractable blind 71 housed in the top rail. Conversion of the compartment simply involves raising the blind 69 from the lowered position to the raised position.

The walls 7a, 7b are continuous internal walls that are 1.6 m high and therefore ensure privacy of

passengers in the compartments 5.

The aisles 51 are formed as curved aisles. The curved aisles contribute to the overall appearance of the cabin.

The curved aisles are formed by forming the doorway walls 7b as convex walls as viewed from the aisles 51 and by staggering positions of the compartments 5 so that the doorways 9 of the compartments 5 on opposite sides of the aisles 51 are not aligned.

More preferably the compartments 5 are staggered so that the doorways 9 of the compartments on one side of the aisles 51 face the doorway walls 7b on the other side of the aisles 51, and vice versa.

As is indicated above, forming the doorway walls 7b as curved walls as viewed from the aisles 51 means that there is additional space in these sections of the compartments 5 for housing furniture in the compartments 5. This is an advantage because it makes it possible to make more efficient use of the available space within the compartments 5.

The doorway walls 7b have windows 17 on both sides of the doorways 9. The windows 17 have retractable blinds 21 so that the passenger occupants can selectively create an open compartment which facilitates visual interaction with other compartments 5 in the cabin or a more private closed compartment 5.

Each compartment 5 comprises a sliding door assembly for closing the doorway 9.

The sliding door assembly of each compartment 5 comprises a pair of doors 23 that are mounted for sliding

movement between retracted positions in which the doors are located in frames (not shown) in the doorway walls 7b and closed positions in which the doors 23 extend across the doorway 9 and close the compartment 5.

With reference to Figure 4, each door 23 has a window 27. The arrangement of the doors 23 and the windows 17 in the doorway walls 7b is such that the windows 27 of the doors 23 overlap the windows 17 in the doorway walls 7b when the doors are in the retracted positions and thereby do not interrupt the view through the windows 17.

With reference to Figure 3, the sliding door assembly also includes retractable blinds 29 on the doors 23 so that the passengers can selectively create an open or a more closed private compartment. The blinds 29 are shown in a closed position in Figure 3.

Each private passenger compartment 5 houses an extensive range of furniture required by passengers, particularly on long-haul flights.

The furniture comprises a chair 3, a cadenza 3, a table assembly 35 housed in the cadenza 33, a bi-fold bed 29 stored in one of the end walls 7a, and a seat 37 located within the compartment space.

The furniture is designed and arranged to be interactive so that the furniture can be selectively arranged in a number of different functional configurations as may be required by passengers, particularly on long-haul flights.

The chair 31 is located to one side of the doorway and is positioned against the end wall 7a on that side of the doorway 9, the seat 37 is located to the other

side of the doorway 9 and is positioned against the end wall 7a on that side of the doorway, (c) the cadenza 33 is located against the wall opposite the doorway 9, (d) the table assembly 35 is housed in the cadenza 33 and is movable between a storage position within the cadenza and an operative position with a table of the table assembly 35 extending horizontally into a space between the chair 31 and the seat 37, and (e) the bed 29 is foldable between a storage position in the end wall 7a (Figure 7) and a horizontal sleeping position within the compartment space.

The chair 31 is multi-functional. Specifically, the chair 31 is foldable between an upright position for a person to sit in the chair and a folded down position in which the chair 31 forms a support for the bed 29.

The chair 31 is specifically shaped to define a bedside table 41 when the chair is in the support position.

The seat 37 and the cadenza 33 also define supports for the bed 29. The cadenza 33 is positioned so that it can be moved vertically between a raised position in which the cadenza 33 is at a convenient height to be accessed by a person seated in the chair 31 and a lowered position in which the cadenza 33 forms a bed support.

The above-described compartment 5 is a compact and efficient use of space by virtue of the arrangement of the furniture in the compartment 5 which provides a passenger with a range of functional options for the use of the compartment 5 without the compartment appearing to be cramped.

By way of particular example, the construction of the chair 31 to be a foldable chair that can be used as a support for the bed 29 makes it possible to locate the

substantial components of a luxury chair and a bed within a relatively confined space without the compartment being a cramped space. In effect, the foldable chair 31 allows the compartment 5 to be converted from one functional configuration to another, quite separate, functional configuration within a relatively confined space.

The conversion that is made possible by the foldable chair means that the entire compartment space is available for each separate function, hence providing an impression a relatively spacious compartment.

The cabin also includes the following features:

- Wardrobes.
- Breakfast tables.
- Storage spaces and a vanity unit in the cadenza 33.
- Baby bassinet.
- Shelving.
- Control panel for lighting and entertainment system.
- Wall-mounted entertainment display screen.

With reference to Figure 9, the wardrobes 53 are in the form of wardrobe frames that are slidably mounted within the end walls 7a. As can be appreciated from the figure, the wardrobe frames are arranged for sliding movement from storage positions within the end walls 7a to access positions extending into the aisles 51. The access positions provide convenient access for passengers. Moreover, the location of the wardrobes 53 within the end walls 7a makes it possible for the wardrobes 53 to be of

sufficiently large size to accommodate business suits etc in a free-hanging form.

Figures 17 to 19 illustrate an embodiment of a service table 61 that is adapted to be positioned on the bedside table 41 of the chair 31 when the chair is in the folded down position. The service table 61 provides convenient access for a passenger in the bed 29. The service table 61 is generally U shaped and includes legs 63 extending from a platform 65.

The cadenza 33 includes a series of storage compartments and an in-built vanity unit and other features, as illustrated in Figures 15 and 16.

In addition, each compartment 5 includes provision for a baby bassinet 65 and storage shelving 67 within the end walls 7a of the compartment. This feature is illustrated in Figure 12.

Each compartment 5 also includes a series of standard utilities, such as control units, as illustrated in Figures 13 and 14.

In the embodiment of the cabin shown in Figures 20 to 39, the cabin comprises 3 rows 11a, 11b, 11c of compartments 5 arranged in a length-wise extending direction of the aircraft.

The two outer rows 11a, 11c are positioned along opposite sides of the aircraft with the aircraft side walls 15 forming compartment walls.

The central row 11b is positioned between and is separated from the outer rows by length-wise extending aisles.

The positions of the compartments 5 are staggered so that the doorways 9 of the compartments 5 on opposite sides of the aisles do not directly face each other. This feature enhances the privacy of the compartments.

The doorway walls 7 are formed as louvered walls so that the passenger occupants can selectively create an open compartment which facilitates visual interaction with other compartments in the cabin or a more private closed compartment.

Each compartment 5 comprises a sliding door assembly for closing the doorway 9.

The sliding door assembly comprises an upper rail 51 and a curtain 55 supported by the rail.

The rail 51 is mounted for sliding movement between a retracted position in which the rail is located in the doorway wall 7 on one side of the doorway 9 and an operative, ie closed, position in which the rail 51 extends across and blocks the doorway 9.

The curtain 55 is arranged to fold in a concertina fashion. Accordingly, the curtain 55 folds against the doorway wall 7 when the rail 51 is slid into the retracted position and the curtain 55 expands and closes the doorway 9 when the rail 51 is in the operative position.

The sliding door assembly also comprises a member (not shown) on the opposite side of the doorway 9 that is adapted to retain the rail in the operative position.

Each private passenger compartment 5 houses basic functional furniture required by passengers, particularly on long-haul flights.

The furniture comprises a chair 21, a work desk 23, a table assembly 25, and a seat 27 located within the compartment space.

As with the previous embodiment, the furniture is designed and arranged to be interactive with each other so that the furniture can be selectively arranged in a number of different functional configurations as may be required by passengers, particularly on long-haul flights.

More specifically, the furniture is designed and arranged to be movable between a range of positions to re-configure the compartment space.

As with the previous embodiment, the configurations comprise relaxation, work, entertainment, and sleep configurations.

More specifically, the private compartment comprises the following combination of furniture: (a) a chair 21 in one corner of the compartment, (b) a bench seat 27 adjacent a wall opposite the chair when the chair is in a take-off position and facing in a forward travel direction of the aircraft, (c) a work desk 23 adjacent a wall that is in a lengthwise-extending direction of the aircraft, (d) a table assembly 25 movable between a storage position against the same wall as the work desk 23 and an operative position with a table of the table assembly 25 extending horizontally in a space between the chair 21 and the seat 27, and (e) a bed 29 movable between a raised storage position and a lowered operative position on the work desk.

The chair 21 is arranged so that it can swivel between a range of positions. For example, the chair 21 can be positioned in an aircraft take-off position so that

a person in the chair faces a forward travel direction of the aircraft, as shown in Figures 20, 24, and 25. In addition, the chair 21 can be positioned so that the person faces the work desk 25, as shown in Figure 22 (the rearward compartment shown in the figure).

The chair 21 is an adjustable chair, with a chair back, seat and foot-rest that can be placed in a range of positions to meet passenger requirements. The chair may be of a conventional construction.

Figure 27 shows the table assembly 25 in an operative position.

With reference particularly to Figure 27, the table assembly 25 comprises a table 33 that has a central panel and two side wings 35 that can be folded onto the central panel.

The table assembly 25 also comprises a base member 41 that, when mounted in a compartment, is supported for sliding movement between the storage position adjacent the compartment side wall and the operative position between the chair 21 and the seat 27. The base member 41 is in the form of a straight-sided rectangular cabinet that defines a storage compartment. The base member 41 is supported for sliding movement in a compartment by a track assembly, identified in part by the rail 43 mounted to and extending rearwardly from the base member.

The table assembly 25 also comprises a support arm 37 that interconnects the table 33 and the base member 41 and facilitates moving the table 33 from the storage position to the operative position.

The support arm 37 is pivotally mounted at a

lower end to a forward part of an upper section of the base member 41.

The support arm 37 is also pivotally mounted at an upper end to an underside of the table 33. The support arm 37 is foldable between a storage position in which the support arm 37 (and the table 33) lies flat on top of the base member 41 and an operative position in which the support arm 37 is angled forwardly (as shown in Figures 27 and 29).

The support arm 37 is coupled to the base member 41 so that it can not pivot forward beyond the operative position shown in Figures 27 and 29.

The support arm 37 comprises a V-shaped channel member 45 near the upper end thereof which acts as a support element for the table 33 and supports an underside of the table 33 when the table assembly is in the operative position with the table 33 in the horizontal position.

The above-described table assembly 25 can be moved from the storage position to the operative position by sliding the base member 41 outwardly from the storage position, lifting the table 33 upwardly and inwardly into the compartment space and thereby pivoting the support arm 37 upwardly and inwardly into the compartment space until the table 33 is in the horizontal operative position.

As is indicated above, the compartment is multi-functional and the basic furniture can be positioned in a range of configurations. This feature is illustrated, by way of example, in Figures 28 to 39.

Figure 28 illustrates one configuration of the private passenger compartment 5. In this configuration

the table assembly 25 is in the operative position in which the table 33 of the table assembly 25 is in an unfolded position in a space between the chair 21 and the seat 27. In this configuration the compartment is multi-functional and can be used for a range of purposes. For example, the table assembly 25 can be used as a meals table for supporting one or more meals delivered to the compartment to be eaten by the single passenger occupant of the compartment or the passenger and a "visiting" passenger. Alternatively, the table assembly 25 can be used as a work desk by the single passenger or the passenger and a "visiting" passenger.

Figure 29 illustrates a first step to transform the compartment from the configuration shown in Figure 28 to an alternative configuration.

In the first step shown in Figure 29 the wings 35 of the table 33 are folded inwardly onto the central panel of the table 33.

With reference to Figures 30 and 31, in a second step the table 33 is lifted upwardly and outwardly (in relation to the interior of the compartment space) toward the aircraft side wall 15 to pivot the table 33 and the support arm 37 into the folded position shown in Figure 12 in which the table 33 and the support arm 37 overlie and are supported by the base member 41.

Thereafter, the base member 41 of the table assembly 25 is slid from the operative position shown in Figure 31, in which the base member extends into the space between the chair 23 and the seat 27, and the storage position shown in Figure 32, in which the base member 41 is located against the aircraft side wall 15.

The final step in the transformation sequence