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(54) Title: INTEGRATED CHILD SEAT FRAME

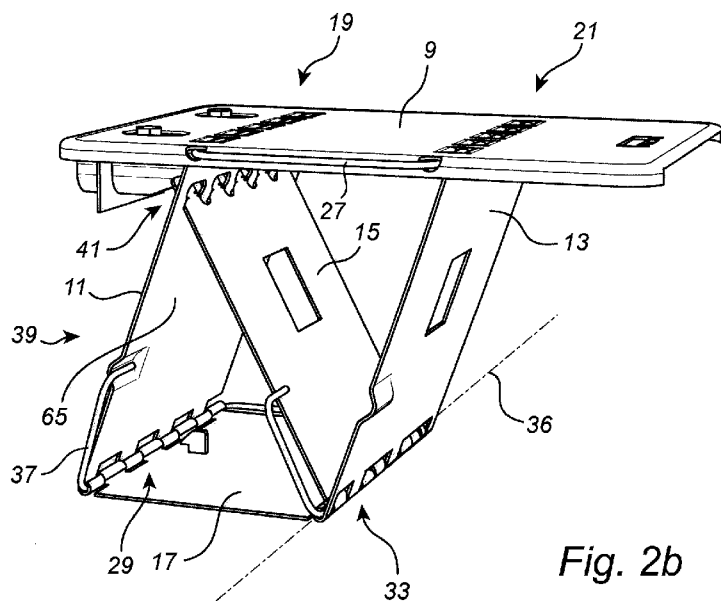


Fig. 2b

(57) Abstract: The present invention relates to an integrated child seat frame (1) configured for being integrated into a vehicle seat (3), the integrated child seat frame (1) comprising a cushion support member (9), and a first and a second pivotable arm (11, 13), each of which has a first end (11a, 13a) which is pivotally connected to the cushion support member (9), wherein the integrated child seat frame (1) is adapted to assume both a first elevation and a second elevation, at which second elevation the cushion support member (9) is elevated above its position at the first elevation. The integrated child seat frame (1) comprises a pivotable central support arm (15) arranged to retain the integrated child seat frame (1) at the second elevation, wherein the first arm (11) and a first end (15a) of the central support arm (15) are adapted to form a releasable connection (41) releasably connecting the central support arm (15) to the first arm (11) when the integrated child seat frame (1) assumes the second elevation.

INTEGRATED CHILD SEAT FRAME

Technical Field of the Invention

The present invention relates to an integrated child seat frame configured for being integrated into a vehicle seat, the integrated child seat frame comprising a cushion support member, and a first and a second pivotable arm, each of which has a first end which is pivotally connected to the cushion support member, wherein the integrated child seat frame is adapted to assume both a first elevation and a second elevation, at which second elevation the cushion support member is elevated above its position at the first elevation.

Background Art

Today, many vehicles are designed to comprise at least one child seat that is integrated into the vehicle seating system. Such an integrated child seat is designed as an integral part of a vehicle seat for the purpose of seating a child in an elevated position on the vehicle seat in order to correctly position the vehicle seat belt over the child's body.

US 6,971,718 discloses an adjustable vehicle seat. The adjustable seat comprises a squab element, two pair of links allowing the squab element to be moved upwardly from an initial position, in which the seat may be used by an adult, to an elevated position, in which the seat may be used by a child, and latches to maintain the seat in the elevated position.

With respect to previously known solutions, it is desirable to provide a simplified and more compact integrated child seat frame.

Summary of the Invention

It is an object of the present invention to provide an improved integrated child seat frame.

This and other objects that will be apparent from the following summary and description are achieved by an integrated child seat frame according to the appended claims.

According to an aspect of the present invention, there is provided an integrated child seat frame configured for being integrated into a vehicle seat, the integrated child seat frame comprising a cushion support member, and a first and a second pivotable arm, each of which has a first end which is

5 pivotally connected to the cushion support member, wherein the integrated child seat frame is adapted to assume both a first elevation and a second elevation, at which second elevation the cushion support member is elevated above its position at the first elevation, the integrated child seat frame further comprises a pivotable central support arm arranged to retain the integrated

10 child seat frame at the second elevation, wherein the first arm and a first end of the central support arm are adapted to form a releasable connection releasably connecting the central support arm to the first arm when the integrated child seat frame assumes the second elevation.

A vehicle seat comprising such an integrated child seat may assume

15 an adult seating position, which corresponds to the first elevation and in which the vehicle seat is prepared for an adult, and a child seating position, which corresponds to the second elevation and in which the vehicle seat is prepared for a child. The pivotable central support arm enables a robust and compact design of the integrated child seat frame and provides for a robust and

20 reliable locking of the integrated child seat frame in the child seating position, i.e. at the second elevation. Also, the central support arm enables an integrated child seat frame that may be adjusted between an adult seating position and a child seating position in an easy manner. Furthermore, an integrated child seat frame having relatively few parts may be provided.

25 Hence, a robust, flat, light weight and cost-efficient integrated child seat module that is easy to operate may be provided.

According to one embodiment the integrated child seat frame comprises a base structure to which a second end of each of the first and second arm and a second end of the central support arm are pivotally

30 connected. The base structure provides for a very robust design and facilitates mounting of the child seat frame into a vehicle.

According to one embodiment the base structure comprises at least one base plate.

According to one embodiment the base structure comprises one single base plate.

According to one embodiment the second end of the central support arm is pivotally connected to the base structure adjacent to the second end of
5 the second arm.

According to one embodiment the central support arm and the second pivotable arm are pivotable around a common axis, which enables a robust design having very few parts since a common hinge pin may be used.

According to one embodiment the first pivotable arm comprises at least
10 one aperture configured to receive a connecting portion arranged at the first end of the central support arm.

According to one embodiment said connecting portion comprises at least one tongue, the base of which is configured to engage an edge of said aperture, thereby forming said connection.

15 According to one embodiment said tongue has a recess adapted to cooperate with a protrusion arranged at the edge of said aperture.

According to one embodiment the integrated child seat frame further comprises a button device adapted for forcing the central support arm to release from its connection to the first pivotable arm in order to facilitate
20 operation of the integrated child seat frame, i.e. to facilitate adjustment from the second elevation to the first elevation and/or adjustment from the first elevation to the second elevation.

According to one embodiment the button device comprises a push button having a push surface at one end, which push surface is arranged to
25 act on an abutment surface of the central support arm to push the central support arm away from its connection to the first arm.

According to one embodiment the first pivotable arm is arranged to form a slide surface for the first end of the central support arm, wherein the first end of the central support arm is arranged to, during deployment of the
30 integrated child seat frame from said first elevation to said second elevation, slide along said slide surface into the releasable connection.

According to one embodiment the integrated child seat frame further comprises a spring element arranged to form a spring portion supporting

deployment of the integrated child seat frame from said first elevation to said second elevation.

According to one embodiment said spring element is configured to form a hinge pin portion connecting a respective second end of at least one of
5 the first arm, the second arm and the central support arm to a base structure.

According to one embodiment at least said first pivotable arm and said pivotable central support arm are formed from sheet metal. This embodiment has the advantage that the frame may be very thin when it assumes the first elevation, i.e. in a folded state, which facilitates integration of the frame into a
10 vehicle seat.

According to another aspect of the present disclosure there is provided a vehicle seat comprising an integrated child seat frame of the type described above and a seat cushion.

These and other aspects of the invention will be apparent from and
15 elucidated with reference to the claims and the embodiments described hereinafter.

Brief Description of the Drawings

The invention will hereafter be described in more detail and with
20 reference to the appended schematic drawings.

Fig. 1a is a perspective view of a vehicle seat with an integrated child seat in an adult seating position.

Fig. 1b is a perspective view of the vehicle seat in Fig. 1a with the integrated child seat in a child seating position.

25 Fig. 2a is a partly exploded view showing an integrated child seat frame according to an embodiment of the present disclosure.

Fig. 2b is a perspective view showing the integrated child seat frame shown in Fig. 2a.

Figs. 3a-c are perspective views illustrating deployment of the
30 integrated child seat frame shown in Fig. 2a and Fig. 2b from a first elevation to a second elevation.

Figs. 3d-g are sectional views illustrating folding of the integrated child seat frame shown in Fig. 2a and Fig. 2b from a second elevation to a first elevation.

Detailed Description of Preferred Embodiments of the Invention

Figs. 1a and 1b illustrate an integrated child seat frame 1 according to an embodiment of the present disclosure. The integrated child seat frame 1 is integrated into a vehicle seat 3 and forms together with a seat cushion member 5, which is mounted on the integrated child seat frame 1, an integrated child seat 7. The vehicle seat 3, which is associated with a conventional safety belt (not shown), is adjustable between an adult seating position, illustrated in Fig. 1a, and a child seating position, illustrated in Fig. 1b. In the adult seating position the seat cushion member 5 of the integrated child seat 7 is flush with remaining parts of the vehicle seat cushion 3a. In the child seating position the seat cushion member 5 of the integrated child seat 7 is elevated from its position in the adult seating position in order to position a child at the right height for the safety belt to work properly. The vehicle seat 3 may thus be prepared for an adult or for a child.

Now referring to Fig. 2a and Fig. 2b the integrated child seat frame 1 comprises a flat cushion support member 9, to which the seat cushion 5 is connected, a first pivotable arm 11, a second pivotable arm 13, a pivotable central support arm 15, which is arranged between the first and second arms 11, 13, and a flat base structure 17. Each of the cushion support member 9, the first pivotable arm 11, the second pivotable arm 13 and the central support arm 15 are formed from sheet metal, which enables a robust and compact design having few parts. The flat base structure 17 may e.g. be formed from sheet metal or a plastic material.

An upper end 11a of the first arm 11 is connected to the cushion support member 9 by a first hinge mechanism 19 and an upper end 13a of the second arm 13 is connected to the cushion support member 9 by a second hinge mechanism 21. Each of the first and second hinge mechanisms 19, 21 comprises a respective hinge pin 23, 25 which form part of an upper connecting element 27. A lower end 11b of the first arm 11 is connected to the base plate 17 by a third hinge mechanism 29 which comprises a third hinge pin 31. A lower end 13b, 15b of each of the second arm 13 and the central support arm 15 is connected to the base plate 17 by a fourth hinge mechanism 33 which comprises a fourth hinge pin 35. Both of the the second

arm 13 and the central support arm 15 are thus pivotable around the fourth hinge pin 35, i.e. around a common axis 36. Each of the third and fourth hinge pins 31, 33 form part of a lower connecting member 37.

Fig. 2a shows the connecting element 37 and the base structure 17 assembled to each other. Assembling the connecting element 37 and the base structure 17 to each other may e.g. be carried out by inserting an U-shaped element comprising the third and fourth hinge pins 31, 33 into hollow hinge sections 17a of the base structure 17 and then perform bending of the free ends of the U-shaped element to achieve the final shape of the connecting element 37, i.e. the shape shown in Fig. 2a.

The first and second pivotable arms 11, 13 are substantially parallel to each other and form part of a parallelogram linkage 39.

The pivotable arms 11, 13 enables the cushion support member 9 to assume both a first elevation, which corresponds to the adult seating position shown in Fig. 1a, and a second elevation, which corresponds to the child seating position shown in Fig. 1b. At the second elevation the cushion support member 9 is elevated above its position at the first elevation. At the second elevation the seat cushion 5 of the integrated child seat 7 is thus elevated above its position in the first elevation.

The first arm 11 and the upper end 15a of the central support arm 15 are adapted to form a releasable connection 41 releasably connecting the central support arm 15 to the first arm 11 when the integrated child seat frame 1 assumes the second elevation. To this end the first pivotable arm 11 has apertures 43 at its upper end 11a and the central support arm 15 has a connecting portion 44 with tongues 45 at its upper end 15a. Each of the apertures 43 is configured to receive a respective one of the tongues 45 of the central support arm 15.

The base of each tongue 45 is configured to engage protrusions 47 arranged at an edge of a respective one of said apertures 43, thereby forming the releasable connection 41 between the first end 15a of the central arm 15 and the first end 11a of the first arm 11. To this end each tongue 45 has two recesses 49, as best illustrated in Fig. 3b, adapted to cooperate with the

protrusions 47 by engaging them. The connection 41 thus locks the integrated child seat frame 1 at the second elevation.

The central support arm 11, which is configured to retain the cushion support member 9 at the second elevation when connected to the first arm 11 by the connection 41, is arranged diagonally between the upper end 11a of the first arm 11 and the lower end 13b of the second arm 13, i.e. between the parallel arms 11, 13 of the parallelogram linkage 39.

The integrated child seat frame 1 further comprises a button device 51 for releasing the central support arm 15 from its connection 41 to the first arm 11. The button device 51 is arranged to push the tongues 45 of the central support arm 15 out of the apertures 43 of the first arm 11. The button device 51 comprises a push button 53 which is biased by a spring element 55. The spring biased push button 53 has at one end 53a a push surface 57 arranged to, when an opposite end 53b of the push button 53 is pressed, act on an abutment surface 50 formed by the tongues 45. When the button 53 is pressed the upper end 15a of the central support arm 15 is thus pushed away from its connection 41 to the first support arm 11.

The spring element 55 has two connecting portions 56, 58 which are connected to the button device 51, as illustrated in Fig. 1a. The spring element 55, which biases the push button 53, further has a locking portion 59 arranged to cooperate with a lock latch 61 arranged at the base structure 17 for locking the integrated child seat frame 1 at the first elevation. The locking portion 59 is arranged to be released from its engagement with the lock latch 61 at the first elevation by pushing the spring biased push button 53.

The button device 51 is thus adapted for releasing the integrated child seat frame 1 from the first elevation, in which it is locked by a locking mechanism formed by the locking portion 59 and the lock latch 61, and for releasing the integrated child seat frame 1 from its second elevation, in which it is locked by the connection 41 between the central support arm 15 and the first arm 11.

The second connecting element 37 comprises a first spring portion 63 that is arranged so as to balance the integrated child seat frame 1 at an

intermediate elevation between the first and second elevations when the integrated child seat frame 1 is released from the first elevation.

The second connecting element 37 further comprises a second spring portion 64 that is arranged to apply a force on the central support arm 15, which force acts to retain the connection 41 between the central support arm 15 and the first arm when the integrated child seat frame 1 assumes the second elevation. Furthermore, the central support arm 15 is arranged so as to balance the integrated child seat frame 1 at an intermediate elevation between the first and second elevations when the integrated child seat frame 1 is released from the second elevation. The second connecting element 37 thus has multiple functions. Firstly, it connects each of the first arm 11, the second arm 13 and the central support arm 15 to the base structure 17. Secondly, it is arranged to maintain the integrated child seat frame 1 in an intermediate position between the first and second elevations during deployment or folding thereof. Hence, the second connecting element 37 has not only a connecting function but also a balancing function.

Figs. 3a-g illustrate the function of the integrated child seat frame 1.

With reference to Figs. 3a-c deployment of the integrated child seat frame 1 from the first elevation, i.e. from a folded state, to the second elevation, i.e. to a deployed state, will be described hereinafter.

Fig. 3a shows the integrated child seat frame 1 at the first elevation. When the push button 53 is pressed the locking portion 59 of the spring element 55 is pushed away from its engagement with the lock latch 61, as illustrated by arrows A and B in Fig. 3a. Then, the cushion support member 9 is released and free to move upwardly towards the second elevation, as illustrated in Fig. 3b. During the movement towards the second elevation the first arm 11 is pivoted around the hinge pin 31, as illustrated by arrow C in Fig. 3b. The central support arm 15 and the second arm 13 are pivoted around a common axis 36 formed by the hinge pin 35. As the first arm 11 is pivoted the central support arm 15 slides along a slide surface 65 formed by the first arm 11, as illustrated by arrow D in Fig. 3b. The upper end 15a of the central support arm 15 slides along the slide surface 65 until the central support arm 15 has reached the second elevation and a connection 41

between the first arm 11 and the central support arm 15 is established, see Fig. 3c. The central support arm 15 is thus arranged to move together with the first and the second arms 11, 13 as the integrated child seat frame 1 is raised from the first elevation to the second elevation.

5 With reference to Figs. 3d-e folding of the integrated child seat frame 1 from the second elevation, i.e. from a deployed state, to the first elevation, i.e. to a folded state, will be described hereinafter.

Fig. 3d illustrates the integrated child seat frame 1 at the second elevation. In this state the upper end 15a of the central support arm 15 is
10 locked to the upper end 11a of the first arm 11 by the connection 41. Then, the push surface 57 of the button 53 is not in contact with the central support arm 15.

When the push button 53 is pressed, as illustrated by arrow E in Fig. 3e, contact between the push surface 57 of the push button 53 and the
15 abutment surface 50 of the central support arm 15 is established. The tongues 45 at the upper end 15a of the central support arm 15 are then released from their engagement with the protrusions 47 at edges of the apertures 43 of the first arm 11 and pushed out of the apertures 43 of the first arm 11. The central support arm 15 is moved against a spring force F1 from
20 the second spring portion 65 of the lower connecting element 37.

When the tongues 45 of the upper end 15a of the central support arm 15 has been brought out of the apertures 43 the central arm 15 is free to rotate to the folded state, i.e. the state illustrated in Fig. 3a. Movement to the folded state is supported by the spring force F1, which presses the upper end
25 15a of central support arm 15 against the slide surface 65 of the first arm 11. As the first arm 11 is rotated to the first elevation the central support arm 15 slides along the slide surface 65 of the first arm 11, as illustrated by arrow G in Fig. 3g. The central support arm 15 is thus arranged to move together with the first and the second arms 11, 13 as the integrated child seat frame 1 is
30 folded from the second elevation to the first elevation.

It is realized by a person skilled in the art that features from various embodiments disclosed herein may be combined with one another in order to provide further alternative embodiments.

CLAIMS

1. Integrated child seat frame (1) configured for being integrated into a vehicle
5 seat (3), the integrated child seat frame (1) comprising
a cushion support member (9), and
a first and a second pivotable arm (11, 13), each of which has a first
end (11a, 13a) which is pivotally connected to the cushion support member
(9),
10 wherein the integrated child seat frame (1) is adapted to assume both
a first elevation and a second elevation, at which second elevation the
cushion support member (9) is elevated above its position at the first
elevation,
c h a r a c t e r i z e d i n
15 that the integrated child seat frame (1) comprises a pivotable central
support arm (15) arranged to retain the integrated child seat frame (1) at the
second elevation, wherein
the first arm (11) and a first end (15a) of the central support arm (15)
are adapted to form a releasable connection (41) releasably connecting the
20 central support arm (15) to the first arm (11) when the integrated child seat
frame (1) assumes the second elevation.
2. Integrated child seat frame (1) according to claim 1, further comprising a
base structure (17) to which a second end (11b, 13b) of each of the first and
25 second arm (11, 13) and a second end (15b) of the central support arm (15)
are pivotally connected.
3. Integrated child seat frame (1) according to claim 2, wherein the second
end (15b) of the central support arm (15) is pivotally connected to the base
30 structure (17) adjacent to the second end (13b) of the second arm (13).

4. Integrated child seat frame (1) according to any of the preceding claims, wherein the central support arm (15) and the second pivotable arm (13) are pivotable around a common axis (36).
- 5 5. Integrated child seat frame (1) according to any of the preceding claims, wherein the first arm (11) comprises at least one aperture (43) configured to receive a connecting portion (44) arranged at the first end (15a) of the central support arm (15).
- 10 6. Integrated child seat frame (1) according to claim 5, wherein said connecting portion comprises at least one projecting tongue (45), the base of which is configured to engage an edge of said aperture (43), thereby forming said connection (41).
- 15 7. Integrated child seat frame (1) according to claim 6, wherein the projecting tongue (45) has at least one recess (49) adapted to cooperate with a protrusion (47) arranged at an edge of said aperture (43).
8. Integrated child seat frame (1) according to any of the preceding claims,
20 further comprising a button device (51) adapted for forcing the central support arm (15) to release from its connection (41) to the first arm (11).
9. Integrated child seat frame (1) according to claim 8, wherein the button
25 device (51) comprises a push button (53) having a push surface (57) at one end, which push surface (57) is arranged to act on an abutment surface (50) of the central support arm (15) to push the central support arm (15) away from its connection (41) to the first pivotable arm (11).
10. Integrated child seat frame (1) according to any of the preceding claims,
30 wherein the first pivotable arm (11) is arranged to form a slide surface (65) for the first end (15a) of the central support arm (15), wherein the first end (15a) of the central support arm (15) is arranged to, during deployment of the integrated child seat frame (1) from said first elevation to said second

elevation, slide along said slide surface (65) into the releasable connection (41).

11. Integrated child seat frame (1) according to any of the preceding claims,
5 further comprising a spring element (37) arranged to form a spring portion (63) supporting deployment of the integrated child seat frame (1) from said first elevation to said second elevation.

12. Integrated child seat frame (1) according to claim 11, wherein said spring
10 element (37) is configured to form a hinge pin portion (31, 35) connecting a respective second end (11b, 13b, 15b) of at least one of the first arm (11), the second arm (13) and the central support arm (15) to a base structure (17).

13. Integrated child seat frame (1) according to any of the preceding claims,
15 wherein at least the first arm (11) and the central support arm (15) are formed from sheet metal.

14. Vehicle seat (3) comprising an integrated child seat frame (1) according to any of the preceding claims and a seat cushion (5).

1/6

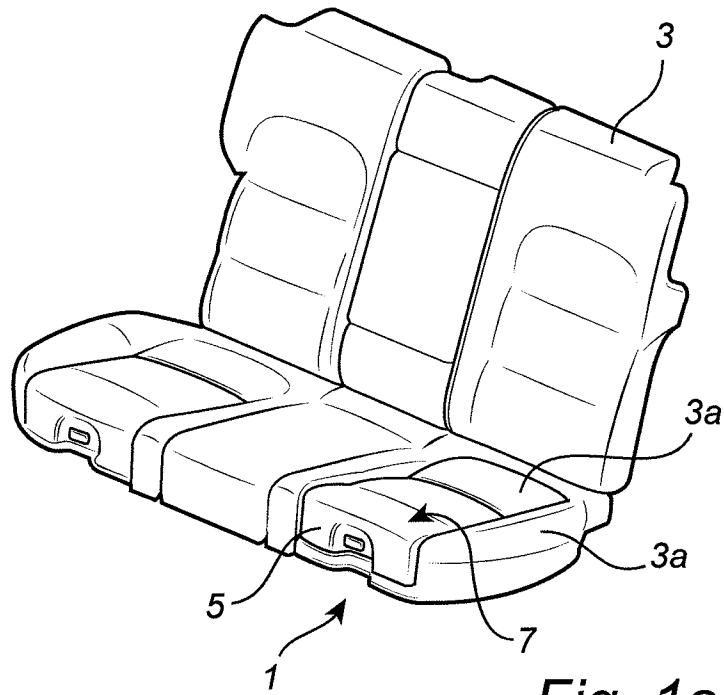


Fig. 1a

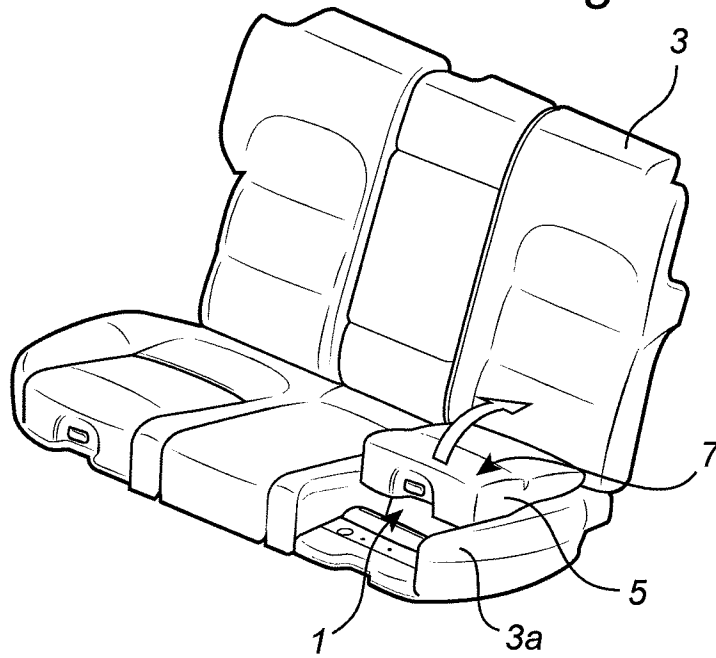


Fig. 1b

2/6

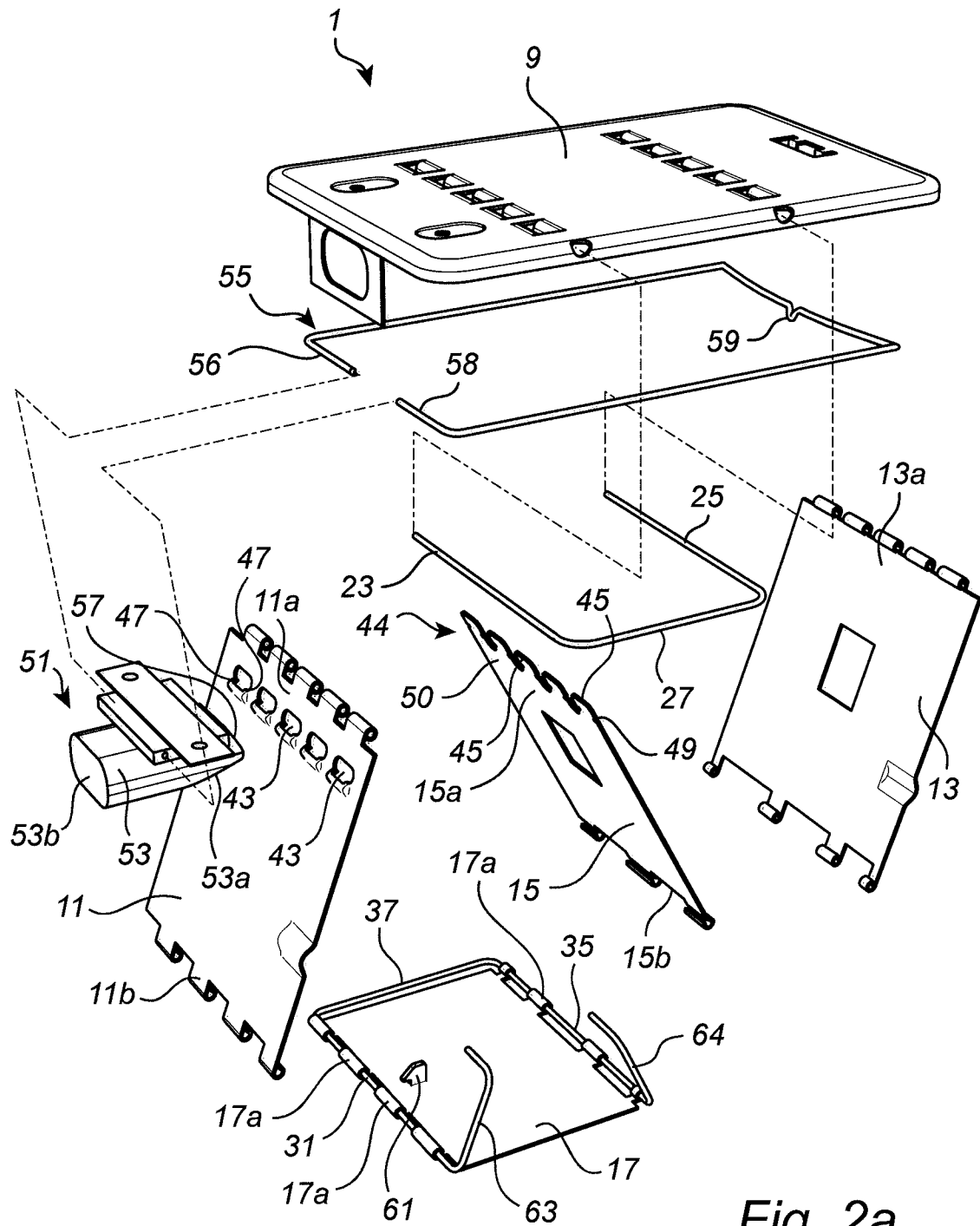
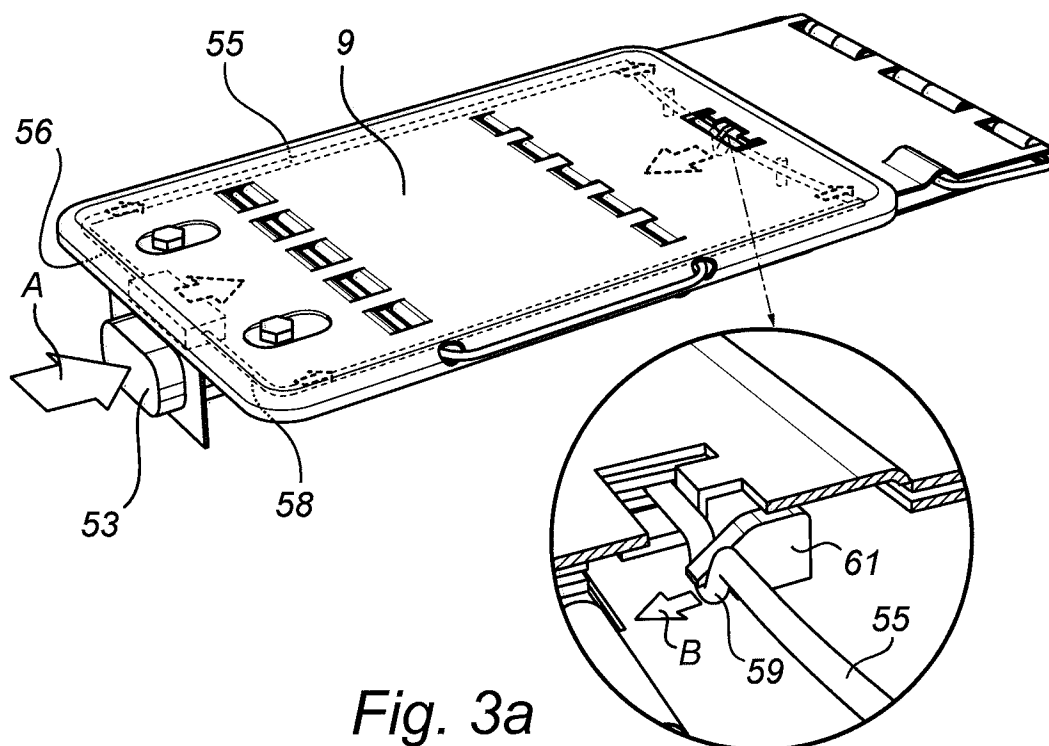
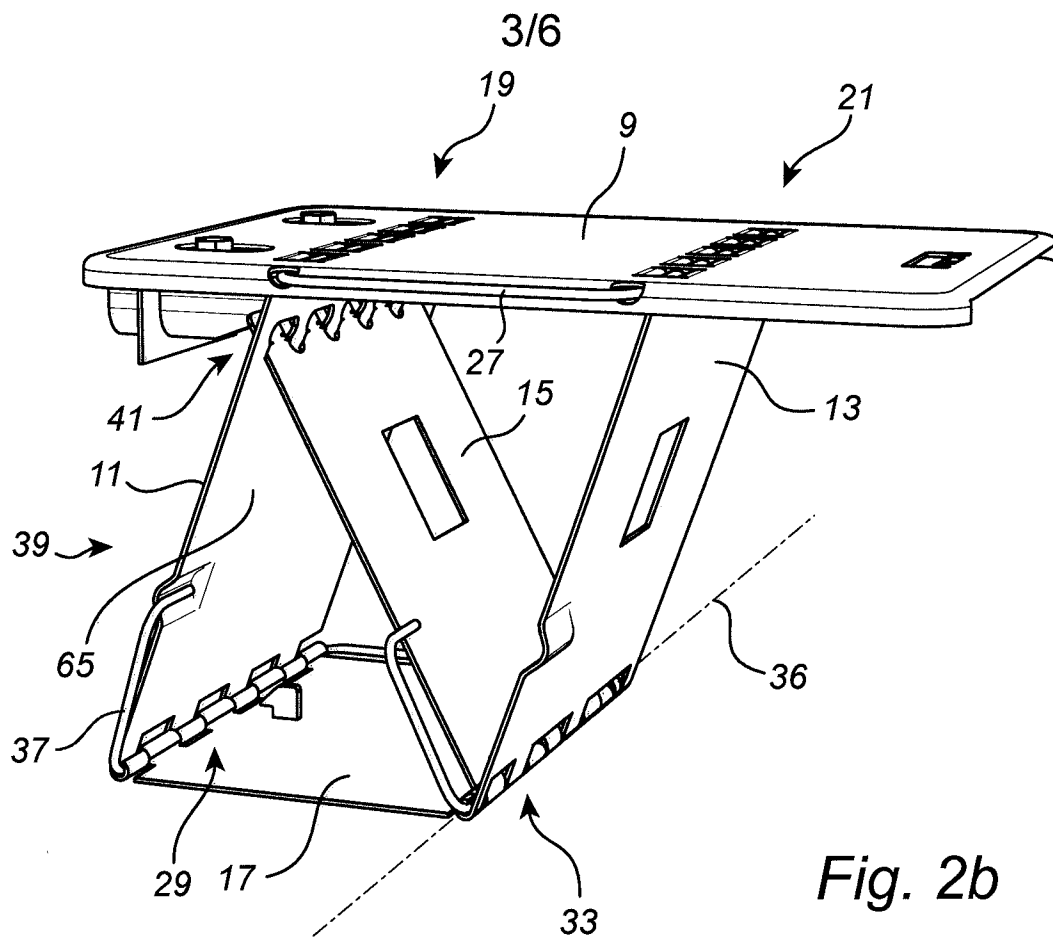
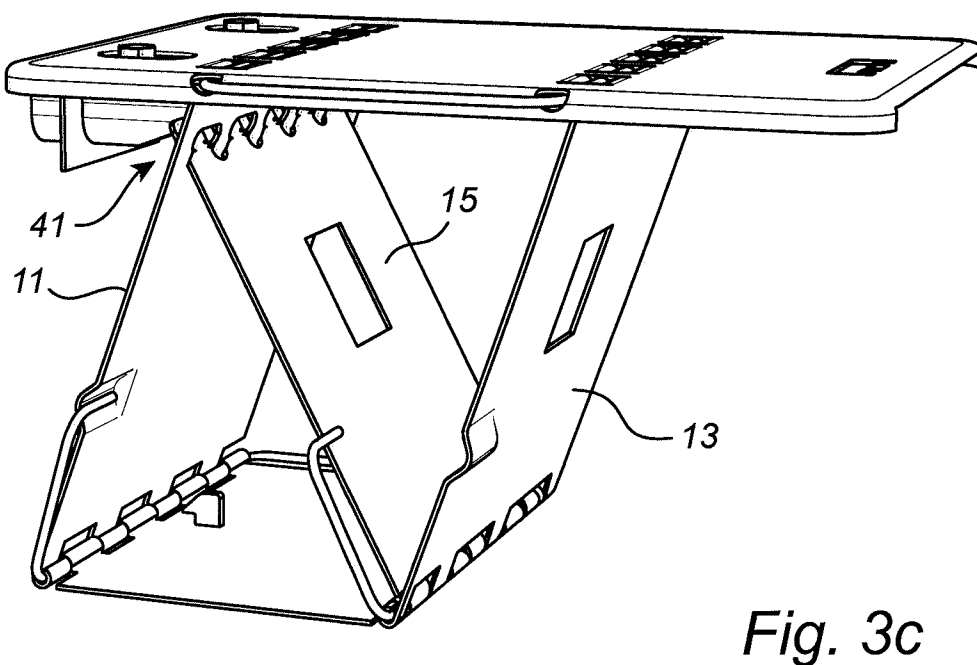
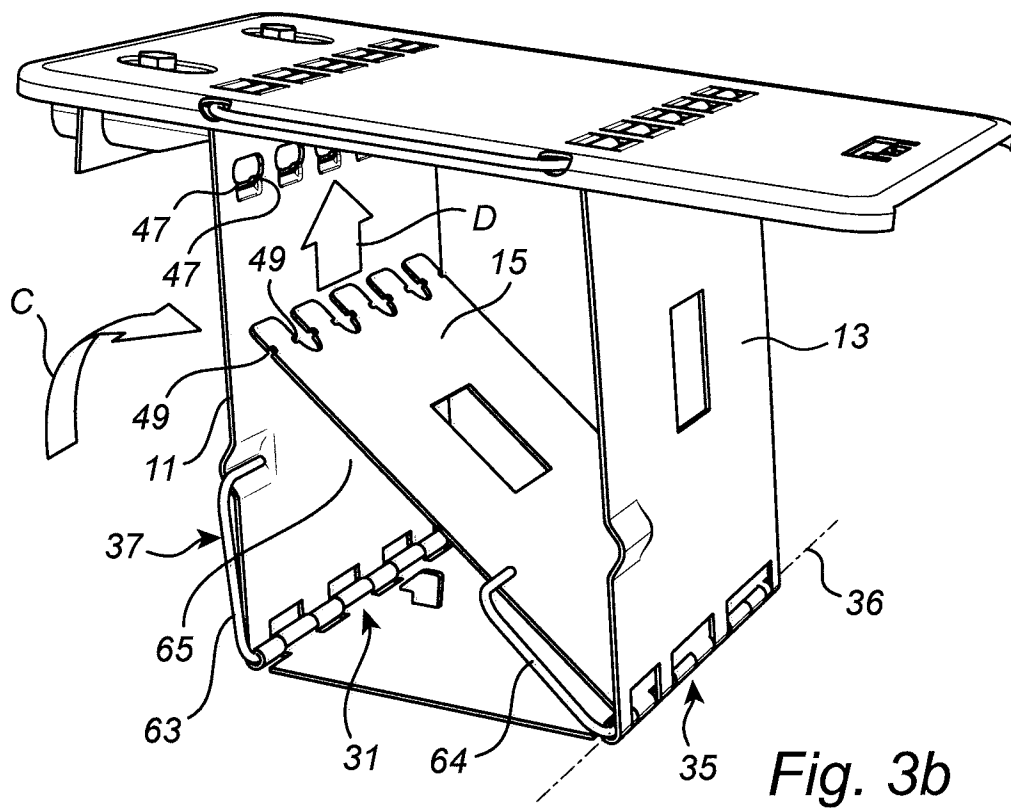


Fig. 2a



4/6



5/6

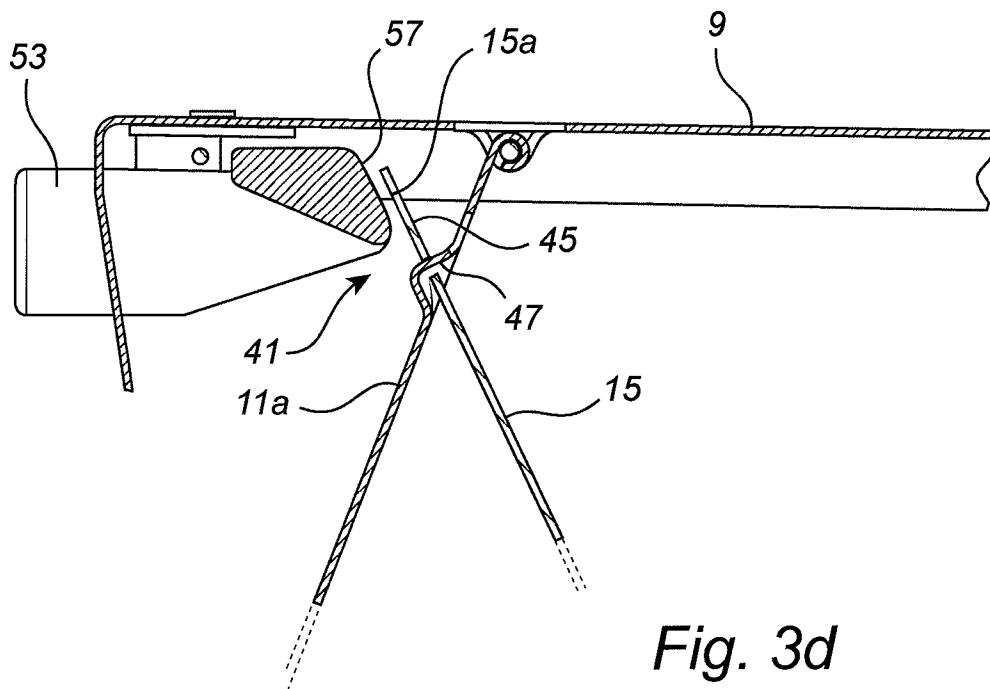


Fig. 3d

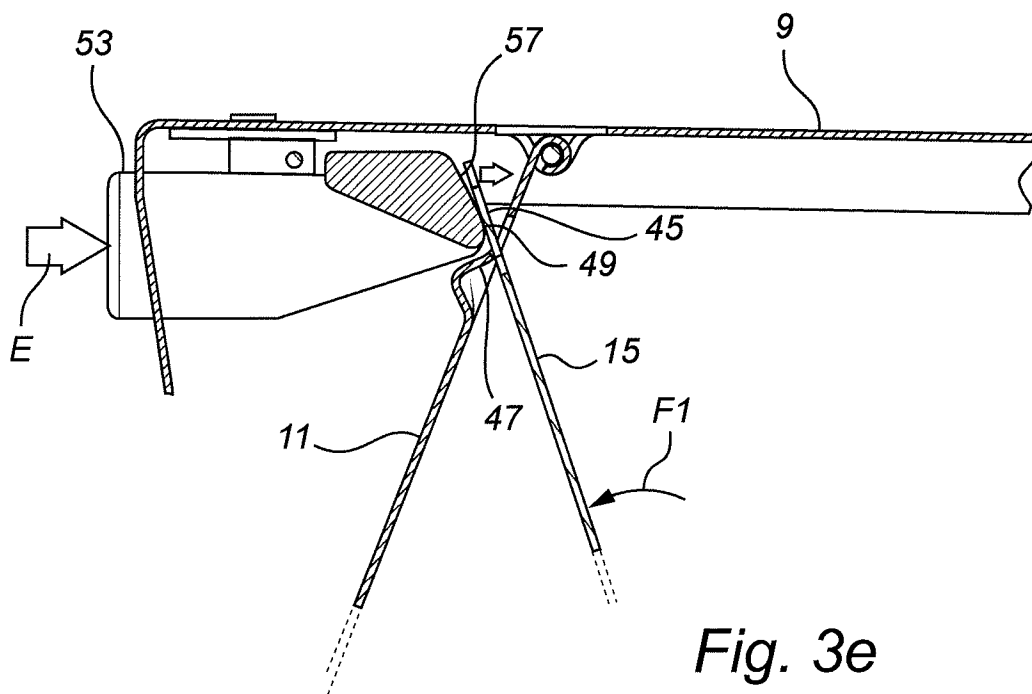


Fig. 3e

6/6

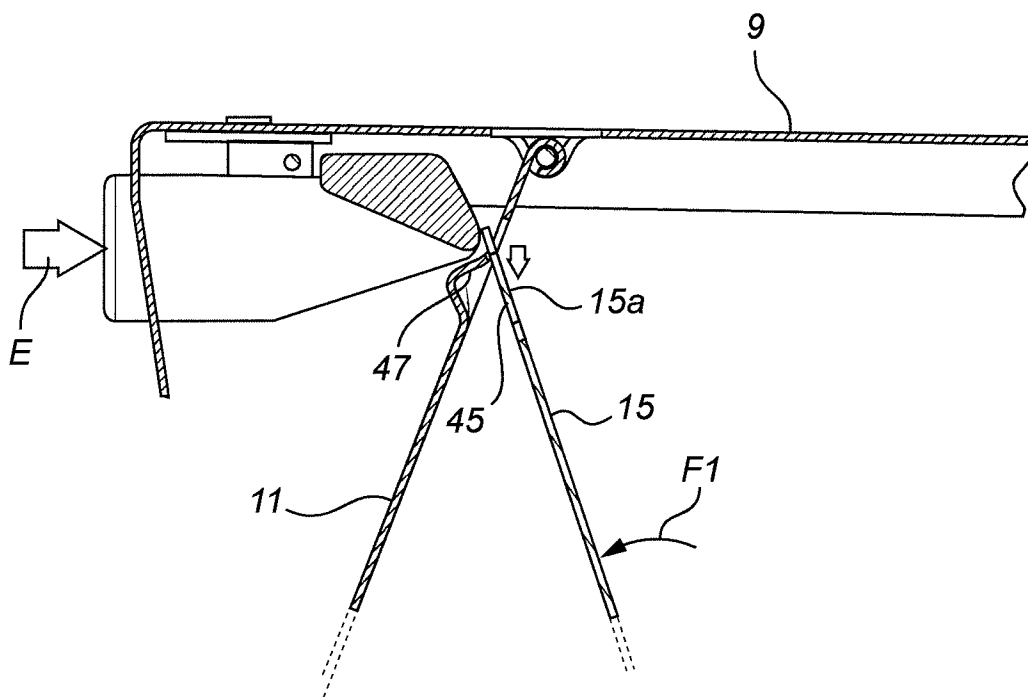


Fig. 3f

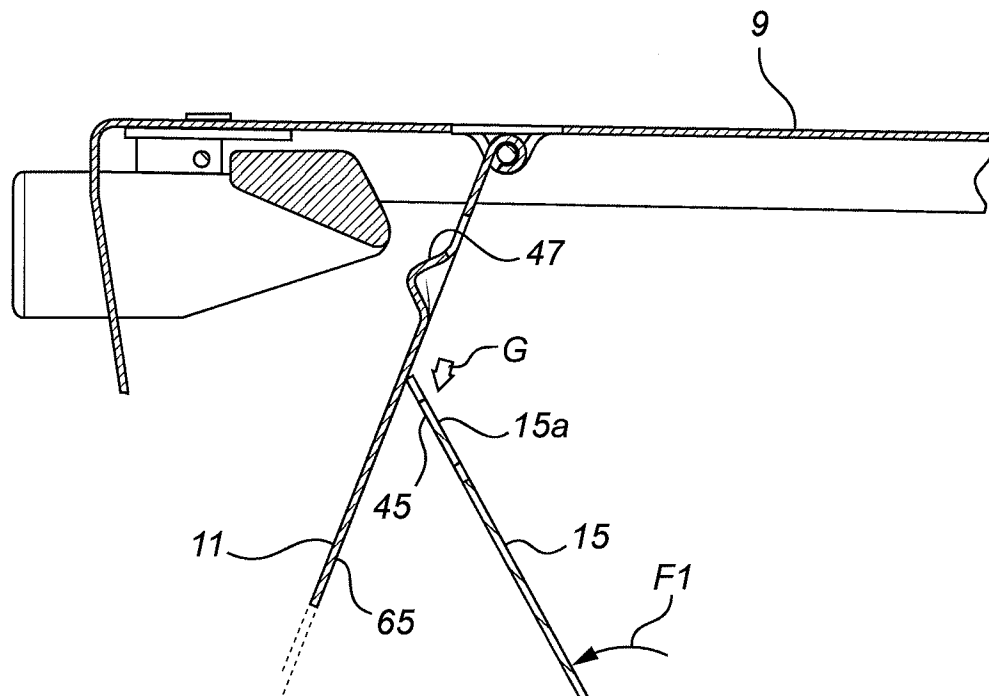


Fig. 3g

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2014/050535

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

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: B60N

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

SE, DK, FI, NO classes as above

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

EPO-Internal, PAJ, 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	GB 2278775 A (HAMMERSTEIN GMBH C ROB ET AL), 14 December 1994 (1994-12-14); pages 7-9; figures 1, 5 --	1-14
A	FR 2664215 A1 (EUROP SIEGES AUTOMOBILES), 10 January 1992 (1992-01-10); figures --	1-14
A	US 6557936 B1 (AUGSBERGER NORBERT ET AL), 6 May 2003 (2003-05-06); figures --	1-14
A	DE 19522967 A1 (HAMMERSTEIN GMBH C ROB), 11 January 1996 (1996-01-11); figures --	1-14



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

16-12-2014

Date of mailing of the international search report

16-12-2014

Name and mailing address of the ISA/SE

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INTERNATIONAL SEARCH REPORTInternational application No.
PCT/SE2014/050535

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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