

DEPLOYABLE PANEL ASSEMBLY

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is related to and claims priority benefits from U.S. Provisional Application Serial No. 61/976,037 (“the ‘037 application”), filed on April 7, 2014, entitled DOUBLE PIVOT VIDEO ARMS. The ‘037 application is hereby incorporated in its entirety by this reference.

FIELD OF THE INVENTION

[0002] The field of the invention relates to entertainment features and passenger seats for aircraft or the like.

BACKGROUND

[0003] Many passenger seats such as those on passenger aircraft, buses, trains, and the like include mechanisms related to passenger comfort, convenience, and/or entertainment. For example, some seat shell assemblies are designed to include convenience and entertainment features (which may be moveable or deployable) including, for example, video monitors and the like. The design of conventional seat shells along with the design of the convenience and entertainment features may include inefficiencies that lead to reduced space and inadequate ergonomics for passengers.

[0004] In certain situations, it may be desirable to design seat shells and related subcomponents to maximize passenger space and enhance passenger ergonomics. Efficient seat shell and convenience and entertainment feature design facilitates advantageous ergonomics and passenger comfort.

SUMMARY

[0005] The terms “invention,” “the invention,” “this invention” and “the present invention” used in this patent are intended to refer broadly to all of the subject matter of this patent and the patent claims below. Statements containing these terms should be understood

not to limit the subject matter described herein or to limit the meaning or scope of the patent claims below. Embodiments of the invention covered by this patent are defined by the claims below, not this summary. This summary is a high-level overview of various aspects of the invention and introduces some of the concepts that are further described in the Detailed Description section below. This summary is not intended to identify key or essential features of the claimed subject matter, nor is it intended to be used in isolation to determine the scope of the claimed subject matter. The subject matter should be understood by reference to appropriate portions of the entire specification of this patent, any or all drawings and each claim.

[0006] According to certain embodiments of the present invention, a deployable panel assembly comprises: a support plate; a front support arm with a first end pivotably attached to the support plate; and a rear support arm with a first end pivotably attached to the support plate, wherein the support plate is configured to move between a stowed position and a deployed position.

[0007] In some embodiments, a second end of the front support arm is pivotably attached to a seat shell; and a second end of the rear support arm is pivotably attached to the seat shell.

[0008] In certain embodiments, when in the stowed position, the support plate is approximately parallel to a surface of the seat shell. In some embodiments, when moving from the stowed position to the deployed position, the support plate moves away from the seat shell and away from a passenger occupancy space. In certain embodiments, the movement between the stowed position and the deployed position includes a complex kinematic motion path that includes both rectilinear and rotational movement.

[0009] In some embodiments, the first end of the front support arm comprises an upper pivotable attachment to the support plate and a lower pivotable attachment to the support plate.

[0010] The second end of the front support arm, in certain embodiments, comprises an upper pivotable attachment to the seat shell and a lower pivotable attachment to the seat shell.

[0011] The second end of the rear support arm, in certain embodiments, comprises a tab configured to rotate with respect to a wall fitting about a pin. In some embodiments, the tab comprises an arced slot configured to slide along a stationary pin. In certain embodiments, the tab comprises a deployment motion stop configured to contact the stationary pin when the support plate is in the deployed position.

[0012] According to certain embodiments of the present invention, a deployable panel assembly comprises: a support plate; a video screen attached to the support plate; a front support arm with a first end having at least two pivotable attachments to a first edge of the support plate and a second end having at least two pivotable attachments to a seat shell; and a rear support arm with a first end pivotably attached to a second edge of the support plate and a second end pivotably attached to the seat shell, wherein the support plate is configured to move between a stowed position and a deployed position.

[0013] The second end of the front support arm, in certain embodiments, is pivotably attached to the seat shell at a location closer to a passenger occupancy space compared to the second end of the rear support arm.

[0014] In some embodiments, when in the stowed position, the support plate is approximately parallel to a surface of the seat shell.

[0015] In certain embodiments, when moving from the stowed position to the deployed position, the support plate moves away from the seat shell and away from a

passenger occupancy space. In some embodiments, the movement between the stowed position and the deployed position includes a complex kinematic motion path that includes both rectilinear and rotational movement.

[0016] The first end of the front support arm, in some embodiments, comprises an upper pivotable attachment disposed adjacent to an upper edge of the support plate and a lower pivotable attachment disposed adjacent to a lower edge of the support plate.

[0017] The second end of the front support arm, in certain embodiments, comprises an upper pivotable attachment to a first fitting of the seat shell and a lower pivotable attachment to a second fitting of the seat shell.

[0018] In some embodiments, the second end of the rear support arm comprises a tab configured to rotate with respect to a wall fitting about a pin.

[0019] The tab, in some embodiments, comprises an arced slot configured to slide along a stationary pin. In certain embodiments, the tab comprises a deployment motion stop configured to contact the stationary pin when the support plate is in the deployed position.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] Figs. 1A and 1B are perspective views of deployable panel assemblies according to certain embodiments of the present invention.

[0021] Figs. 2A and 2B are perspective views of the deployable panel assemblies of Figs. 1A and 1B.

[0022] Figs. 3A, 3B, 3C, 3D, 3E, 3F, and 3G are top views of deployable panel assemblies according to certain embodiments of the present invention.

[0023] Fig. 4 is a perspective view of deployable panel assemblies according to certain embodiments of the present invention.

[0024] Fig. 5 is a detail view of deployable panel assemblies according to certain embodiments of the present invention.

DETAILED DESCRIPTION

[0025] The subject matter of embodiments of the present invention is described here with specificity to meet statutory requirements, but this description is not necessarily intended to limit the scope of the claims. The claimed subject matter may be embodied in other ways, may include different elements or steps, and may be used in conjunction with other existing or future technologies. This description should not be interpreted as implying any particular order or arrangement among or between various steps or elements except when the order of individual steps or arrangement of elements is explicitly described.

[0026] Figs. 1A-5 illustrate embodiments of a deployable panel assembly 100. In these embodiments, the deployable panel assembly 100 comprises a support plate 101, a front support arm 105, and a rear support arm 110, and is configured to move between a stowed position and a deployed position. The support plate 101 may include an inner edge with one or more attachments to the front support arm 105 and may include an outer edge with one or more attachments to the rear support arm 110. The support plate 101 may be configured to secure a video screen 250 or another entertainment device.

[0027] As shown in Figs. 1A and 1B, the deployable panel assembly 100 may be attached to the surface of a seat shell 1 and may be configured such that the support plate 101 folds approximately flat against the surface of the seat shell 1 when in the stowed position. In some embodiments, the front support arm 105 may include (1) an upper wall attachment 108 that attaches to an upper wall fitting 113, which is secured to the surface of seat shell 1 and (2) a lower wall attachment 109 that attaches to a lower wall fitting 114, which is secured to the surface of seat shell 1. In some embodiments, the seat shell 1 may include an opening 2, as shown in Fig. 1A.

[0028] In some embodiments, the front support arm 105 extends in the vertical direction for approximately the full height of the support plate 101 and includes an upper

attachment 106 and a lower attachment 107. As shown in Fig. 1A, the upper attachment 106 of the front support arm 105 may interface with upper front fitting 102 of the support plate 101 and the lower attachment 107 of the front support arm 105 may interface with lower fitting 104 of the support plate 101.

[0029] Although not illustrated in the figures, the front support arm 105 may be designed with any appropriate number of attachments to the surface of the seat shell 1 and/or to the support plate 101. In other words, with respect to the interface with seat shell 1, the front support arm 105 may include (a) only one of upper wall fitting 113 and lower wall fitting 114; (b) both upper wall fitting 113 and lower wall fitting 114; or (c) upper wall fitting 113, lower wall fitting 114, and one or more additional wall fittings. Similarly and independent of the attachment to the seat shell 1, with respect to the interface with support plate 101, the front support arm 105 may include (a) only one of upper attachment 106 and lower attachment 107; (b) both upper attachment 106 and lower attachment 107; or (c) upper attachment 106, lower attachment 107, and one or more additional wall attachments.

[0030] As with the number of connections described above, there are numerous variations for the type of mechanical connection between the front support arm 105 and the seat shell 1 and between the front support arm 105 and the support plate 101. For example, although each connection is illustrated as a lug/clevis with a rotational axis, one or more of the connections to the front support arm 105 may include a spherical bearing or a ball and socket joint to allow rotation in multiple axes.

[0031] The rear support arm 110 may include a front portion 111 that attaches to upper rear fitting 103 and a rear portion 112 that interfaces with rear wall fitting 115. As described for the front support arm 105, although not illustrated in the figures, the rear support arm 110 (1) may be designed with any appropriate number of attachments to the surface of the seat shell 1 and/or to the support plate 101 and (2) may be designed for

numerous variations for the type of mechanical connection between the rear support arm 110 and the seat shell 1 and between the rear support arm 110 and the support plate 101.

[0032] In some embodiments, as shown in Fig. 5, the rear portion 112 of rear support arm 110 is replaced with a tab 500. Tab 500 interfaces with and rotates about a pin 501 connected to rear wall fitting 115. To guide and constrain the motion of rear support arm 110, the tab 500 includes an arced slot 504, which interfaces with a stationary pin 503 (which may include bearings or a component for reducing friction) attached to rear wall fitting 115. In some embodiments, arced slot 504 has a center corresponding to pin 501 such that, when rear support arm 110 rotates about pin 501, the arced slot 504 slides along stationary pin 503. To limit motion at the deployed position (*see* Fig. 3G), tab 500 includes a deployment motion stop 505, which is disposed adjacent to one end of the arced slot 504 (*see* Fig. 5) such that the stationary pin 503 will contact the deployment motion stop 505 when rear support arm 110 reaches the deployed position. To limit motion at the stowed position (*see* Fig. 3A), rear wall fitting 115 includes a stowage motion stop 502, which is disposed adjacent to one edge of the rear wall fitting 115 (*see* Fig. 5) such that the stowage motion stop 502 will contact an edge of the tab 500 when rear support arm 110 reaches the stowed position. In some embodiments, the deployment motion stop 505 and the stowage motion stop 502 may include a soft touch material (*i.e.*, rubber, polymer, plastic, or another suitable material) to reduce shock and/or vibration related to contact at either the deployed or stowed positions.

[0033] Fig. 2A shows the support plate 101 and a video screen 250 in the deployed position where a passenger's line of sight is approximately perpendicular to the surface of video screen 250 such that the passenger occupancy space is located toward the bottom right corner for Fig. 2A. Fig. 3G also illustrates the deployed position and shows the arrangement of front support arm 105 and rear support arm 110 when deployed. Fig. 2B shows a swept

volume 260 that represents the full motion of the support plate 101 and the video screen 250 between the stowed position and the deployed position.

[0034] Figs. 3A-3G show a progression of the support plate 101 and the video screen 250 from the stowed position (Fig. 3A) to the deployed position (Fig. 3G). As shown in Figs. 3A-4, the support plate 101 and the video screen 250, when moving from the stowed position to the deployed position move away from the seat shell and away from the passenger occupancy space. In other words, the support plate 101 and the video screen 250 do not merely pivot; they follow a complex kinematic motion path that includes both rectilinear and rotational movement.

[0035] In some situations, a support plate 10 and video screen 50, which are attached to a seat shell with a single axis hinge 20, use the same stowed position as that of the support plate 101 and the video screen 250. However, as shown in Fig. 4, because support plate 10 and video screen 50 merely rotate about the single axis hinge 20, support plate 10 and video screen 50 are offset a distance X from support plate 101 and the video screen 250. The distance X represents a significant decrease in passenger space. In other words, implementing deployable panel assembly 100 moves the deployed location from the location occupied by support plate 10 and video screen 50 by a distance X. In addition to increasing passenger space, the distance X also allows a passenger a better viewing angle for the video screen 250.

[0036] The components of the deployable panel assembly 100 may be formed of materials including, but not limited to, carbon composite, plastic, thermoplastic, steel, aluminum, stainless steel, other plastic or polymer materials, other metallic materials, other composite materials, or other similar materials. Moreover, the components of the deployable panel assembly 100 may be attached to one another via suitable fasteners, which include, but are not limited to, screws, bolts, rivets or other mechanical or chemical fasteners.

[0037] Different arrangements of the components depicted in the drawings or described above, as well as components and steps not shown or described are possible. Similarly, some features and sub-combinations are useful and may be employed without reference to other features and sub-combinations. Embodiments of the invention have been described for illustrative and not restrictive purposes, and alternative embodiments will become apparent to readers of this patent. Accordingly, the present invention is not limited to the embodiments described above or depicted in the drawings, and various embodiments and modifications may be made without departing from the scope of the claims below.

CLAIMS

That which is claimed is:

1. A deployable panel assembly comprising:
 - a support plate;
 - a front support arm with a first end pivotably attached to the support plate; and
 - a rear support arm with a first end pivotably attached to the support plate, wherein the support plate is configured to move between a stowed position and a deployed position.

2. The deployable panel assembly of claim 1, wherein:
 - a second end of the front support arm is pivotably attached to a seat shell; and
 - a second end of the rear support arm is pivotably attached to the seat shell.

3. The deployable panel assembly of claim 2, wherein, when in the stowed position, the support plate is approximately parallel to a surface of the seat shell.

4. The deployable panel assembly of claim 2, wherein, when moving from the stowed position to the deployed position, the support plate moves away from the seat shell and away from a passenger occupancy space.

5. The deployable panel assembly of claim 4, wherein the movement between the stowed position and the deployed position includes a complex kinematic motion path that includes both rectilinear and rotational movement.

6. The deployable panel assembly of claim 1, wherein the first end of the front support arm comprises an upper pivotable attachment to the support plate and a lower pivotable attachment to the support plate.
7. The deployable panel assembly of claim 2, wherein the second end of the front support arm comprises an upper pivotable attachment to the seat shell and a lower pivotable attachment to the seat shell.
8. The deployable panel assembly of claim 2, wherein the second end of the rear support arm comprises a tab configured to rotate with respect to a wall fitting about a pin.
9. The deployable panel assembly of claim 8, wherein the tab comprises an arced slot configured to slide along a stationary pin.
10. The deployable panel assembly of claim 9, wherein the tab comprises a deployment motion stop configured to contact the stationary pin when the support plate is in the deployed position.
11. A deployable panel assembly comprising:
 - a support plate;
 - a video screen attached to the support plate;
 - a front support arm with a first end having at least two pivotable attachments to a first edge of the support plate and a second end having at least two pivotable attachments to a seat shell; and

a rear support arm with a first end pivotably attached to a second edge of the support plate and a second end pivotably attached to the seat shell, wherein the support plate is configured to move between a stowed position and a deployed position.

12. The deployable panel assembly of claim 11, wherein the second end of the front support arm is pivotably attached to the seat shell at a location closer to a passenger occupancy space compared to the second end of the rear support arm.

13. The deployable panel assembly of claim 11, wherein, when in the stowed position, the support plate is approximately parallel to a surface of the seat shell.

14. The deployable panel assembly of claim 11, wherein, when moving from the stowed position to the deployed position, the support plate moves away from the seat shell and away from a passenger occupancy space.

15. The deployable panel assembly of claim 14, wherein the movement between the stowed position and the deployed position includes a complex kinematic motion path that includes both rectilinear and rotational movement.

16. The deployable panel assembly of claim 11, wherein the first end of the front support arm comprises an upper pivotable attachment disposed adjacent to an upper edge of the support plate and a lower pivotable attachment disposed adjacent to a lower edge of the support plate.

17. The deployable panel assembly of claim 11, wherein the second end of the front support arm comprises an upper pivotable attachment to a first fitting of the seat shell and a lower pivotable attachment to a second fitting of the seat shell.
18. The deployable panel assembly of claim 11, wherein the second end of the rear support arm comprises a tab configured to rotate with respect to a wall fitting about a pin.
19. The deployable panel assembly of claim 18, wherein the tab comprises an arced slot configured to slide along a stationary pin.
20. The deployable panel assembly of claim 19, wherein the tab comprises a deployment motion stop configured to contact the stationary pin when the support plate is in the deployed position.

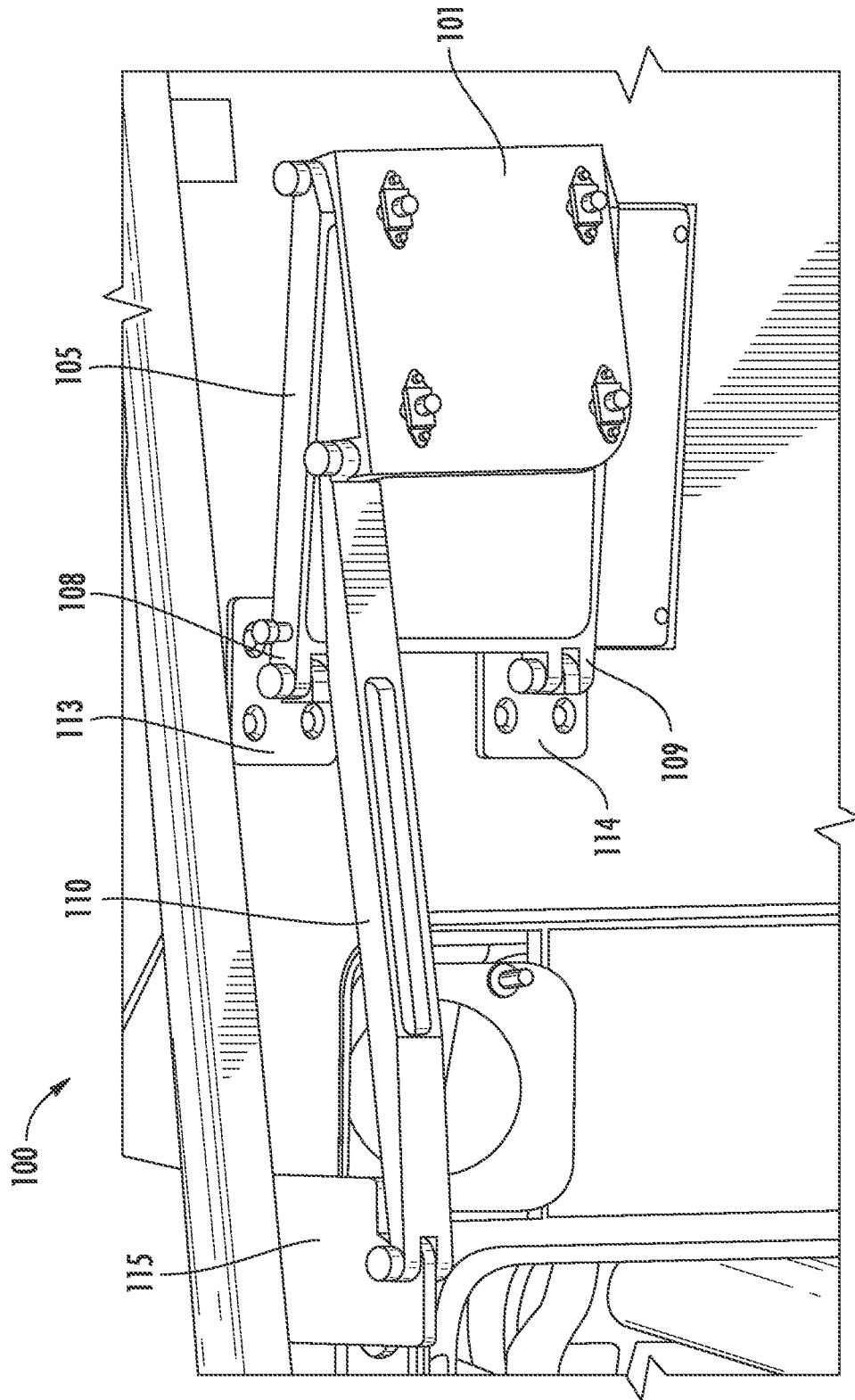


FIG. 1B

3/6

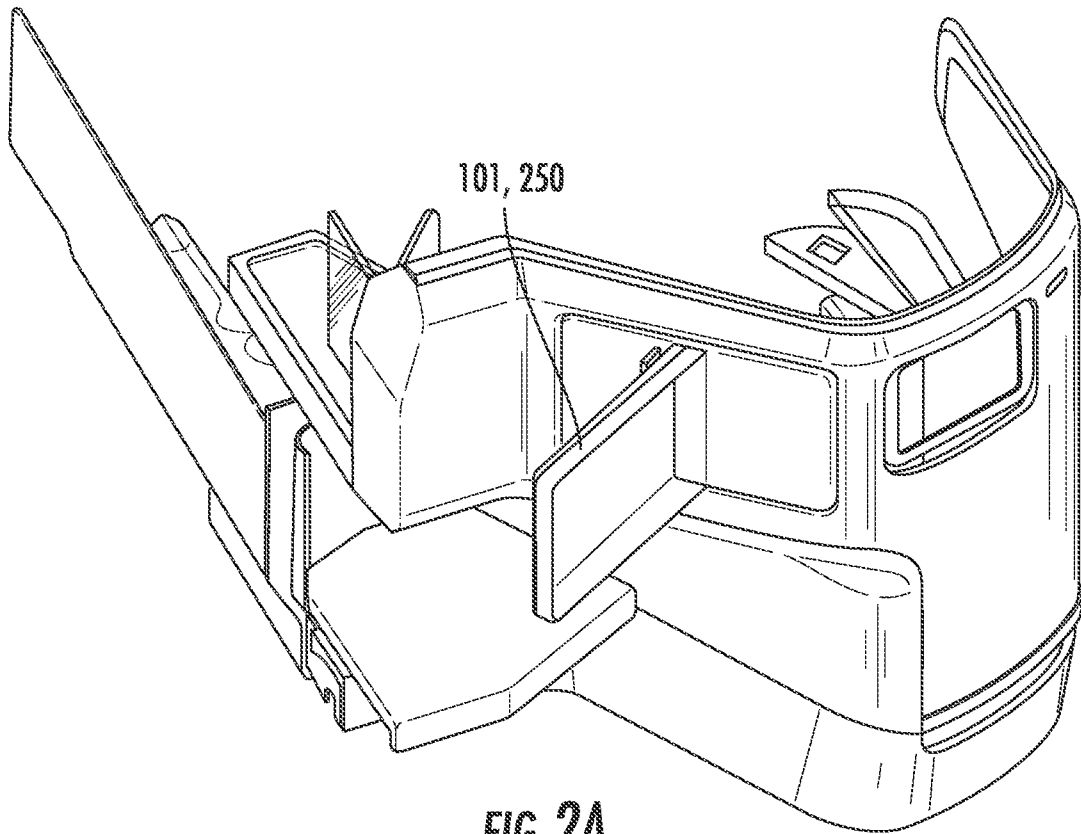


FIG. 2A

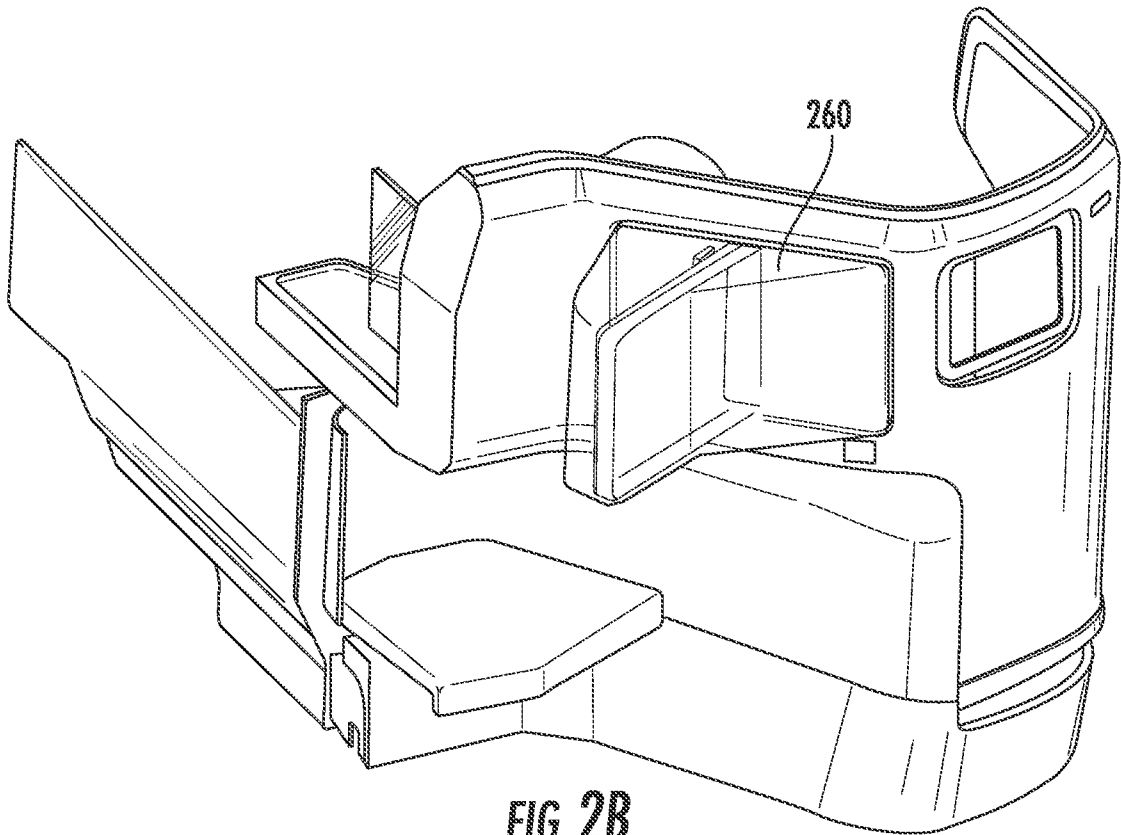


FIG. 2B

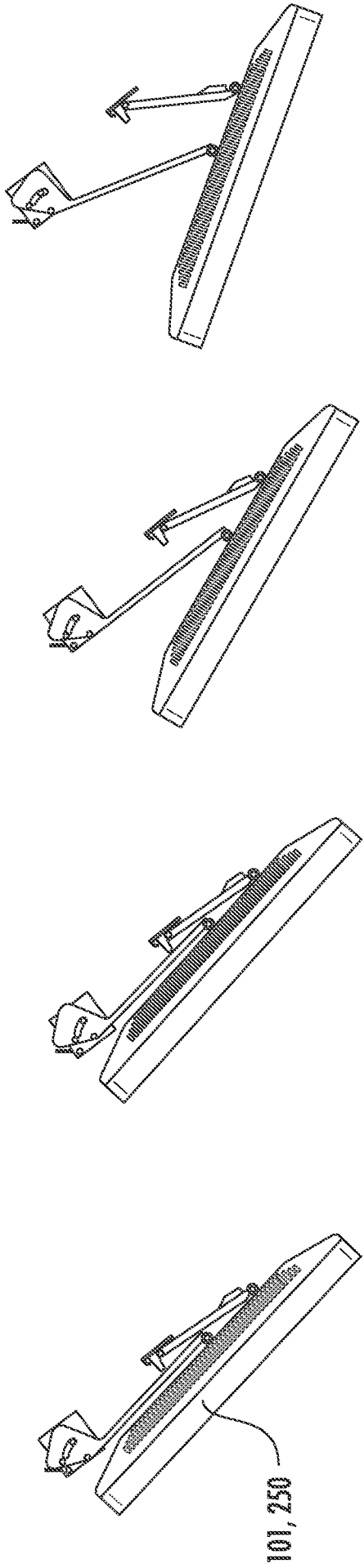


FIG. 3A

FIG. 3B

FIG. 3C

FIG. 3D

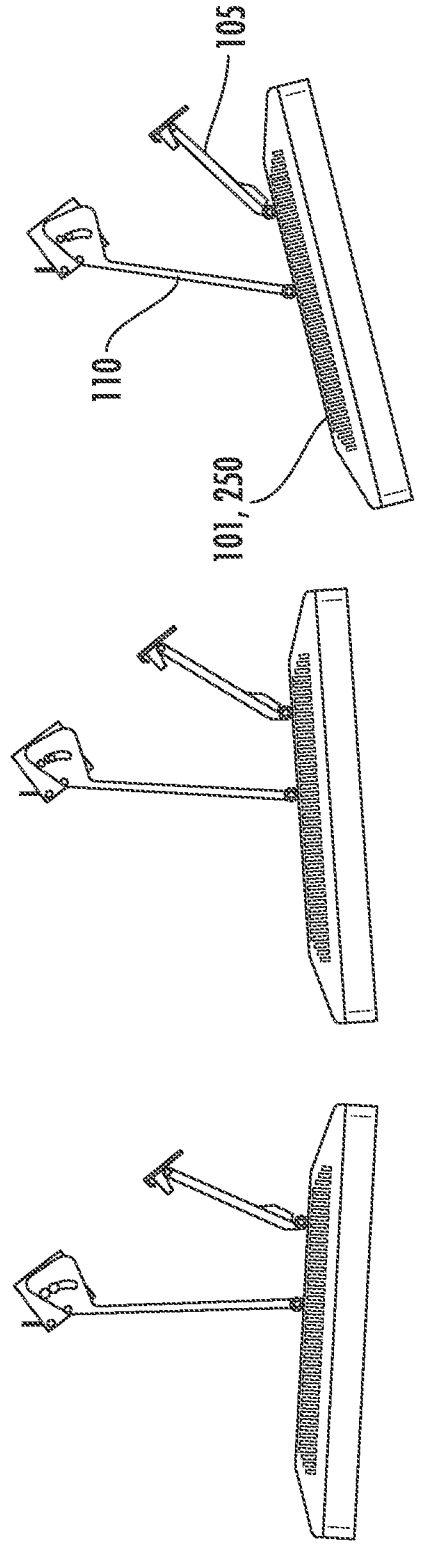


FIG. 3E

FIG. 3F

FIG. 3G

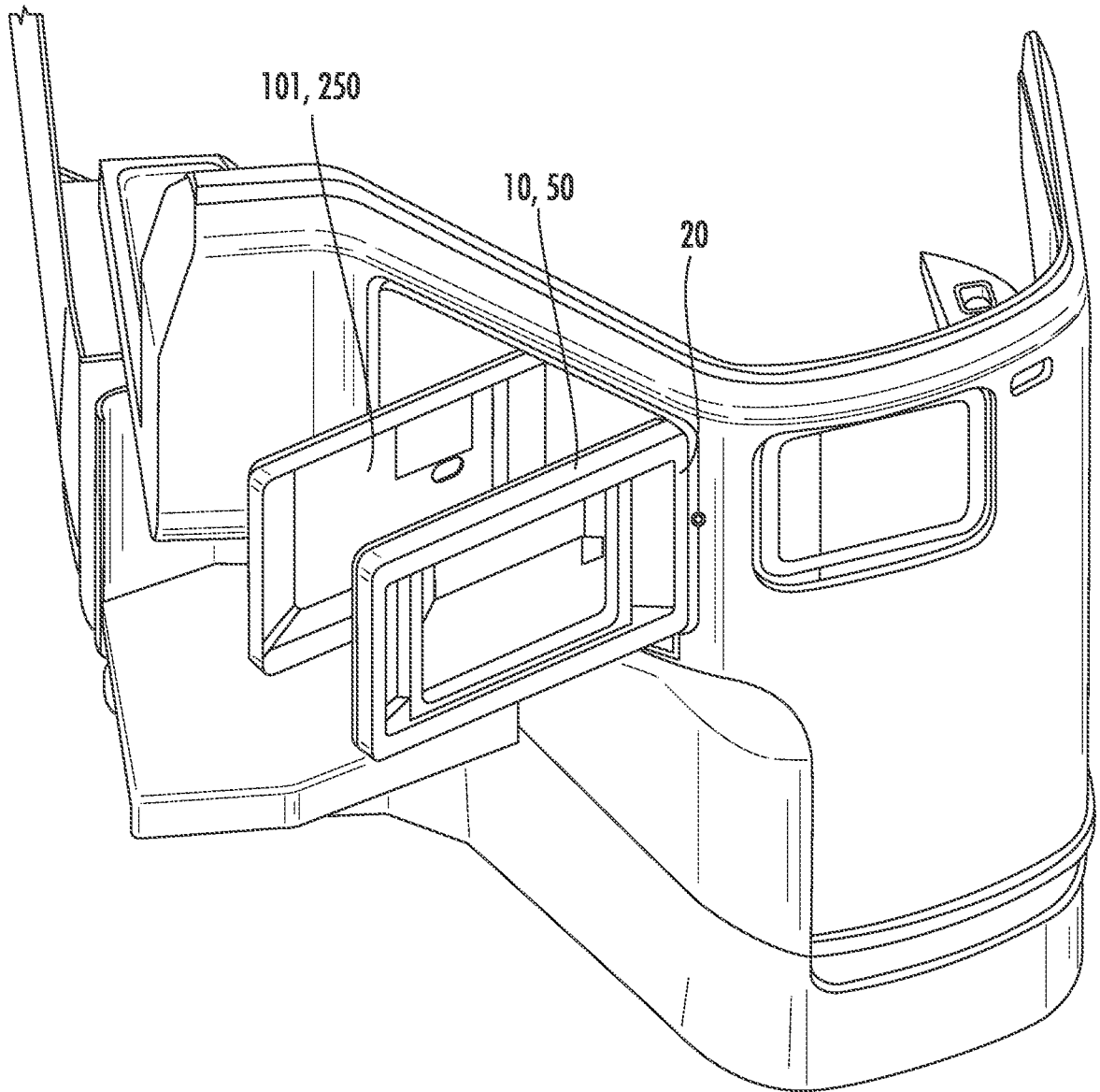


FIG. 4

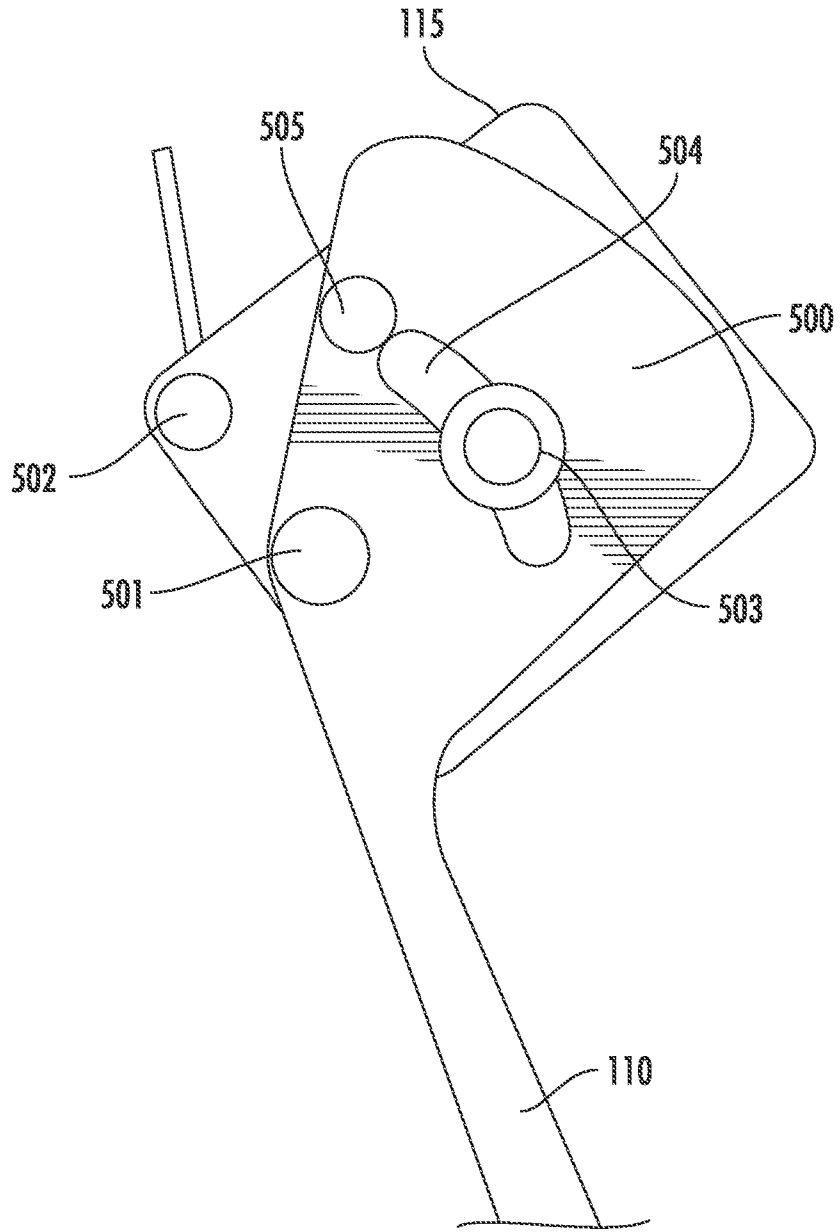


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No PCT/IB2015/052484
--

A. CLASSIFICATION OF SUBJECT MATTER
 INV. B64D11/06 B64D11/00
 ADD.

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)
F16M B64D

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 2012/001044 A1 (GWAG SU-MAN [KR]) 5 January 2012 (2012-01-05) abstract; figures 2,11, 12	1-8, 11-18 9,10,19, 20
Y	----- US 2007/023599 A1 (FEDEWA DALE [US]) 1 February 2007 (2007-02-01) paragraph [0076] - paragraph [0078]; figures 1A, 2A, 10	9,10,19, 20
A	----- US 5 096 271 A (PORTMAN JOHN R [US]) 17 March 1992 (1992-03-17) abstract; figures 1-4	1-20
A	----- US 8 613 385 B1 (HULET GLADE L [US] ET AL) 24 December 2013 (2013-12-24) abstract; figures 11, 12 ----- -/--	1-20

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"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</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p>
---	---

Date of the actual completion of the international search 24 June 2015	Date of mailing of the international search report 06/07/2015
--	---

Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer <p style="text-align: center; font-size: 1.2em;">Wojski, Guadalupe</p>
--	---

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2015/052484

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 10 2007 025881 A1 (GOEHRS STEFFEN [DE]) 4 December 2008 (2008-12-04) abstract; figures 1a-1c -----	1-20
X	US 2010/060044 A1 (POZZI ALEXANDER NICHOLAS [US] ET AL) 11 March 2010 (2010-03-11) figures 1-4 -----	1-5
A	US 2007/262625 A1 (DRYBURGH IAN [GB] ET AL) 15 November 2007 (2007-11-15) figure 20 -----	1-20
A	WO 00/21831 A2 (BRITISH AIRWAYS PLC [GB]; ROUND MATTHEW [GB]; DARBYSHIRE MARTIN [GB]) 20 April 2000 (2000-04-20) figures 1,2,5c,5b -----	1-20

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2015/052484

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
US 2012001044	A1	05-01-2012	KR 100951999 B1	08-04-2010
			US 2012001044 A1	05-01-2012
			WO 2010082777 A1	22-07-2010

US 2007023599	A1	01-02-2007	US 2007023599 A1	01-02-2007
			WO 2007044289 A2	19-04-2007

US 5096271	A	17-03-1992	JP 3104925 B2	30-10-2000
			JP H0597098 A	20-04-1993
			US 5096271 A	17-03-1992

US 8613385	B1	24-12-2013	NONE	

DE 102007025881	A1	04-12-2008	NONE	

US 2010060044	A1	11-03-2010	AT 546359 T	15-03-2012
			EP 2321177 A2	18-05-2011
			HK 1151009 A1	17-08-2012
			US 2010060044 A1	11-03-2010
			WO 2010030753 A2	18-03-2010

US 2007262625	A1	15-11-2007	AT 260800 T	15-03-2004
			AT 385491 T	15-02-2008
			AU 709431 B2	26-08-1999
			AU 717706 B2	30-03-2000
			AU 717708 B2	30-03-2000
			AU 4182396 A	03-07-1996
			BR 9510008 A	21-10-1997
			CA 2165097 A1	14-06-1996
			CA 2389315 A1	14-06-1996
			CH 692978 A5	15-01-2003
			CH 692979 A5	15-01-2003
			CH 693534 A5	30-09-2003
			CN 1132711 A	09-10-1996
			CN 1266799 A	20-09-2000
			DE 19544754 A1	20-06-1996
			DE 69532644 D1	08-04-2004
			DE 69532644 T2	10-03-2005
			DE 69535699 T2	05-02-2009
			EP 0794897 A1	17-09-1997
			EP 1162138 A2	12-12-2001
			ES 2220943 T3	16-12-2004
			ES 2301509 T3	01-07-2008
			FI 972497 A	12-08-1997
			FI 20011825 A	17-09-2001
			FI 20040633 A	04-05-2004
			FR 2727932 A1	14-06-1996
			FR 2769286 A1	09-04-1999
			GB 2295962 A	19-06-1996
			GB 2326824 A	06-01-1999
			GB 2331237 A	19-05-1999
			HK 1002312 A1	12-05-2000
			HK 1002357 A1	24-12-2004
			HK 1020432 A1	29-12-2000
			HK 1028221 A1	02-11-2001
			IT RM950813 A1	13-06-1996
			JP 4313441 B2	12-08-2009
			JP H08258796 A	08-10-1996

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/IB2015/052484

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		JP 2008074398 A	03-04-2008
		KR 100396343 B1	06-04-2004
		NL 1001893 C2	13-06-1996
		NZ 297049 A	29-04-1999
		NZ 334165 A	29-06-1999
		NZ 334166 A	29-06-1999
		RU 2350488 C2	27-03-2009
		SG 33627 A1	18-10-1996
		TW 309494 B	01-07-1997
		TW 393418 B	11-06-2000
		US 6059364 A	09-05-2000
		US 6209956 B1	03-04-2001
		US 2002017810 A1	14-02-2002
		US 2005077761 A1	14-04-2005
		US 2007262625 A1	15-11-2007
		US 2009166470 A1	02-07-2009
		US 2013313866 A1	28-11-2013
		WO 9618537 A1	20-06-1996
		ZA 9510537 A	19-06-1996

WO 0021831	A2	20-04-2000	
		AT 286827 T	15-01-2005
		AU 770136 B2	12-02-2004
		AU 6221899 A	01-05-2000
		BR 9914556 A	12-03-2002
		CA 2347165 A1	20-04-2000
		CN 1332683 A	23-01-2002
		DE 19983643 T1	31-01-2002
		DE 69923201 D1	17-02-2005
		DE 69923201 T2	29-12-2005
		DK 1121291 T3	23-05-2005
		DK 200100603 A	31-05-2001
		EP 1121291 A2	08-08-2001
		ES 2230931 A1	01-05-2005
		ES 2239461 T3	16-09-2005
		FI 20010777 A	12-04-2001
		HK 1041243 A1	26-08-2005
		JP 4690548 B2	01-06-2011
		JP 2002527288 A	27-08-2002
		NO 20011877 A	13-06-2001
		NZ 511409 A	31-10-2003
		US 7178871 B1	20-02-2007
		WO 0021831 A2	20-04-2000
