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Datasheet for the decision of 24 March 2009

Case Number: T 1016/07 - 3.2.01

Application Number: 97203565.3

Publication Number: 0847917

IPC: B64D 25/04

Language of the proceedings: EN

Title of invention:
Reduced head impact seat system

Patentee:
The Boeing Company

Opponent:
AIRBUS SAS et al.

Headword:
-

Relevant legal provisions:
-

Relevant legal provisions (EPC 1973):
EPC Art. 56

Keyword:
"Inventive step - yes"

Decisions cited:
-

Catchword:
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Case Number: T 1016/07 - 3.2.01

D E C I S I O N
of the Technical Board of Appeal 3.2.01
of 24 March 2009

Appellants: (Opponents)	AIRBUS SAS et al. 1 Rond-Point Maurice Bellonte F-31700 Blagnac (FR)
Representative:	Habenicht, Wieland Patentanwalt Nymphenburger Strasse 79 D-80636 München (DE)
Respondent: (Patent Proprietor)	The Boeing Company 100 North Riverside Plaza Chicago IL 60606-2016 (US)
Representative:	McLeish, Nicholas Alistair Maxwell Boult Wade Tennant Verulam Gardens 70 Gray's Inn Road London WC1X 8BT (GB)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted 19 April 2007 concerning maintenance of European patent No. 0847917 in amended form.**

Composition of the Board:

Chairman: S. Crane
Members: J. Osborne
G. Weiss

Summary of Facts and Submissions

I. The opponents' appeal is directed against the decision posted 19 April 2007 according to which it was found that, account being taken of the amendments made by the patent proprietor during the opposition proceedings, the patent and the invention to which it relates meet the requirements of the EPC 1973.

II. The following state of the art played a role during the appeal proceedings:

D1: US-A-5 468 045;

D3: US-A-5 340 059.

III. At oral proceedings on 24 March 2009 the appellants requested that the decision under appeal be set aside and that the patent be revoked. The respondent requested that the appeal be dismissed (main request) or in the alternative that the decision be set aside and the patent maintained in amended form on the basis of claims 1 to 7 filed with a letter dated 16 January 2008 (auxiliary request).

IV. Claim 1 as approved by the opposition division (respondent's main request) reads:

"Apparatus including a first seat (18) and a second seat (32) positioned adjacent and to the rear of the first seat (18), the first seat (18) comprising:
a seat frame (24);
a seat pan (20) mounted on said frame;
a seat back (22) mounted on said frame for pivotal

movement toward said seat pan (20); characterised by a panel (28) that is detachably fastened to the rearward surface of said seat back so as to break free of said seat back when said seat back pivots forward under a predetermined load imposed by a sudden deceleration, and stay in upright position to lie in the path travelled by the head of a passenger in said second subsequent seat and experiencing said sudden deceleration, thereby reducing peak deceleration of the head."

Claims 2 to 8 specify features additional to the subject-matter of claim 1.

V. The appellants' submissions in as far as they are relevant to the present decision may be summarised as follows:

D3 relates to an apparatus for reducing injuries of aircraft seat occupants during a crash as measured by the Head Injury Criterion (HIC). It discloses adjacent rows of seats equipped with folding tray-tables on the rearward sides. For the row of seats adjacent to a bulkhead a cabinet is provided on the bulkhead to act as a cushion to decelerate the head. Folding tray-tables may also be provided on that cushion and it is explicitly stated that they act as part of the energy absorbing restraint system. The skilled person learns from this disclosure that the head is subjected to a less severe impact if decelerated by an impact protection element before reaching the bulkhead. The skilled person would transfer this teaching to middle rows of seats by ensuring that the impact absorption of the folding tray-tables on the backs of the seats is

not compromised by the presence of an object directly in front of it. This requires that the seat back move forwards during a crash. The skilled person is anyway aware that it is conventional that the seat back on an aircraft seat may pivot forwardly.

D1 also relates to occupant protection in vehicles and teaches that the back of the seat should rotate forwardly during an impact. Although D1 specifically addresses injuries in children they also travel in aircraft. A combination of the teachings of D3 and D1 therefore renders the subject-matter of claim 1 obvious.

VI. The respondent's rebuttal was essentially as follows:

D3 does not represent the closest state of the art for consideration of inventive step of claim 1. It relates exclusively to improvements in the protection of passengers sitting behind a bulkhead and explicitly states that the protection of passengers in the middle rows of seats is satisfactory. There is no suggestion that the impact absorbing cabinet which is proposed by D3 should be placed anywhere other than on a bulkhead. Moreover, D3 fails to teach that the folding tray-table should act as the energy-absorbing member.

As regards combining the teaching of D3 with that of D1, the latter relates to child safety seats for cars and D3 explicitly teaches that restraint systems for cars are not suitable for use in aircraft. Moreover, the teaching of D1 is directed towards a problem which is different from that of reducing the HIC value, namely reducing neck injuries in children. The seat back which in accordance with D1 pivots forwardly during a crash

is mounted to the rear bulkhead of a car so is not susceptible to any impact from a passenger seated behind. The skilled person aiming to solve the problem of reducing the HIC for occupants of middle rows of aircraft seats would have no cause to consider the teaching of D1.

Reasons for the Decision

1. The patent relates to head injury protection for an occupant of a seat positioned behind another seat (middle row seat), such as in an aircraft. Conventionally aircraft seats are provided with a lap-belt restraint system which in an impact restrains the seat occupant's pelvic area but allows the upper torso and head to pivot forwardly and potentially impact against the seat placed in front. The risk of injury to the head may be assessed on the basis of acceleration and time measurements, expressed as a Head Injury Criterion value (HIC). The patent aims to reduce the risk of injury as determined by the HIC.

Main request

2. Of the grounds for opposition put forward in this case only lack of inventive step has been pursued during the appeal proceedings. The appellant considers that the subject-matter of present claim 1 would result from an obvious combination of a closest state of the art represented by D3, when read in the light of the general knowledge of the skilled person, and D1.

3. D3 relates to reducing the risk of head injury to aircraft passengers wearing a lap belt restraint and seated in the first row behind a bulkhead. Figure 2 illustrates the problem which was being addressed, namely impact between the head of a passenger sitting in the first row behind a bulkhead and the bulkhead itself. The teaching of D3 sets out from the premise that protection of a passenger in a seat behind the first row was already satisfactory and provided by the structure of the uppermost portion of the back of the seat positioned in front of the passenger. Figure 2 also illustrates that earlier arrangement showing the heads of passengers contacting the backs of seats in front of them. The solution offered by D3 to the problem of improving protection for passengers immediately behind a bulkhead was to provide on the rear face of the bulkhead an energy absorbing structure modelled on the known seat backs. Figure 3 accordingly illustrates passengers in all rows of seats with their heads in essentially identical positions in contact with the forwardly positioned energy absorbing structure or seat back respectively. Folding tray-tables are illustrated in their conventional positions both in the backs of the seats and in the structure on the bulkhead. D3 therefore is directed at increasing the safety of the passenger in the front row to the level deemed satisfactory for those in the middle rows. The respondent takes the view that because D3 teaches that the safety level in the middle rows was already satisfactory the skilled person would not begin from that teaching when seeking to improve safety in those middle rows. The board does not necessarily agree with that view but since it is not decisive in the present case and in order not to deviate from the appellants'

line of argumentation it is assumed in the following that D3 does form a valid starting point.

3.1 The board and the parties are in agreement that D3 does disclose the following features of present claim 1 to the skilled person:

- apparatus including a first seat and a second seat positioned adjacent and to the rear of the first seat, the first seat comprising a seat frame and a seat pan mounted on the frame.

3.1.1 The appellant contends that since the skilled person knows that the backs of aircraft seats conventionally pivot forwardly that feature also is implicitly disclosed in D3. The board disagrees with that contention because it is evident that an essential feature of the earlier known arrangement was that the seat back remained in the upright position in order to provide energy absorption at the position indicated in figures 2, 3. This is also consistent with the explicit teaching of D3 that it is desirable to restrain the head by an object which is positioned as close as possible to the face, see the paragraph bridging columns 5, 6.

3.1.2 The appellant furthermore contends that the folding tray-tables on the backs of the seats are taught by D3 as being a panel as defined in present claim 1 and draw support for this contention from a statement in column 6, lines 32 to 38 that the table "is primarily intended to spread the impact loads over a large area for better absorption of kinetic energy". However, the panel as defined in present claim 1 is specified as

lying in the path travelled by the head of a passenger. By comparison, as may be seen in figures 3 to 5 of D3, the table is positioned beneath the area at which the head impacts. Furthermore, the above-mentioned statement in D3 relating to the table spreading impact loads is to be read together with column 6, lines 19 to 21 which distinguishes between the localised head strike area referenced '40' and the entire aft surface of the energy absorbing material which would include the table and which is also designated as a strike area but without any further reference to head impact.

3.2 The following features of present claim 1 therefore are new with respect to D3:

- a seat back mounted on the frame for pivotal movement toward the seat pan;

- a panel that is detachably fastened to the rearward surface of the seat back so as to break free of the seat back when the seat back pivots forward under a predetermined load imposed by a sudden deceleration, and stay in upright position to lie in the path travelled by the head of a passenger in the second subsequent seat and experiencing the sudden deceleration, thereby reducing peak deceleration of the head.

The board is satisfied that these features solve the problem set out in the patent specification, namely to reliably reduce HIC values so as to reduce or prevent head injuries whilst having little effect on aircraft interiors, cause no reduction in seating density and without requiring active triggering.

4. D1 relates to an integral child safety seat for a car. It is mounted in the centre of the rear seat and includes a 'full harness' type of belt having two shoulder straps. The upper ends of the shoulder straps are fastened to the seat back which in turn is attached, pivotably at its lower end, to a frame which mounts to the rear bulkhead of the car. D1 addresses the problem that during an impact whilst the belt restrains the child's shoulders, that restraint is transmitted to the child's head only by the neck which is potentially susceptible to injury as a result. The problem is said to be particularly acute with children because in comparison with adults they have disproportionately heavy heads. The solution proposed by D1 is to controllably allow the seat back to pivot forwardly when subjected to the loads of the shoulder belts, thereby increasing the distance available for decelerating the child's head and correspondingly decreasing the loads which must be carried by the neck.

4.1 D3 in column 7, lines 16 to 29 explicitly teaches away from the use of automotive restraint systems in aircraft on the basis that they are unsuited to the different crash profile of an aircraft. The skilled person wishing to solve the problem set out under 3.2 above in the technical field of aircraft seating therefore would not be motivated to consider the teaching of D1 relating to an automotive restraint system. Indeed, the problem which D1 addresses results from the use of a shoulder restraint whilst that set out under 3.2 above results from its absence. Moreover, whilst D3 addresses the problem of reducing HIC values, D1 is concerned with the quite different problem of

reducing neck injuries. Even if the skilled person would consider D1 he would find nothing of relevance to solving the problem set out under 3.2 above. As set out in the previous paragraph, the back rest of the child safety seat according to D1 pivots forwardly in order to reduce the forces carried by the neck when decelerating the head. The child using the safety seat is positioned forward of the seat back and during the crash pivots together with the seat back away from the frame mounting the seat to the rear bulkhead. Since the rear bulkhead forms the rearmost delimitation of the passenger compartment it is evident that the mounting frame serves no purpose as a restraint for a passenger positioned behind it. It follows that there is no teaching, even implicit, that the separation of the seat back from the mounting frame in the course of restraining the child could serve any purpose in reducing injuries to a passenger who would be behind the seat.

4.2 Similarly, the feature in present claim 1 of a panel which remains in an upright position to lie in the path travelled by the head of a passenger and thereby reduce peak deceleration of the head is not known from D1. As already mentioned in the preceding paragraph the child safety seat mounting frame is positioned at the rearmost delimitation of the passenger compartment so that there is no explicit teaching as regards any ability as a restraint device for passengers positioned behind it. The skilled person would, moreover, immediately recognise from the construction of the mounting frame that it could not serve as a panel within the meaning of present claim 1 since it is merely an open, rectangular, tubular construction with

plates mounted at each corner, the greatest part of the area enclosed by the tubing being open.

5. It follows from the foregoing that the state of the art according to D3 and D1 is not detrimental to inventive step of the subject-matter of present claim 1 (Article 56 EPC 1973). Since claims 2 to 8 contain all features of claim 1 the same conclusion applies to them. Under these circumstances consideration of the respondent's auxiliary request is superfluous.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

A. Vottner S. Crane