



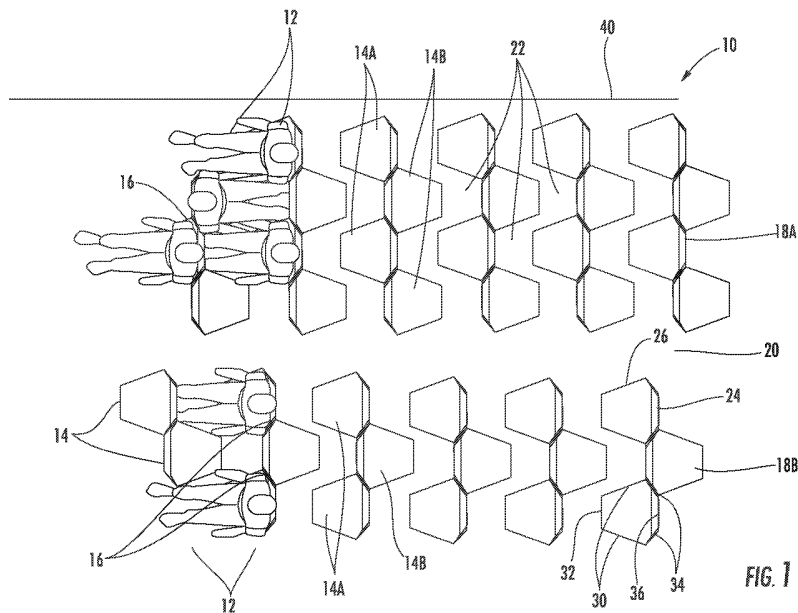
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(54) Title: SEATING ARRANGEMENTS



(57) Abstract: Described are seating arrangements with at least one row having at least one forward-facing seat and at least one aft-facing seat. The at least one forward-facing seat and the at least one aft-facing seat are arranged adjacent to one another so that a shoulder space on one side of the at least one forward-facing seat overlaps with adjacent shoulder space of the at least one aft-facing seat.

WO 2015/083088 A1

SEATING ARRANGEMENTS

CROSS REFERENCE TO RELATED APPLICATIONS

5 [0001] This application is related to and claims priority benefits from U.S. Provisional Application Serial No. 61/910,571 (“the ‘571 application”), filed on December 2, 2013, entitled ECONOMY CLASS CABIN HEXAGON, the entire contents of which is incorporated herein by reference.

FIELD OF THE INVENTION

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[0002] The invention relates to seating arrangements for aircraft cabins and to the corresponding seat unit.

BACKGROUND

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[0003] Common carriers, such as passenger airlines, bus lines, and train lines, among others, frequently convey substantial numbers of passengers simultaneously. In many instances, there is a desire to increase the number of seats within a given space to optimize the number of passengers being transported at any given time. By increasing the number of passenger seats in the space, the amount of space available for each passenger is diminished.

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[0004] Typically, such seating arrangements include conventional seats that are positioned so that all passengers are facing forward.

[0005] For example, single aisle aircraft are designed to accommodate two columns separated by a center aisle. Within each column are rows of triple seats, thus providing a six abreast configuration.

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[0006] For twin aisle aircraft, the seating arrangement is more complex, and may depend on the aisle and seat width that the particular carrier wishes to provide for its passengers. Within each column, there may be single, double, tripe, quad, or even quint seats, which may provide anywhere from an eight to an eleven abreast configuration.

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[0007] Conventionally, the seats are positioned at the same longitudinal position within the cabin, so that space needed at shoulder and arm area is limiting on passenger comfort.

[0008] Thus, in certain cases, it may be desirable to increase cabin density while also creating seat units that increase the space available at the shoulder and arm area by creating an overlap in the shoulder areas of adjacent seats.

SUMMARY

[0009] 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.

[0010] According to certain embodiments of the present invention, a seating arrangement comprises at least one row comprising at least one forward-facing seat and at least one aft-facing seat, wherein the at least one forward-facing seat and the at least one aft-facing seat are arranged adjacent to one another so that a shoulder space on one side of the at least one forward-facing seat overlaps with adjacent shoulder space of the at least one aft-facing seat.

[0011] The at least one forward-facing seat and the at least one aft-facing seat may each comprise a pivotally mounted seat pan. In some embodiments, the seat pan comprises tapered sides.

[0012] In certain embodiments, an armrest comprising opposing portions is positioned between the at least one forward-facing seat and the at least one aft-facing seat, and the opposing portions may be inwardly angled.

[0013] According to some embodiments, passengers seated in the at least one forward-facing seat and the at least one aft-facing seat do not face each other.

[0014] In some embodiments, the at least one forward-facing seat and the at least one aft-facing seat each comprise a seat back comprising a receptacle for removably mounting a tray table. The at least one forward-facing seat and the at least one aft-facing seat may each comprise a seat back comprising a receptacle for removably mounting a personal electronic device.

[0015] According to certain embodiments of the present invention, a seating arrangement comprises at least two rows of seats positioned within a column, wherein each row comprises at least one forward-facing seat and at least one aft-facing seat, wherein the at least one forward-facing seat and the at least one aft-facing seat are arranged adjacent to one another so that a shoulder space on one side of the at least one forward-facing seat overlaps with adjacent shoulder space of the at least one aft-facing seat, wherein the at least one forward-facing seat in each row are longitudinally aligned with each other within the column, and wherein the at least one aft-facing seat in each row are longitudinally aligned with each other within the column.

5 [0016] The at least one forward-facing seat and the at least one aft-facing seat of each row may each comprise a pivotally mounted seat pan. In some embodiments, the seat pan comprises tapered sides.

[0017] In certain embodiments, an armrest comprising opposing portions is positioned between the at least one forward-facing seat and the at least one aft-facing seat of each row, and the opposing portions may be inwardly angled.

15 [0018] According to some embodiments, passengers seated in the at least one forward-facing seat and the at least one aft-facing seat of each row do not face each other.

[0019] In some embodiments, the at least one forward-facing seat and the at least one aft-facing seat of each row each comprise a seat back comprising a receptacle for removably mounting a tray table. The at least one forward-facing seat and the at least one aft-facing seat of each row may each comprise a seat back comprising a receptacle for removably mounting a personal electronic device.

20 [0020] According to certain embodiments of the present invention, a seating arrangement comprises at least two rows of seats separated by an aisle, wherein each row comprises a plurality of alternating facing seats, wherein shoulder space of one seat overlaps with shoulder space of an adjacent seat, wherein the at least two rows of seats collectively comprise at least seven seats.

[0021] In some embodiments, the plurality of alternating facing seats each comprise a pivotally mounted seat pan.

30 [0022] According to some embodiments, passengers seated in the plurality of alternating facing seats do not face each other.

[0023] In some embodiments, the plurality of alternating facing seats each comprise a seat back comprising a receptacle for removably mounting a personal electronic device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] The invention will be better understood on reading the following description and examining the Figures that accompany it. These Figures are provided by way of illustration only and are in no way limiting on the invention.

[0025] Figure 1 is a top view of a seating configuration, according to certain embodiments of the present invention.

[0026] Figure 2 is a top perspective view of the seating configuration of Figure 1.

[0027] Figure 3 is front perspective view of the seating configuration of Figure 1.

[0028] Figure 4 is a perspective view of a row of a seating configuration, according to certain embodiments of the present invention.

[0029] Figure 5 is a perspective view of a portion of the row of the seating configuration of Figure 4.

[0030] Figure 6 is a perspective view of a row of a seating configuration, according to certain embodiments of the present invention.

[0031] Figure 7 is a perspective view of a row of a seating configuration, according to certain embodiments of the present invention.

[0032] Figure 8 is a perspective view of an optional armrest of the seating configuration of Figure 7.

[0033] Figure 9 is a perspective view of a row of a seating configuration, according to certain embodiments of the present invention.

[0034] Figure 10 is a perspective view of a row of a seating configuration, according to certain embodiments of the present invention.

[0035] Figure 11 is a perspective view of a tray table for use with a seat back of a seating configuration, according to certain embodiments of the present invention.

[0036] Figure 12 is a front view of a row of a seating configuration, according to certain embodiments of the present invention.

DETAILED DESCRIPTION

[0037] 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.

[0038] While the embodiments of vehicle seats may be described with reference to an aircraft seat, they are by no means so limited. In fact, the seats may be used in conjunction with any type of vehicle or otherwise as desired.

[0039] According to certain embodiments, as illustrated in Figures 1-3, a seating arrangement 10 comprises at least two rows 12 of side-by-side seats 14, at least one of the rows 12 comprising at least one forward-facing seat 14A and at least one aft-facing seat 14B.

These seats 14A, 14B are arranged adjacent to one another in an overlapping design, in which the shoulder space 16 on one side of the forward-facing seat 14A overlaps with the adjacent shoulder space 16 of the adjacent aft-facing seat 14B and vice versa.

[0040] In some embodiments, as illustrated in Figures 1-3, the rows 12 may be arranged in at least two columns 18A, 18B separated by an aisle 20. The rows 12 in one of the columns 18A, 18B may be laterally aligned with the rows 12 in the opposing columns 18A, 18B or may be staggered forward or aft relative to the rows 12 in the opposing columns 18A, 18B. A person of ordinary skill in the relevant art will understand that this is but one possible arrangement of rows, and that greater or fewer rows may be included in the aircraft cabin as needed or desired to achieve the appropriate cabin density.

[0041] In certain configurations, the rows 12 are arranged within each column 18A, 18B so that the forward-facing seats 14A are longitudinally aligned with each other, and the aft-facing seats 14B are longitudinally aligned with each other. In certain embodiments, each row 12 may comprise more than one forward-facing seat 14A and/or more than one aft-facing seat 14B. As a result, a space 22 is created between two same-facing seats 14A (or 14B) by the lateral dimension of the opposite-facing seat 14B (or 14A) positioned between the two same-facing seats 14A (or 14B), which provides leg room and personal space for an opposite-facing seat 14B (or 14A) located in another row 12 and longitudinally positioned behind the opposite-facing seat 14B (or 14A).

[0042] The configuration of the seat 14A, 14B shown in Figures 1-12 may be identical for all the passengers, according to certain embodiments. However, a person of ordinary skill in the relevant art will understand that it is not required that each of the seats 14A, 14B be identical in every aspect, and in some cases, it may be desirable to have the seats 14A, 14B differ from one another in certain locations within the aircraft cabin 40.

[0043] Each seat 14A, 14B may comprise a seat back 24 and a seat pan 26. In certain embodiments, the seat pan 26 is pivotally coupled to a seat frame 28 supporting the seats 14A, 14B so that the seat pan 26 may be folded up to provide additional space for passenger access/egress between the rows 12 of each column 18A, 18B. Depending on the particular configuration, the pivoting design of the seat pans 26 may be required to meet all aircraft specifications and also achieve the desired seat density for the aircraft cabin 40.

[0044] For example, in single aisle aircraft, a quad (or four passengers abreast) seat configuration is not allowed because the passenger in the window seat must pass over more than two seats to reach the aisle. In order to overcome this limitation, the space between the two rows needs to meet the criteria to be considered an aisle (which requires 15 inches of space below 25 inches from the floor and 20 inches of space above 25 inches from the floor). Providing the necessary amount of distance between rows 12 to qualify the space as an aisle (and thus enable the use of a quad seat in a single aisle aircraft) would significantly increase the amount of pitch (or distance) needed between consecutive rows 12 with conventional fixed seat pans 26. However, by using pivotally mounted seat pans 26, the pitch (or distance) between consecutive rows 12 may be reduced, while still meeting the requirements to qualify the space as an aisle in order to use a quad seat in single aisle aircraft. As a result, the increase in cabin seat density achieved with the overlapping and alternating facing seating arrangement 10 is accentuated through the use of pivoting seat pans 26 to achieve the smallest acceptable pitch possible between rows 12.

[0045] As shown in Figures 1-12, the seat pan 26 may further comprise a pair of tapering front sides 30 that join a front edge 32 of the seat pan 26. The front sides 30 may taper toward one another in the direction of the front edge 32 so as to provide additional room for the space 22 between the seat pans 26. As illustrated in Figures 1-3, each seat pan 26 may further comprise a pair rear sides 34 that join a rear edge 36 of the seat pan 26. These rear sides 34 may also taper toward one another in the direction of the rear edge 36 so as to conform to the shape of the geometry between the overlapping shoulder spaces 16.

[0046] By arranging the seats 14A, 14B in an alternating arrangement within each row 12 and by overlapping the shoulder space 16, the passengers are seated so that they do not have to face the person seated directed beside them in the same row 12, thus providing an additional degree of personal space than a deeper overlapping arrangement, while still maximizing lateral space within an aircraft cabin 40. For example, in this arrangement, as shown in Figures 1-3, it is possible to accommodate a seven abreast row configuration

instead of six abreast row configuration, as is the case when all of the seats are arranged facing in the same direction.

[0047] To further enhance the personal space of each passenger, as illustrated in Figures 4-5, the adjacent seats 14A, 14B may share opposing portions 42A, 42B of an armrest 44. In certain embodiments, the opposing portions 42A, 42B are angled downward toward the front edges 32 of the corresponding seat 14A, 14B. With the angled configuration, there is less likelihood that the arms of passengers seated in the adjacent seats 14A, 14B will contact or interfere with each other.

[0048] In other embodiments, the armrests 42A, 42B may be angled inwardly so there is less likelihood that the arms of passengers seated in the facing seats 14A, 14B will contact or interfere with each other. For example, the armrests 42A, 42B may be angled so as to align with the shape of the tapered front sides 30.

[0049] In yet other embodiments, as illustrated in Figures 6, 8, 10, and 12, a support structure 46 positioned behind a passenger's lower back when a passenger is seated in one of the seats 14A, 14B may include at least one extension 48 that may slide out of the support structure 46 and function as an armrest.

[0050] In certain embodiments, as shown in Figure 9, no armrests 42A, 42B may be provided.

[0051] The seat backs 24 of each seat 14A, 14B may further be equipped with video monitors 50 and/or connections and mounting devices for passengers' personal electronic devices. Likewise, the seat backs 24 may be equipped with tray tables 52 pivotally mounted to the seat backs 24 and/or with mounting locations for tray tables 52 to be removably mounted, such as at least one slot 54 into which at least one angled support rod 56 may be inserted.

[0052] 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

What is claimed is:

1. A seating arrangement comprising:
at least one row comprising at least one forward-facing seat and at least one aft-facing
5 seat;
wherein the at least one forward-facing seat and the at least one aft-facing seat are
arranged adjacent to one another so that a shoulder space on one side of the at least one
forward-facing seat overlaps with adjacent shoulder space of the at least one aft-facing seat.
- 10 2. The seating arrangement of claim 1, wherein the at least one forward-facing seat and
the at least one aft-facing seat each comprise a pivotally mounted seat pan.
3. The seating arrangement of claim 2, wherein the seat pan comprises tapered sides.
- 15 4. The seating arrangement of claim 1, wherein an armrest comprising opposing portions
is positioned between the at least one forward-facing seat and the at least one aft-facing seat.
5. The seating arrangement of claim 4, wherein the opposing portions are inwardly
angled.
20
6. The seating arrangement of claim 1, wherein passengers seated in the at least one
forward-facing seat and the at least one aft-facing seat do not face each other.
7. The seating arrangement of claim 1, wherein the at least one forward-facing seat and
25 the at least one aft-facing seat each comprise a seat back comprising a receptacle for
removably mounting a tray table.
8. The seating arrangement of claim 1, wherein the at least one forward-facing seat and
the at least one aft-facing seat each comprise a seat back comprising a receptacle for
30 removably mounting a personal electronic device.
9. A seating arrangement comprising:
at least two rows of seats positioned within a column;

wherein each row comprises at least one forward-facing seat and at least one aft-facing seat;

wherein the at least one forward-facing seat and the at least one aft-facing seat are arranged adjacent to one another so that a shoulder space on one side of the at least one forward-facing seat overlaps with adjacent shoulder space of the at least one aft-facing seat;

wherein the at least one forward-facing seat in each row are longitudinally aligned with each other within the column; and

wherein the at least one aft-facing seat in each row are longitudinally aligned with each other within the column.

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10. The seating arrangement of claim 9, wherein the at least one forward-facing seat and the at least one aft-facing seat of each row each comprise a pivotally mounted seat pan.

11. The seating arrangement of claim 10, wherein the seat pan comprises tapered sides.

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12. The seating arrangement of claim 9, wherein an armrest comprising opposing portions is positioned between the at least one forward-facing seat and the at least one aft-facing seat of each row.

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13. The seating arrangement of claim 12, wherein the opposing portions are inwardly angled.

14. The seating arrangement of claim 9, wherein passengers seated in the at least one forward-facing seat and the at least one aft-facing seat of each row do not face each other.

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15. The seating arrangement of claim 9, wherein the at least one forward-facing seat and the at least one aft-facing seat of each row each comprise a seat back comprising a receptacle for removably mounting a tray table.

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16. The seating arrangement of claim 9, wherein the at least one forward-facing seat and the at least one aft-facing seat of each row each comprise a seat back comprising a receptacle for removably mounting a personal electronic device.

17. A seating arrangement comprising:
at least two rows of seats separated by an aisle;
wherein each row comprises a plurality of alternating facing seats;
wherein shoulder space of one seat overlaps with shoulder space of an adjacent seat;
5 wherein the at least two rows of seats collectively comprise at least seven seats.
18. The seating arrangement of claim 17, wherein the plurality of alternating facing seats
each comprise a pivotally mounted seat pan.
- 10 19. The seating arrangement of claim 17, wherein passengers seated in the plurality of
alternating facing seats do not face each other.
20. The seating arrangement of claim 17, wherein the plurality of alternating facing seats
each comprise a seat back comprising a receptacle for removably mounting a personal
15 electronic device.

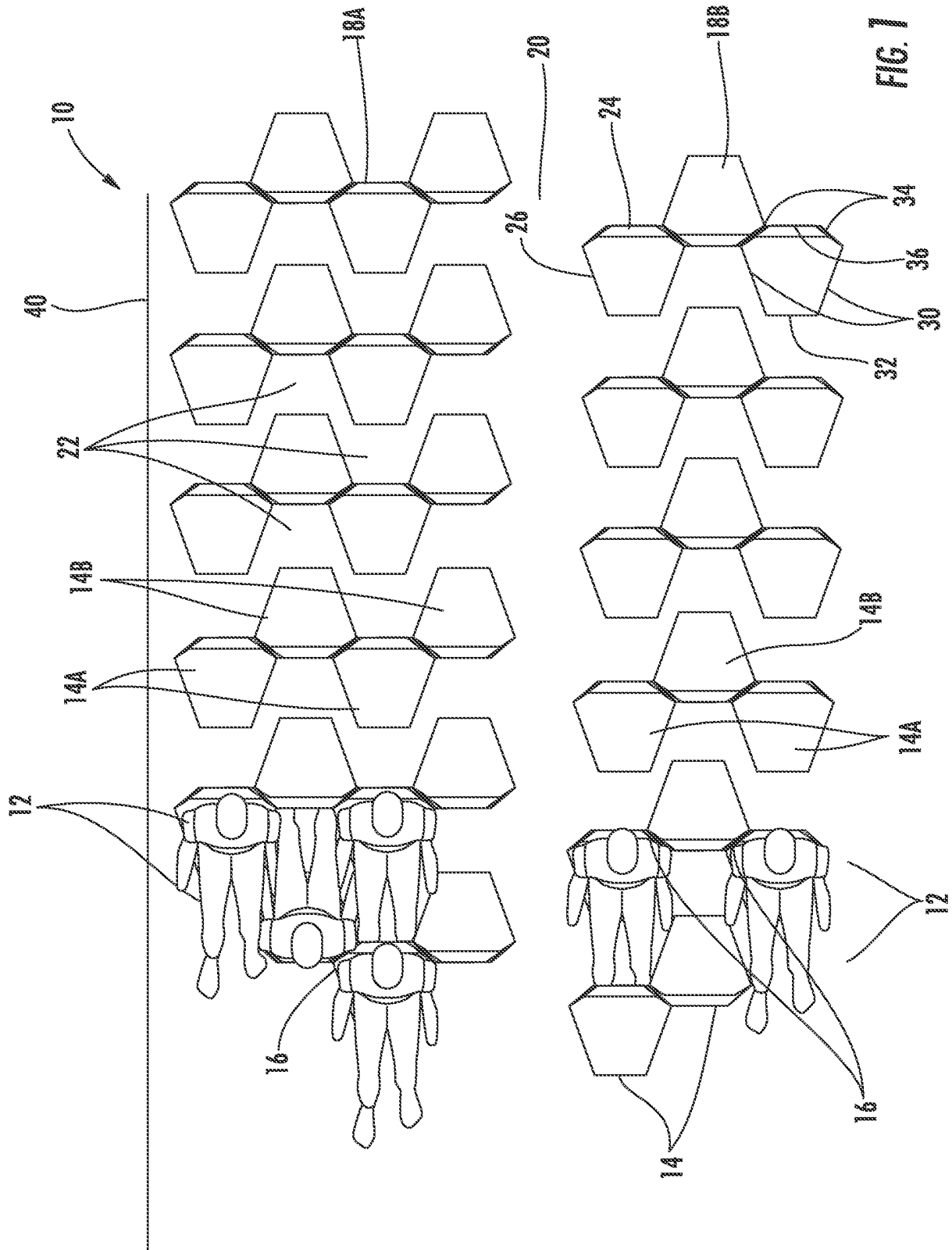


FIG. 1

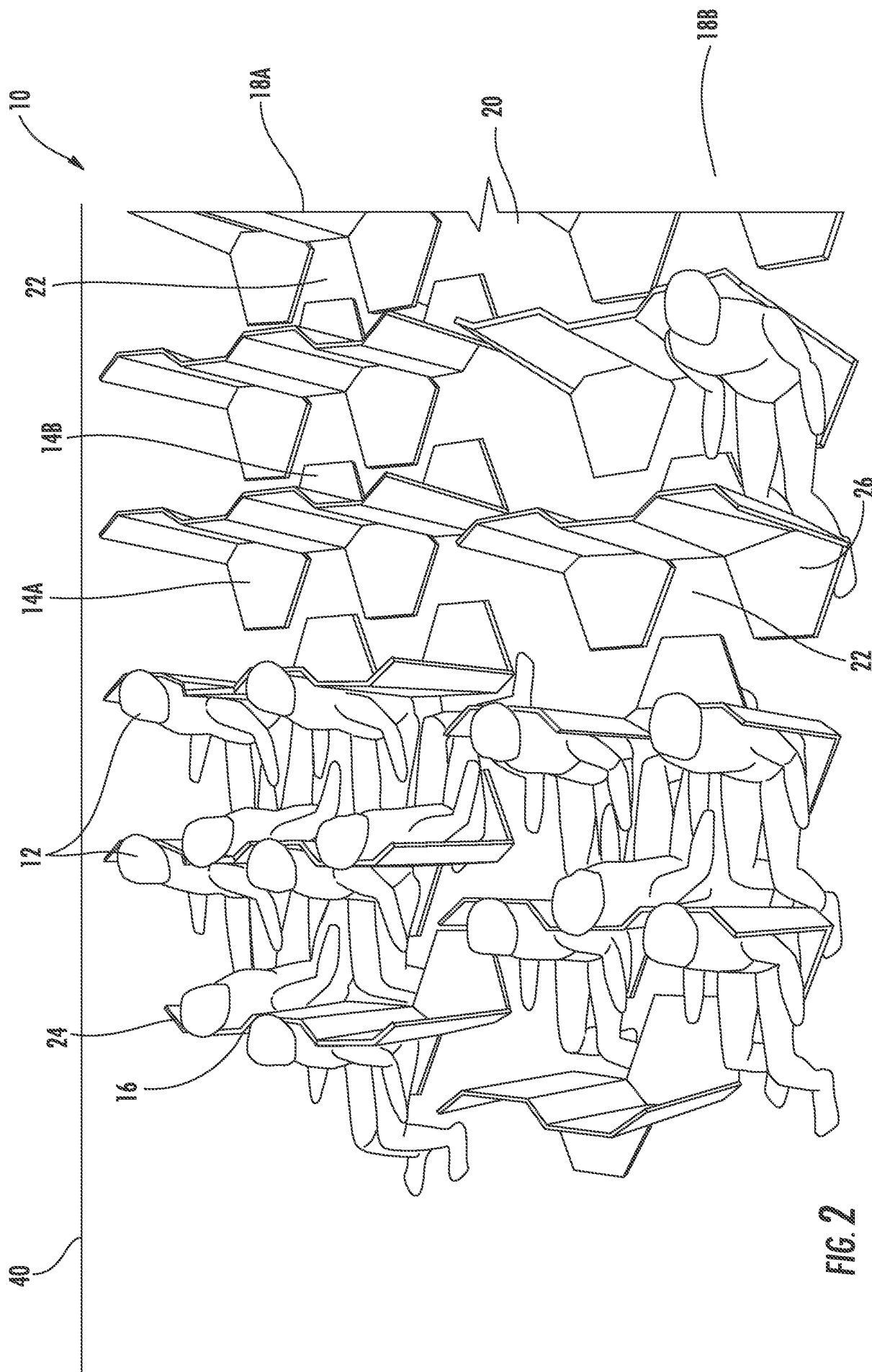


FIG. 2

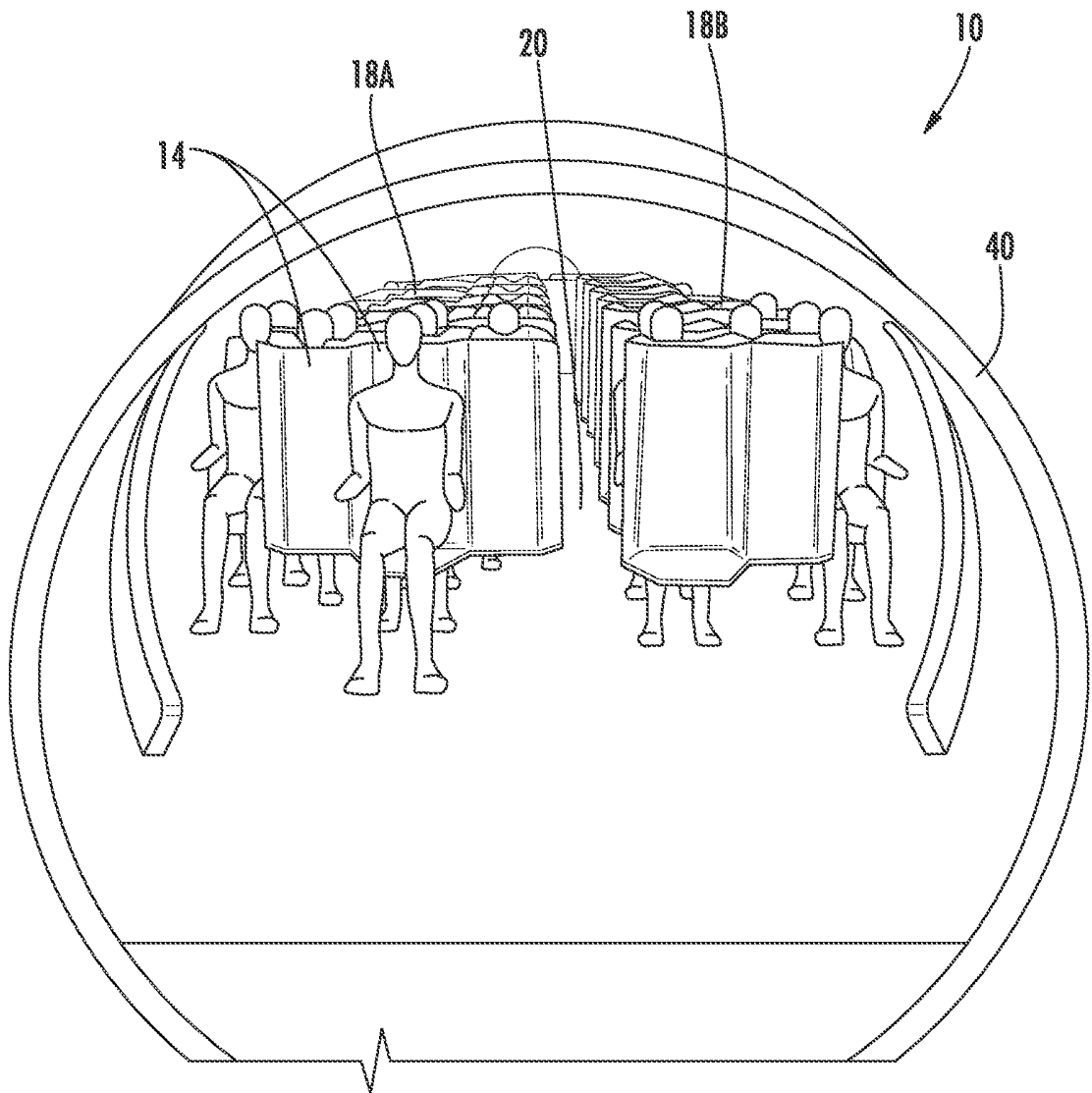


FIG. 3

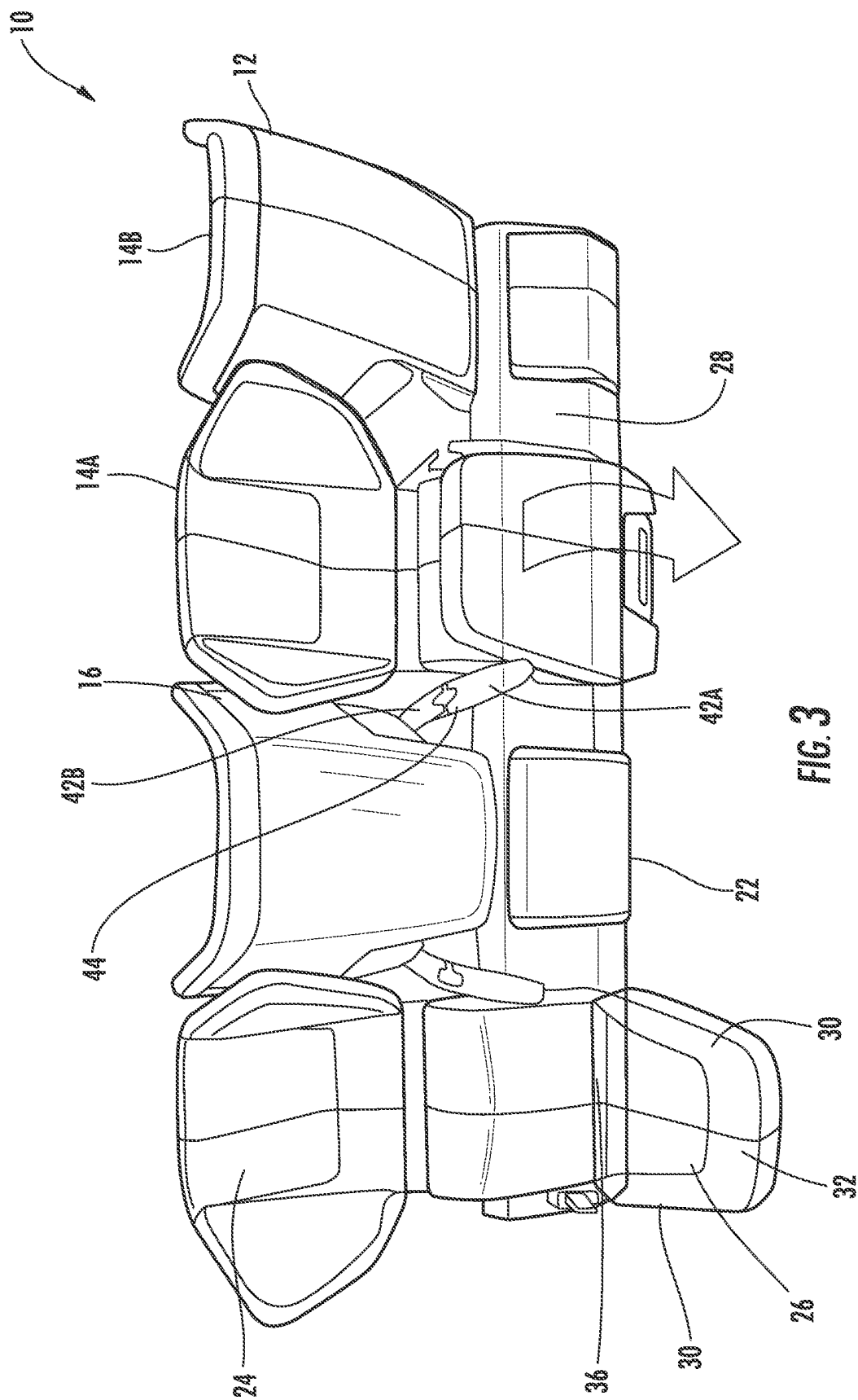


FIG. 3

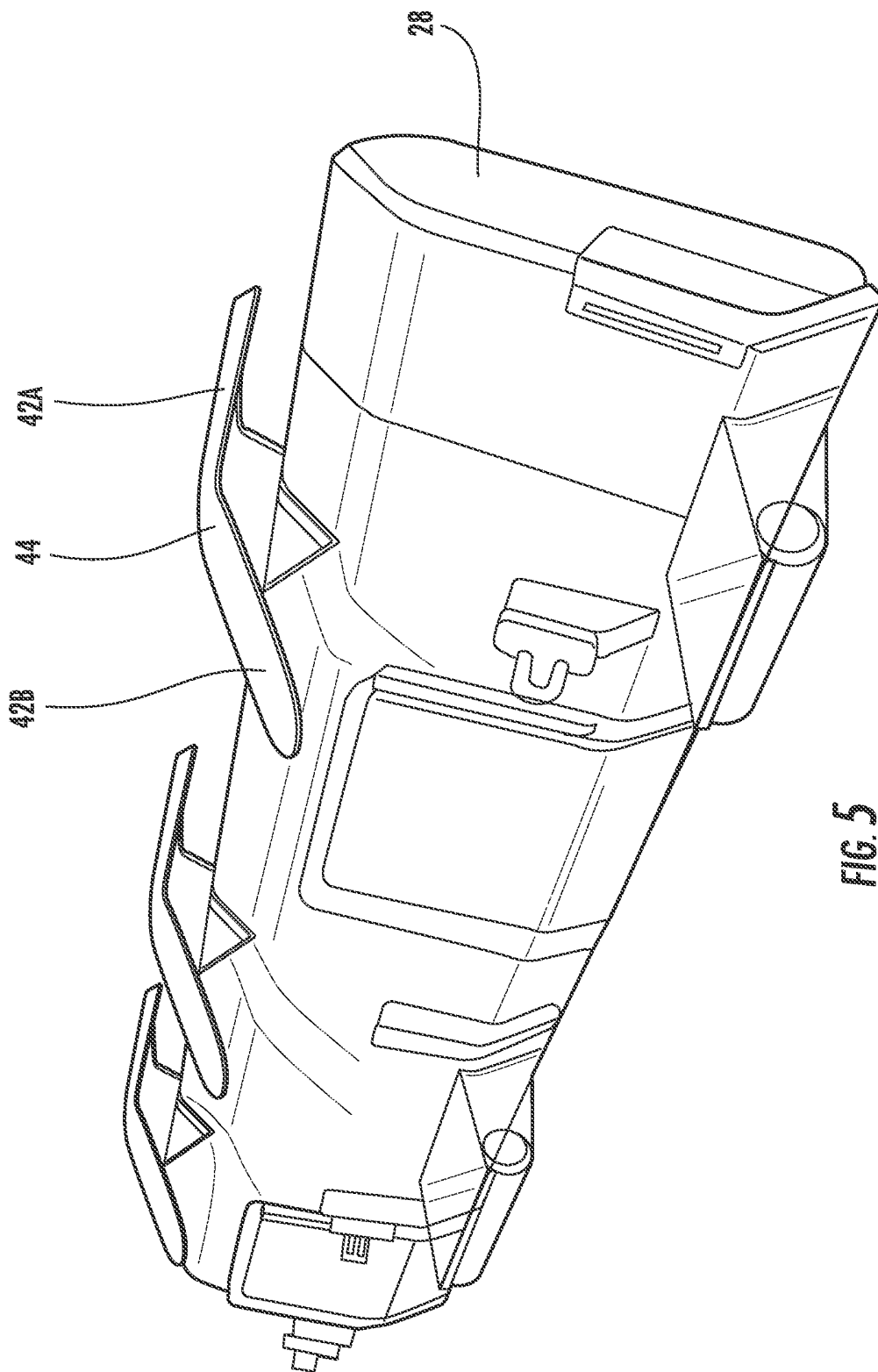


FIG. 5

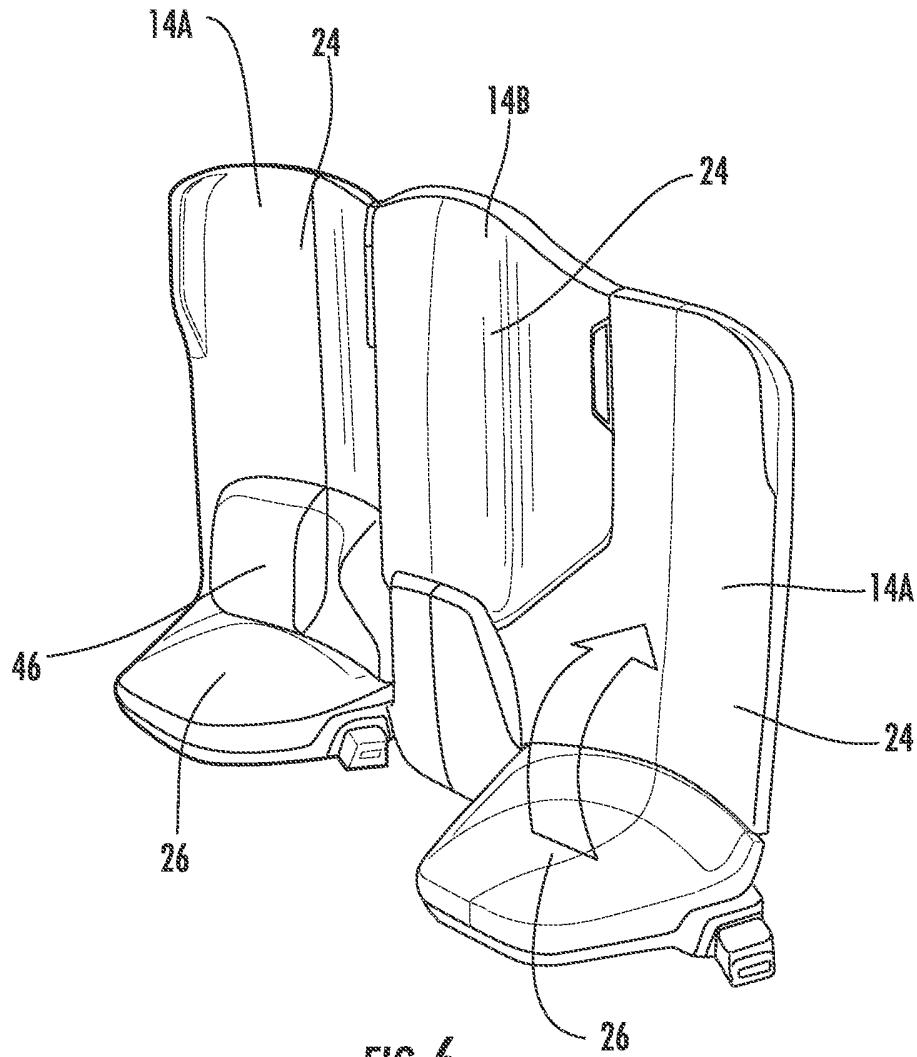


FIG. 6

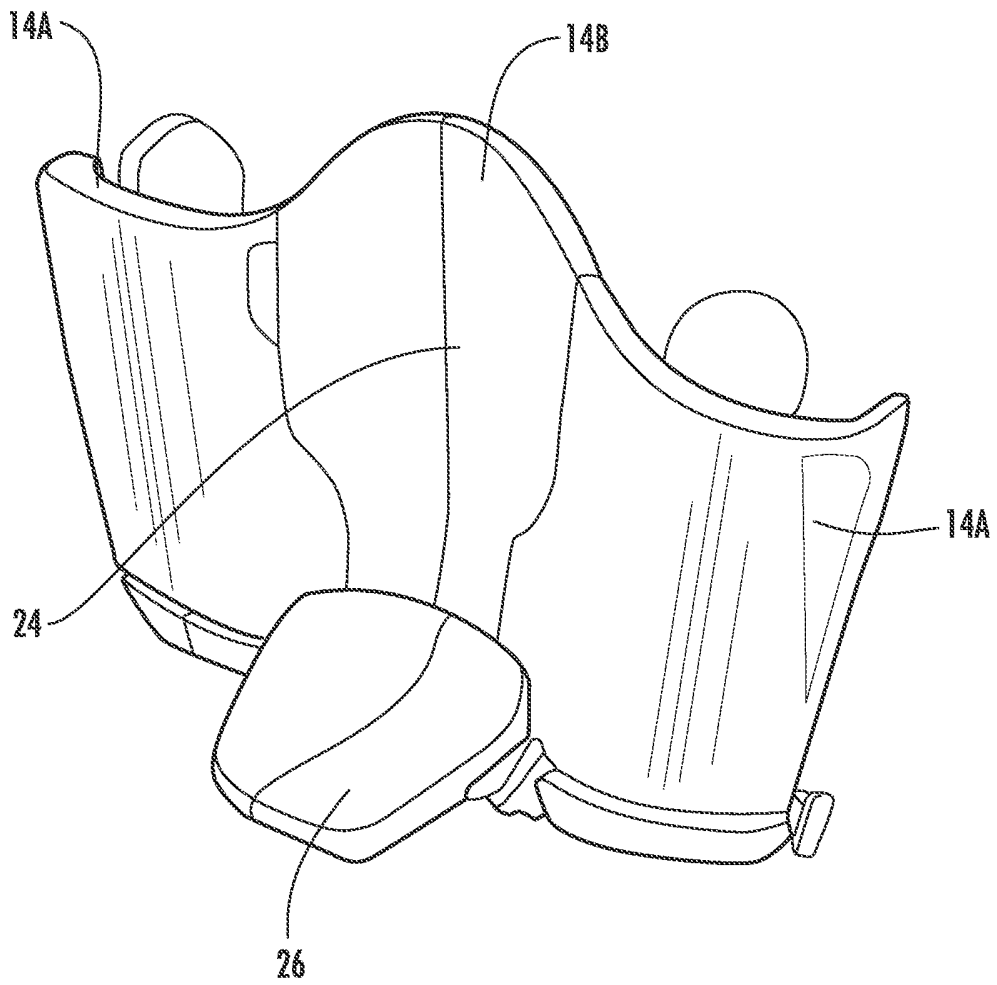


FIG. 7

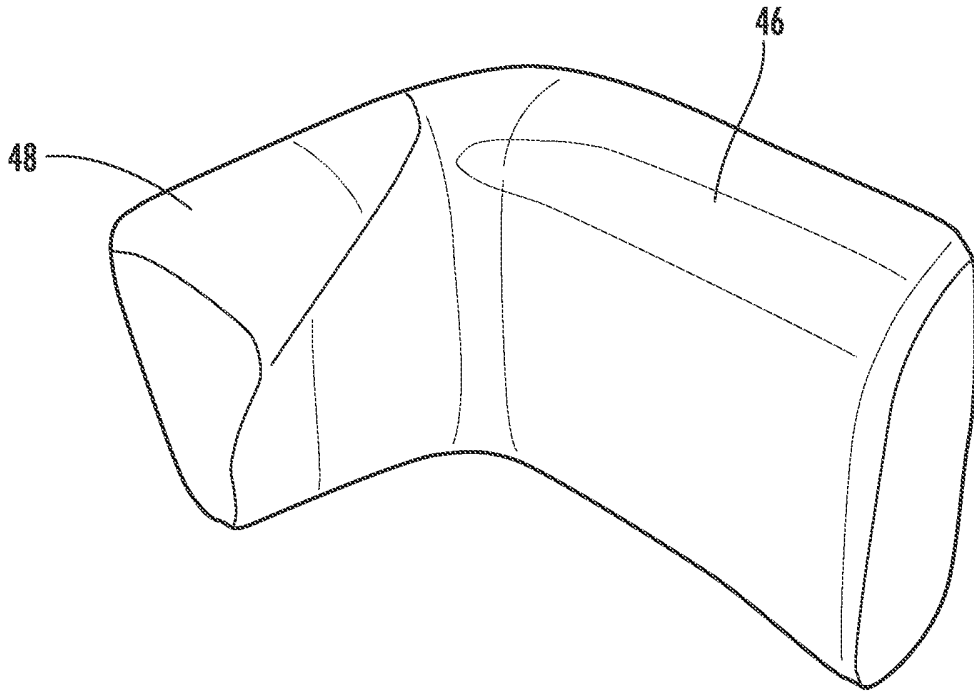


FIG. 8

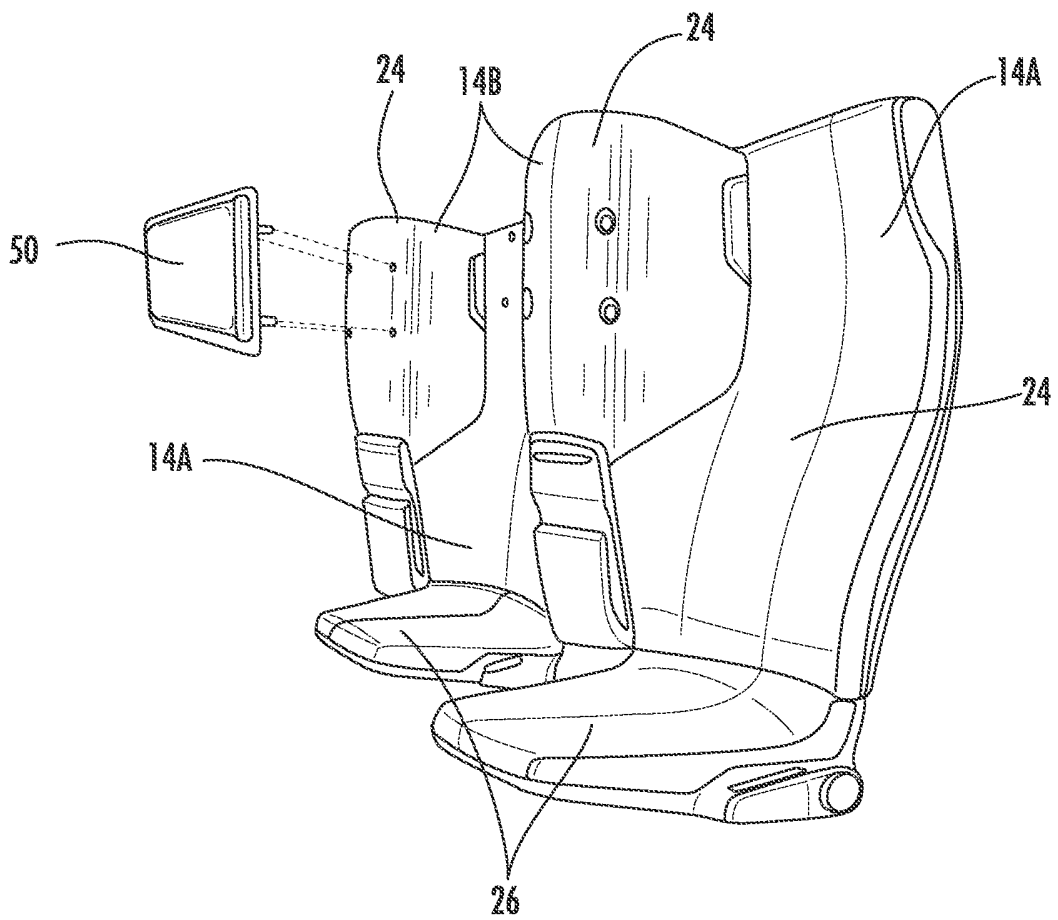


FIG. 9

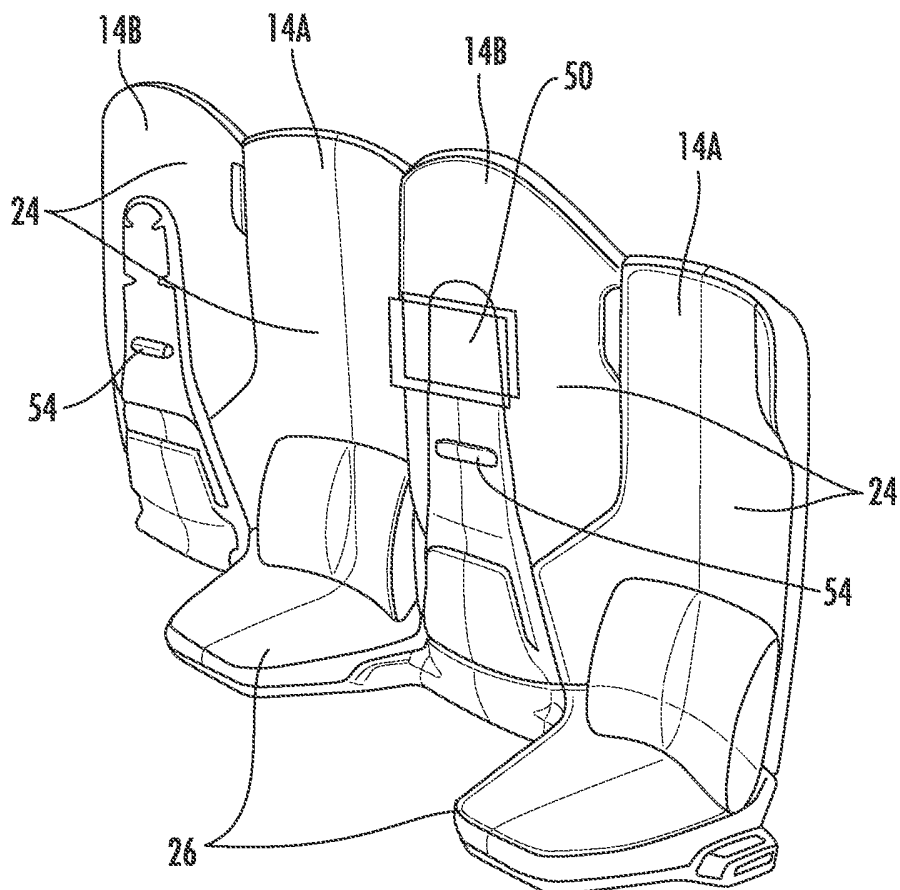


FIG. 10

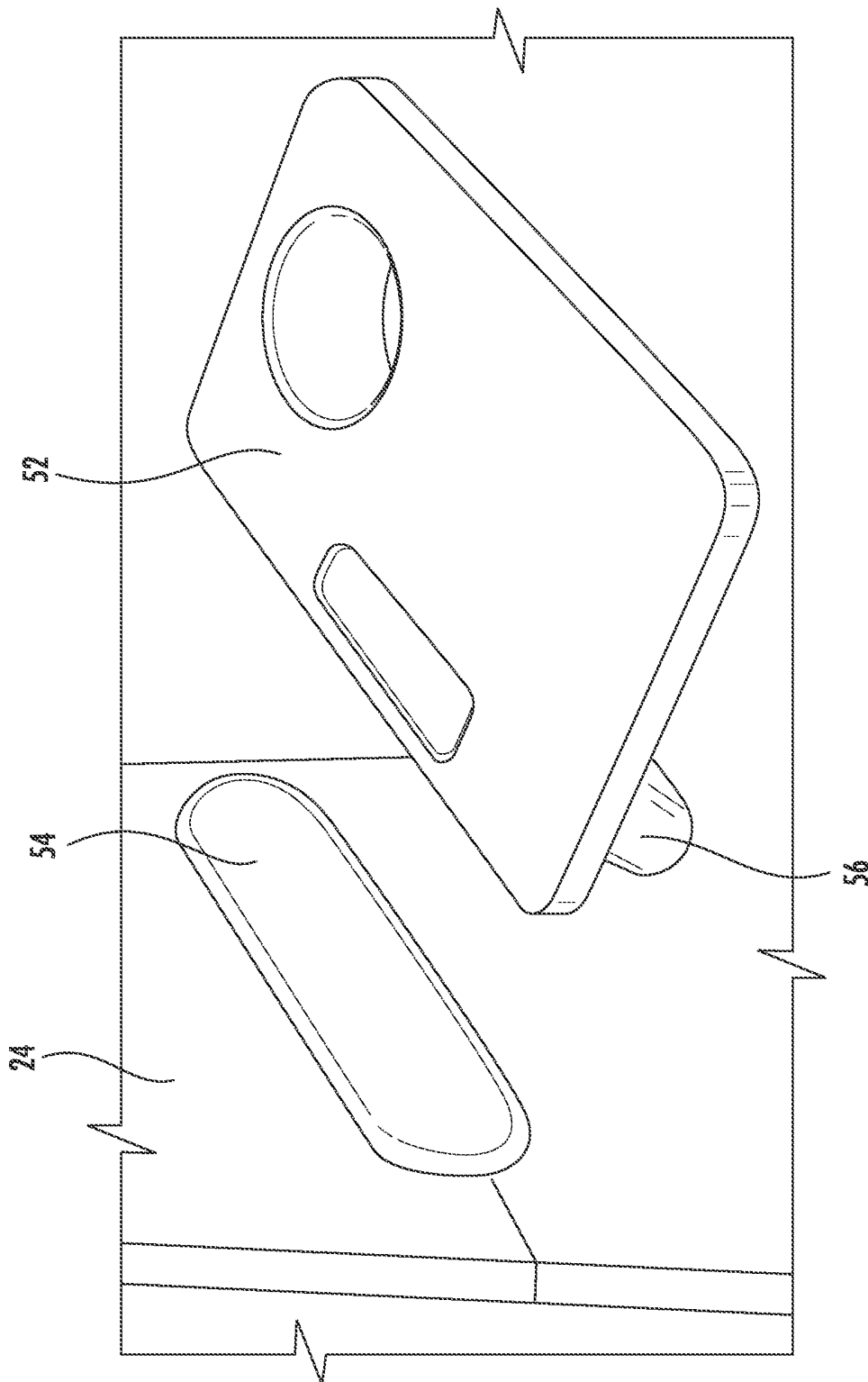


FIG. 11

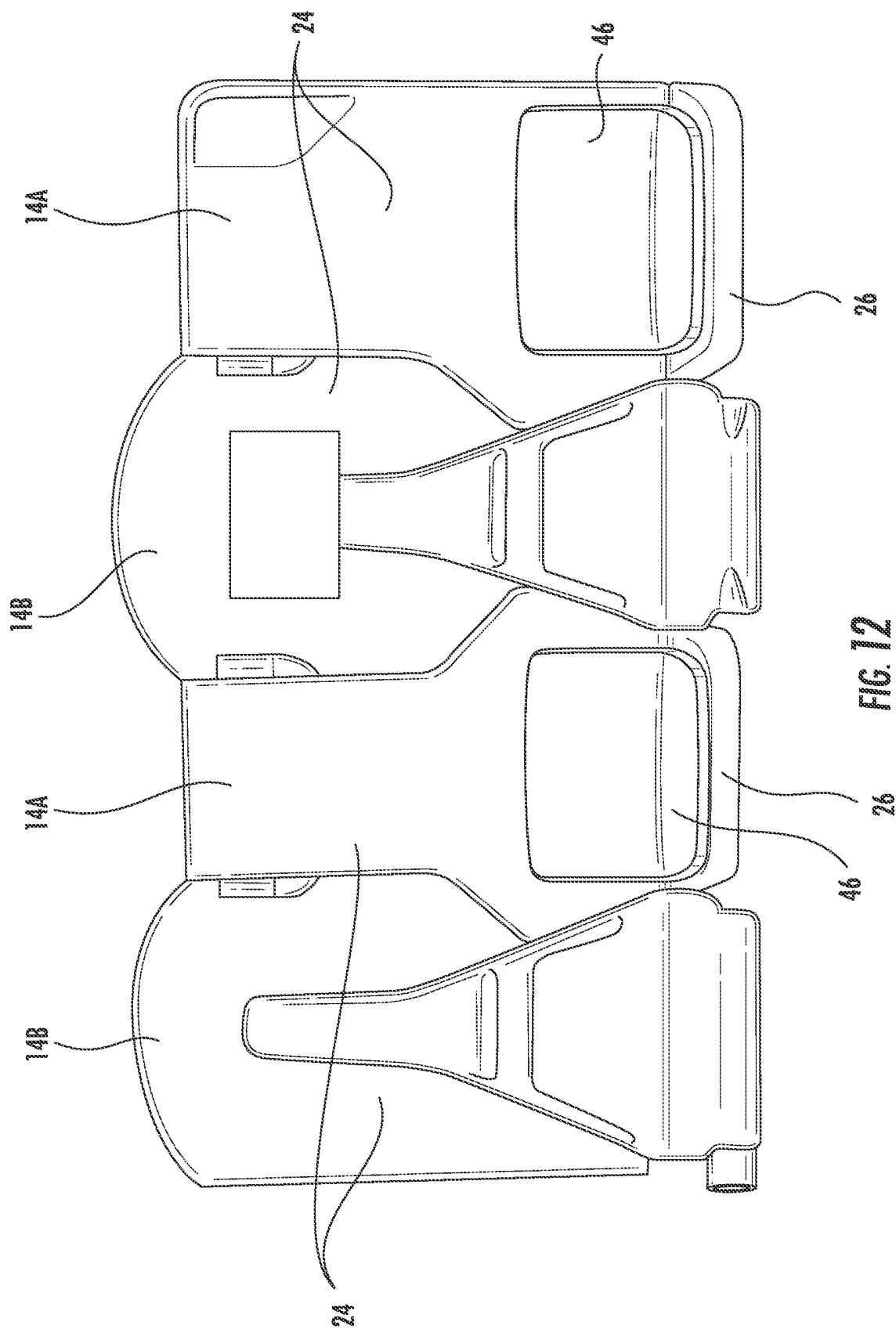


FIG. 12

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2014/066533

A. CLASSIFICATION OF SUBJECT MATTER INV. B64D11/06 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) 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	WO 00/21831 A2 (BRITISH AIRWAYS PLC [GB]; ROUND MATTHEW [GB]; DARBYSHIRE MARTIN [GB]) 20 April 2000 (2000-04-20) abstract figures 6a-6d,11 -----	1-20
X	WO 2007/003889 A1 (PREMIUM AIRCRAFT INTERIORS GRO [GB]; HANKINSON CHRISTOPHER [GB]; DRYBU) 11 January 2007 (2007-01-11) abstract figure 8 -----	1,4,6,9, 12,14
<input type="checkbox"/> Further documents are listed in the continuation of Box C.		
<input checked="" type="checkbox"/> See patent family 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 application or patent 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 "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 "&" document member of the same patent family	
Date of the actual completion of the international search <p align="center">4 March 2015</p>	Date of mailing of the international search report <p align="center">11/03/2015</p>	
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 align="center">Vachey, Clément</p>	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2014/066533

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