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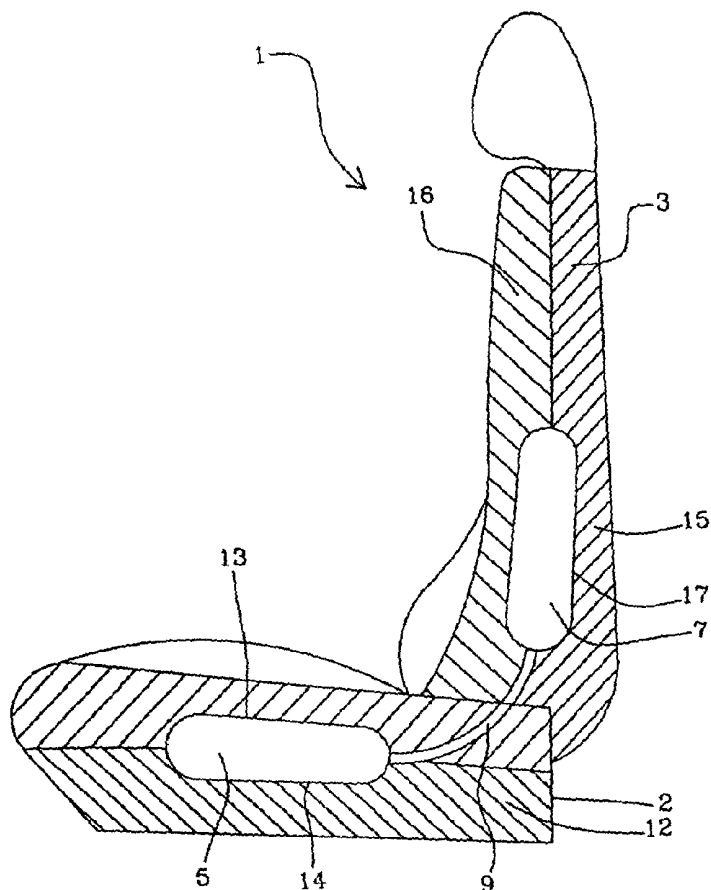
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(75) Inventors/Applicants (*for US only*): **KNUTSSON, Mats**
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(54) Title: AN ACCESSORY FOR A VEHICLE SEAT



(57) Abstract: An accessory for a vehicle seat has two inflatable chambers (5, 6) to be mounted in or on the squab (2) of the seat (1) and a two inflatable chamber (7, 8) to be mounted in or on the backrest (3) of the seat (1). The two inflatable chambers (5, 6) are adapted to respond to an instantaneous pressure applied substantially vertically to the two inflatable chambers (5, 6) and to control movement of the two further inflatable chambers (7, 8) so that the two further inflatable chambers (7, 8) moves substantially horizontally in a pre-determined manner as a function of the instantaneous pressure applied to the two inflatable chambers (5, 6).



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“AN ACCESSORY FOR A VEHICLE SEAT”

THE PRESENT INVENTION relates to an accessory for a vehicle seat which seeks to improve the comfort of the seat for an occupant of the seat.

Sitting in a vehicle seat may be tiring, especially for the lumbar and pelvic regions of the lower back of the occupant of the seat. The reason for this is that a static load is applied to these regions of the lower back when an incorrect posture is adopted by the occupant of the seat.

It has been proposed to provide supports for the lower back of the occupant of a seat in a vehicle, which may reduce fatigue and pain. These supports, however, are usually located in the lumbar area of the lower back above the pelvic region and it has been shown that lumbar supports of this type may actually force the occupant to adopt an incorrect and fatigue inducing posture which actually damages the back of the occupant.

It has been shown that a support for the lower back should be located in the pelvic region to be effective. Such a support would force the occupant of the seat to adopt a posture in which fatigue and pain in the lower back is reduced.

Such a posture may also prevent the pelvic region from rotating in a rearward direction in a frontal collision such that the lap belt portion of a standard seat belt slips over the upper part of the pelvic region, causing injuries to the abdomen of the occupant.

It has also been shown that when a vehicle travels around a corner, an occupant of the vehicle seat has a tendency to roll out of the vehicle seat under the influence of the cornering forces generated by the vehicle.

Such movement of the occupant of the vehicle may impair the occupants' ability to control the vehicle and may reduce the comfort of the occupant during vehicle cornering.

It has further been shown that if the vehicle is involved in a rear impact, a relatively high force is transmitted through the backrest of the seat of the vehicle to the back of the occupant. Such forces can cause injury to the back of the occupant.

The present invention therefore seeks to provide an improved accessory for a vehicle seat.

According to this invention there is provided an accessory for a vehicle seat having a squab and a backrest, the accessory comprising a first element to be mounted in or on the squab of the seat and a second element to be mounted in or on the backrest of the seat, the first element being adapted to respond to an instantaneous pressure applied substantially vertically to the first element and to control movement of the second element so that the second element moves

substantially horizontally in a pre-determined manner as a function of the instantaneous pressure applied to the first element.

Preferably the first and second element each comprise at least one inflatable chamber, the first and second chambers being connected by a duct, the chambers and duct containing a fluid.

Preferably the fluid is air.

Alternatively the first and second element each comprise a substantially rigid body, the substantially rigid bodies being connected to a mechanical linkage.

Conveniently the mechanical linkage comprises at least two arms which are substantially rigidly connected and which are pivotally mounted on part of the squab of the seat.

Alternatively the first element is a sensor adapted to generate a control signal as a function of the instantaneous pressure applied to the first element, the control signal being used to control motive means adapted to move part of the second element.

Conveniently the first element sensor is a pressure sensor and the second element is an inflatable chamber.

Preferably the first element and second element are mounted integrally with the seat.

Alternatively the first element and the second element are mounted in a attachment adapted to be placed on top of the seat.

Preferably the second element is located adjacent the pelvic region of an occupant of the seat.

Alternatively the second element is mounted in or on a side bolster forming part of the backrest of the seat.

Alternatively the second element is mounted in or on an area of the backrest of the seat adjacent the shoulder of the occupant of the seat.

Conveniently there are two said first elements and two said second elements which are symmetrically arranged.

In order that the invention may be more readily understood and so that further features thereof may be appreciated, the invention will now be described by way of example with reference to the accompanying drawings in which:

FIGURE 1 is a front view of a vehicle seat incorporating an accessory in accordance with the invention, with internal components of the seat being illustrated;

FIGURE 2 is a sectional view of the vehicle seat of Figure 1 taken on the line A-A of Figure 1;

FIGURE 3 is a side view of the vehicle seat incorporating an alternative embodiment of the accessory with internal components of the seat being illustrated;

FIGURE 4 is a front view of the vehicle seat of Figure 3;

FIGURE 5 is a side view of the vehicle seat incorporating a second alternative embodiment of the accessory with internal components of the seat being illustrated;

FIGURE 6 is a front view of the vehicle seat of Figure 5;

FIGURE 7 is a side view of the vehicle seat incorporating a further embodiment of the accessory with internal components of the seat being illustrated;

FIGURE 8 is a front view of the vehicle seat of Figure 7;

FIGURE 9 is a block diagram of a further modified embodiment of the accessory;

FIGURE 10 is a side view of the vehicle seat on which an alternative embodiment of the accessory has been mounted with internal components of the accessory being shown in phantom;

FIGURE 11 is a front view of the vehicle seat of Figure 9 illustrating internal components of the accessory.

Referring initially to Figure 1, a vehicle seat 1 has a squab 2 and a backrest 3.

An accessory 4 is mounted in the vehicle seat 1. The accessory comprises two symmetrically arranged inflatable chambers in the form of inflatable bags 5 and 6 which are mounted in the squab 2 of the seat and which also comprises two further symmetrically arranged inflatable chambers in the form of two inflatable bags 7 and 8 are mounted in the backrest 3 of the seat 1. Inflatable bag 5 is in communication with and sealingly connected to inflatable bag 7 by a duct 9. Inflatable bag 6 is sealingly connected to and in communication with inflatable bag 8 via a second duct 10. A first volume of fluid is contained in the sealed volume created by bag 5, duct 9 and bag 7 and a second volume of fluid is contained in the sealed volume created by bag 6, duct 10 and bag 8. It is envisaged that the fluid would be air but it is also envisaged that any other fluid, such as another gas, liquid or foam, could be used as an alternative.

Referring now to Figure 2, the squab 2 comprises a lower supporting layer 12 and an upper supporting layer 13. The lower supporting layer 12 comprises, as is well known in the art, a standard vehicle seat spring arrangement or foam material or a combination of both. The upper supporting layer 13, as is also well known in the art, comprises foam material. The lower supporting layer 12 and the upper supporting layer 13 define between them a cavity 14 in which the inflatable bag 5 is located.

The backrest 3 comprises a rearward supporting layer 15 and a forward supporting layer 16. The rearward supporting layer 15 is formed from a standard spring arrangement or foam material or a combination of both. The forward supporting layer 16 is formed from foam material. The rearward supporting layer 15 and the forward supporting layer 16 define between them a cavity 17 in which the inflatable bag 7 is located.

In the described embodiment, each inflatable bag 5, 6, 7 and 8 is formed from a resilient plastic material such that each inflatable bag 5, 6, 7 and 8 is a variable volume chamber. However, it is to be appreciated that alternative methods of creating a variable volume chamber may be used.

It is to be appreciated that the bags 5 and 6 are located in a position in the squab 2 of the seat 1 so that the bags 5 and 6 are located beneath the front of the pelvic region of the occupant of the seat 1 such that bags 5 and 6 are in front of and adjacent the Ischial tuberosities of the occupant. These tuberosities are boney projections at the top of each femur and are the bones on which a person sits.

The bags 5 and 6 are spaced apart and symmetrically located so that there is a central region of the squab, to be located beneath the base of the spine, where there is no bag.

It is to be further appreciated that the bags 7 and 8 are located in a position in the backrest 3 of the seat 1 such that they are adjacent the pelvic region of the occupant of the seat 1 and are above the base of the spine of the occupant.

When an occupant of the vehicle sits on the squab 2 of the seat 1, he will apply instantaneous pressure in a substantially vertical direction to the bags 5 and 6 mounted in the squab 2 of the seat 1. The instantaneous pressure will compress the inflatable bags 5 and 6 such that at least some of the fluid that was initially contained in the bags 5 and 6 is forced out of the bags 5 and 6, through the ducts 9 and 10, and into the inflatable bags 7 and 8. The total fluid contained in the inflatable bags 5, 6, 7 and 8 and the ducts 9 and 10 will remain

the same. It is to be appreciated that the volume of fluid forced into the inflatable bags 7 and 8 will be substantially the same as the volume of fluid forced out of the inflatable bags 5 and 6 and thus the volume by which the bags 7 and 8 inflate will be pre-determined by the volume by which the inflatable bags 5 and 6 deflate. Thus, the inflation of bags 7 and 8 will be a function of the instantaneous pressure applied to the bags 5 and 6 by the occupant sitting on the squab 2 of the seat 1.

When the inflatable bags 7 and 8 inflate, they cause the part of the backrest 3 of the seat 1 adjacent the inflatable bags 7 and 8 to move outwardly in a substantially horizontal direction such that the part of the backrest 3 applies pressure to the pelvic region of the occupant of the seat 1. The extent of this movement is a function of the instantaneous pressure applied to the bags 5 and 6. Thus, when the bags 7 and 8 are inflated or partially inflated, the pelvic region of the occupant is at least partially supported by the part of the backrest 3 adjacent the inflatable bags such that the occupant adopts a more comfortable posture. It is believed that such a posture will prevent or at least alleviate fatigue and pain in the lower back of the occupant of the vehicle when sitting in the seat 1.

The posture will also minimise the risk of the pelvic region of the occupant rotating in a rearward direction. Such a rotation of the pelvis might cause the lap belt part of a standard seat belt to slip over the upper part of the pelvis thus causing injuries to the abdomen of the occupant of the vehicle if the vehicle is involved in a frontal impact.

It is also to be appreciated that, whenever the occupant moves slightly in the seat 1, the volume of fluid which inflates the inflatable bags 7 and 8 will vary as a function of the changing instantaneous pressure applied to the bags 5

and 6 by the occupant. Thus, the part of the backrest by which the pelvic region of the occupant of the seat 1 is supported will move horizontally in a predetermined manner as a function of the instantaneous pressure applied to the bags 5 and 6. Consequently, the pelvic region of the occupant of the seat 1 will experience a massaging effect as the inflatable bags 7 and 8 partially inflate and partially deflate as a function of the instantaneous pressure. This massaging effect may alleviate fatigue and pain in the pelvic region of the occupant.

The bags 5 and 6 may also prevent submarining of the occupant of the seat 1 underneath the standard seat belt when the vehicle is involved in a frontal impact.

Referring now to Figures 3 and 4, a modified embodiment of the accessory 4 is shown. In this modified embodiment, the inflatable bags 7 and 8 are not positioned in the lower part of the backrest 3 adjacent the pelvis, but instead are located in the upper part of the backrest 3 adjacent the shoulders of an occupant.

The operation of the accessory shown in Figures 3 and 4 will be substantially the same as the operation of the accessory shown in Figures 1 and 2 except that, in this particular embodiment, the shoulders of the occupant of the seat 1 will be supported and the posture of the occupant will be adjusted so that fatigue and pain in the shoulders of the occupant may be reduced.

The shoulders of the occupant of the seat 1 will experience a massaging effect as the inflatable bags 7 and 8 partially inflate and partially deflate as has been described with reference to the embodiment of the accessory of Figures 1 and 2.

Also, in a rear impact situation, if the torso of the occupant moves, by inertia, towards the backrest, the inflatable bags 7 and 8 will be compressed forcing fluid into the bags 5 and 6 which will inflate forcing the pelvis of the occupant upwardly, and thereby absorbing part of the energy of the torso of the occupant. Thus, the acceleration that would otherwise be imparted to the torso of the occupant is reduced.

Referring now to Figures 5 and 6, a second modified embodiment of the accessory 4 is shown. In this modified embodiment, the inflatable bags 5 and 6 are mounted towards the outer edges of the squab 2 of the seat 1. The inflatable bags 7 and 8 are mounted in the side bolsters 18 and 19 respectively of the backrest 3 of the seat 1.

The operation of this second alternative accessory is substantially the same as for the previously described embodiments of the accessory except that, when the vehicle is travelling around a corner, the position of the occupant of the vehicle in the seat 1 will vary such that the instantaneous pressure applied to one of the inflatable bags 5 and 6 mounted in the squab 2 of the seat 1, will increase and the instantaneous pressure applied to the other inflatable bag 5 or 6 will decrease. Thus, if the instantaneous pressure applied to inflatable bag 5 increases, the volume of fluid contained in inflatable bag 5 will decrease and the volume of fluid contained in inflatable bag 7 will increase. The increased volume of fluid contained in inflatable bag 7 will cause inflatable bag 7 to inflate and thus the side bolster 18 will move substantially horizontally outwardly. Thus, as the vehicle corners, the side bolster 18 will provide support to one side of the torso of the occupant of the seat 1 such that the occupant is safely retained in the seat.

If the vehicle corners in the other direction, the instantaneous pressure applied to inflatable bag 6 will increase. The volume of fluid contained in inflatable bag 6 will decrease and the volume of fluid contained in inflatable bag 8 will increase. Thus the side bolster 19 will move outwardly to support the other side of the torso of the occupant of the vehicle.

It is to be understood that a vehicle seat could be provided with two or even three pairs of inflatable bags 5 and 6 in the squab, with two or even three pairs of inflatable bags 7 and 8 in the backrest located to provide support for the pelvis, the shoulders and/or in the side bolsters.

Referring now to Figures 7 and 8, an alternative embodiment of the accessory is shown mounted in the vehicle seat 1. The accessory comprises two substantially rigid elements in the form of a first plate 20 and a second plate 21. The first plate 20 is mounted in the squab 2 of the seat 1 and the second plate 21 is mounted in the backrest 3 of the seat 1. The first plate 20 is connected to a second plate 21 by a mechanical linkage comprising a first arm 22 and a second arm 23. The first arm 22 and the second arm 23 are substantially rigidly connected to one another. The linkage is pivotally mounted on a sub-frame of the squab 2 of the seat 1 such that the linkage may pivot about a pivot axis 24. The first arm 22 extends substantially horizontally from the pivot axis 24 towards the front of the squab 2 of the seat 1 and terminates in the first plate 20. The second arm 23 extends substantially vertically from the pivot axis 24 towards the top edge of the backrest 3 of the seat 1 and terminates in the second plate 21.

The exact location of first plate 20 in the squab 2 and the second plate 21 in the backrest 1 is substantially as has been described with reference to inflatable bags 5 and 6 of Figures 1 and 2.

When an occupant of the vehicle sits on the squab 2 of the seat 1, he will apply instantaneous pressure in a substantially vertical direction to the first plate 20 mounted in the squab 2 of the seat 1. The instantaneous pressure will lower the first plate 20 substantially vertically within the squab 2 of the seat 1. This lowering of the first plate 20 will force the mechanical linkage comprising the first arm 22 and the second arm 23 to pivot in an anti-clockwise direction about the pivot axis 24. The anti-clockwise movement of the second arm 23 will cause the second plate 21 to move substantially horizontally. It is to be appreciated that the movement of the second plate 21 will be pre-determined by the movement of the first plate 20. Thus, the substantially horizontal movement of the second plate 21 will be a function of the instantaneous pressure applied to the first plate 20 by the occupant sitting on the squab 2 of the seat 1.

When the second plate moves, it will cause the part of the backrest 3 of the seat 1 adjacent the second plate 21 to move outwardly in a substantially horizontal direction such that part of the backrest 3 applies pressure to the pelvic region of the occupant of the seat 1. The extent of this movement is a function of the instantaneous pressure applied to the first plate 20.

It is to be appreciated that a substantially horizontal movement of the part of the backrest 3 adjacent the second plate 21 will have a substantially similar effect on the occupant of the seat 1 as the accessory described with reference to Figures 1 and 2 above.

Referring now to Figure 9, a block diagram of a further modified embodiment of the accessory is shown, the accessory comprising a sensor 25, control means 26 and motive means 27. The sensor 25 is a pressure sensor which is mounted in the squab 2 of the seat 1. It is to be appreciated that any other suitable sensor could be used as an alternative to the pressure sensor 25. The motive means 27 is mounted in the backrest 3 of the seat 1 and comprises a solenoid or motor as is well known in the art. It is to be appreciated that the motive means 27 could alternatively comprise a gas generator and inflatable bag, the gas generator being adapted to inflate and deflate the inflatable bag.

The pressure sensor 25 is mounted in the squab 2 of the seat 1 in a position as has been described with reference to inflatable bags 5 and 6 of Figures 1 and 2. The motive means 27 is mounted in the back rest 3 of the seat 1 as has been described with reference to inflatable bags 7 and 8 of Figures 1 to 8.

The control means 26 is a standard microprocessor as is well known in the art and may be mounted in the seat 1 itself or, alternatively, under the squab 2 of the seat 1.

When an occupant of the vehicle sits on the squab 2 of the seat 1, he will apply instantaneous pressure in a substantially vertical direction to the pressure sensor 25 mounted in the squab 2 of the seat 1. The instantaneous pressure will cause the pressure sensor 25 to generate a control signal. The control means 26 is adapted to receive the control signal and to activate the motive means 27 in dependence upon the control signal received. The motive means 27 will move the part of the backrest 3 adjacent the motive means 27 in a substantially horizontal direction such that the part of the backrest 3 applies pressure to part

of the occupant of the seat 1. It is to be appreciated that the motive means 27 will move as a function of the instantaneous pressure applied to the pressure sensor 25 by the occupant sitting on the squab 2 of the seat 1.

The effect of the motive means 27 moving will be substantially as has been described with reference to Figures 1 to 8.

Referring now to Figures 10 and 11, a further alternative embodiment of the accessory 4 is shown. In this alternative embodiment, the inflatable bags 5, 6, 7 and 8 are mounted in a removable seat cover 28. The seat cover 28 comprises a squab portion 29 adapted to rest on the squab 2 of the seat 1 and a backrest portion 30 adapted to rest on the backrest 3 of the seat 1. The inflatable bags 5 and 6 are mounted in the squab portion 29 of the seat cover 28 and the inflatable bags 7 and 8 are mounted in the backrest portion 30 of the seat cover 28. The seat cover 28 may be manufactured of a foam based material but it is envisaged that any other suitable material could be used.

Means may be provided to attach the seat cover 28 to the seat 1 to prevent movement of the seat cover 28 relative to the seat 1. Such means could comprise a strap attached to one vertical edge of the backrest portion 30 of the seat cover 28 and adapted to pass around the back of the backrest 3 of the seat 1 and further adapted to be attached to the opposite vertical edge of the backrest portion 30 of the seat cover 28. A second strap may be attached to one edge of the squab portion 29 of the seat cover 28, the strap being adapted to be passed around the squab 2 of the seat 1 and further adapted to be attached to the opposite edge of the squab portion 29 of the seat cover 28.

It is to be appreciated that any other means suitable for attaching the seat cover 28 to the seat 1 may be used.

The operation of the accessory shown in Figures 9 and 10 will be substantially the same as the operation of the accessory shown in Figures 1 and 2 except that, in this particular embodiment, the accessory 4 may be attached to and removed from a standard vehicle seat, for example, if the accessory was an 'after market' accessory bought after the initial purchase of the vehicle itself.

In the present Specification "comprise" means "includes or consists of" and "comprising" means "including or consisting of".

CLAIMS:

1. An accessory for a vehicle seat having a squab and a backrest, the accessory comprising a first element to be mounted in or on the squab of the seat and a second element to be mounted in or on the backrest of the seat, the first element being adapted to respond to an instantaneous pressure applied substantially vertically to the first element and to control movement of the second element so that the second element moves substantially horizontally in a pre-determined manner as a function of the instantaneous pressure applied to the first element.
2. The accessory of Claim 1, wherein the first and second element each comprise at least one inflatable chamber, the first and second chambers being connected by a duct, the chambers and duct containing a fluid.
3. The accessory of Claim 2, wherein the fluid is air.
4. The accessory of Claim 1, wherein the first and second element each comprise a substantially rigid body, the substantially rigid bodies being connected to a mechanical linkage.
5. The accessory of Claim 4 wherein the mechanical linkage comprises at least two arms which are substantially rigidly connected and which are pivotally mounted on part of the squab of the seat.

6. The accessory of Claim 1, wherein the first element is a sensor adapted to generate a control signal as a function of the instantaneous pressure applied to the first element, the control signal being used to control motive means adapted to move part of the second element.
7. The accessory of Claim 6, wherein the first element sensor is a pressure sensor and the second element is an inflatable chamber.
8. The accessory of any one of the previous claims, wherein the first element and second element are mounted integrally with the seat.
9. The accessory of any of the previous claims, wherein the first element and the second element are mounted in a attachment adapted to be placed on top of the seat.
10. The accessory of any one of the previous claims, wherein the second element is located adjacent the pelvic region of an occupant of the seat.
11. The accessory of any one of the previous claims, wherein the second element is mounted in or on a side bolster forming part of the backrest of the seat.
12. The accessory of any of the previous claims, wherein the second element is mounted in or on an area of the backrest of the seat adjacent the shoulder of the occupant of the seat.
13. An accessory according to any one of the preceding claims wherein there are two said first elements and two said second elements which are symmetrically arranged.

1 / 6

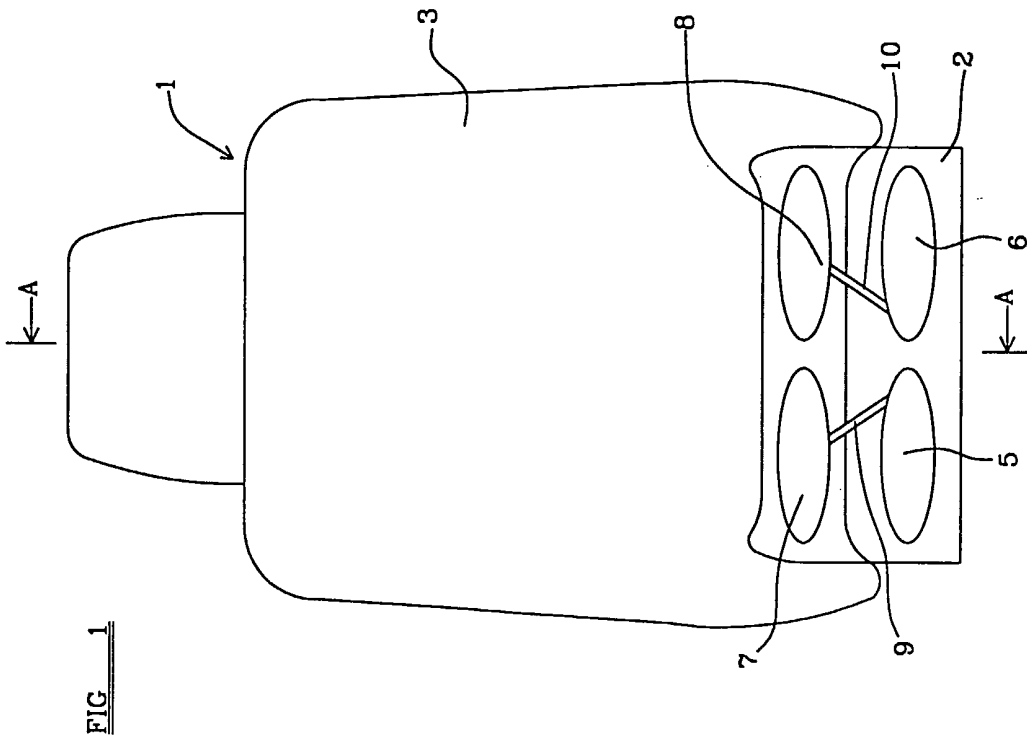


FIG 2

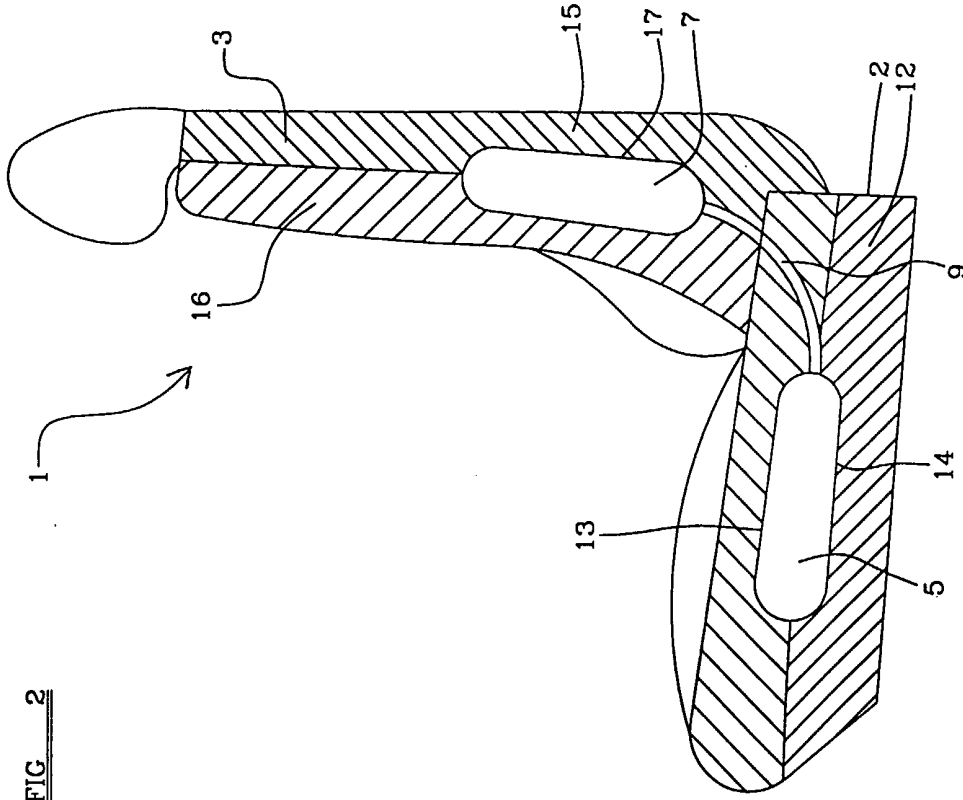


FIG 3

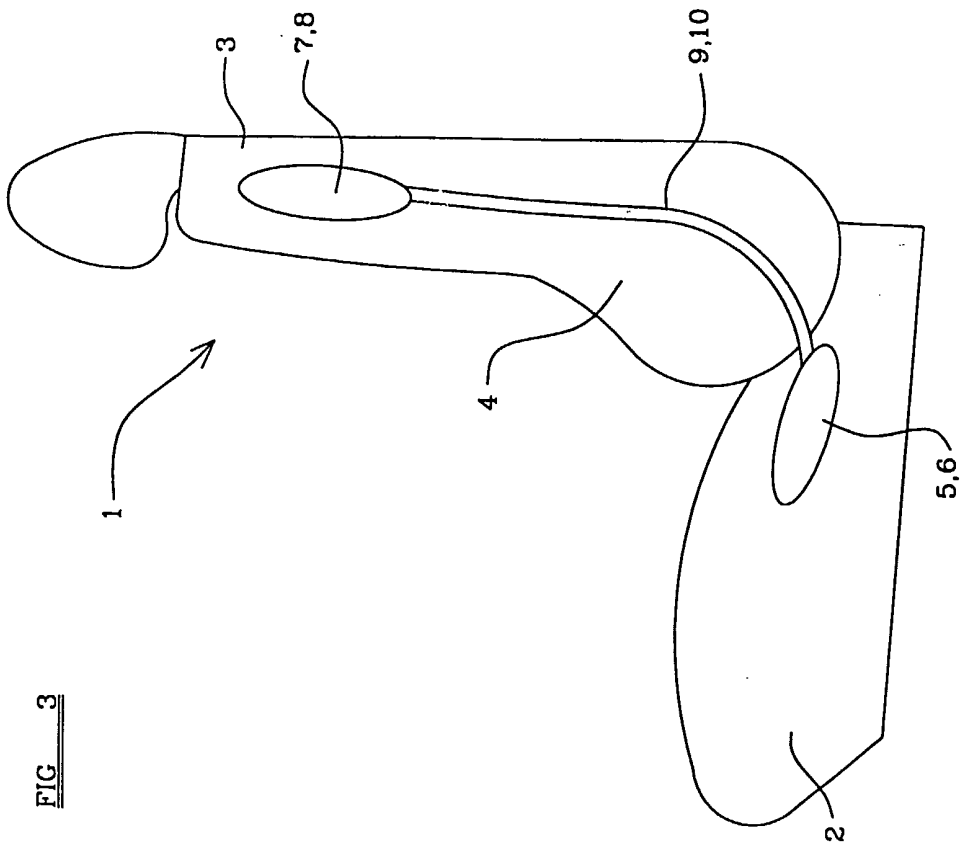
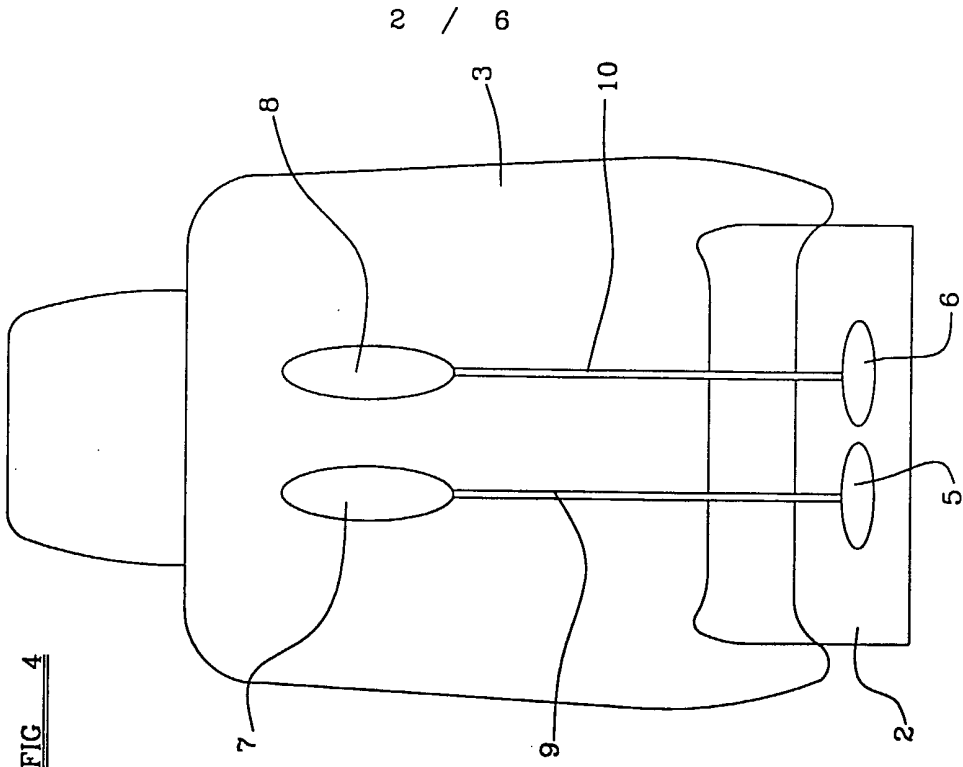
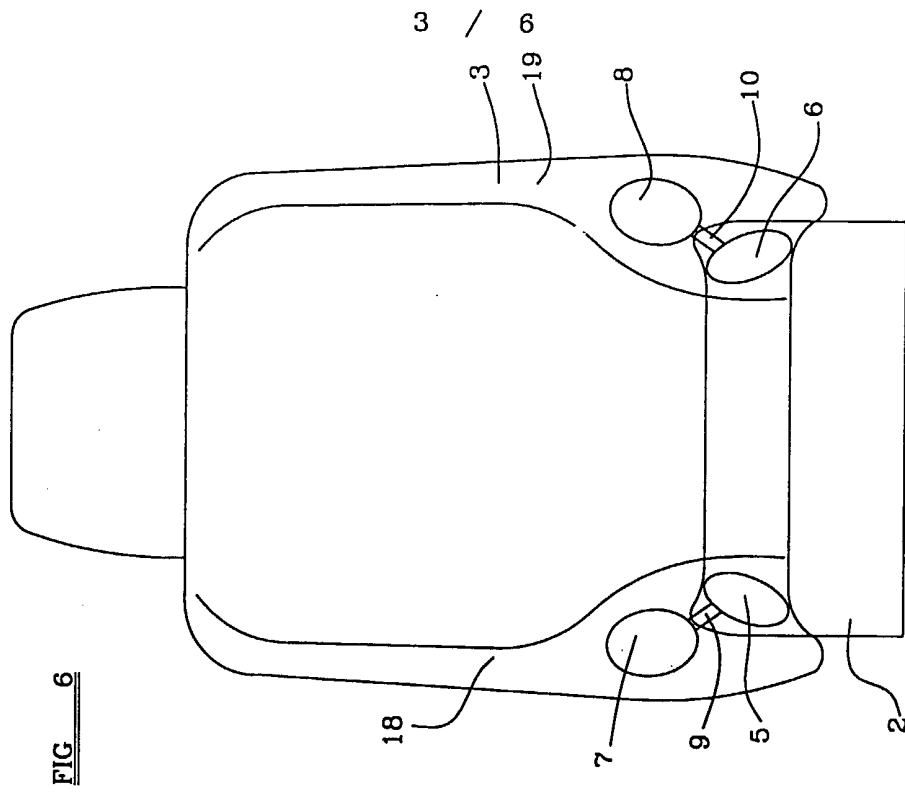
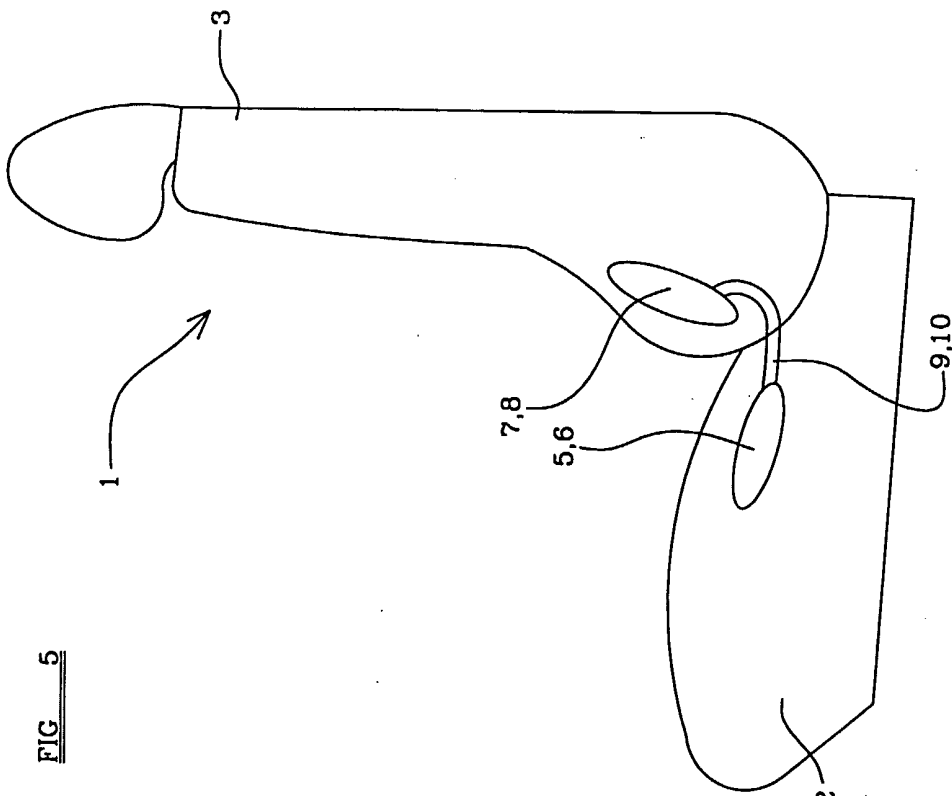


FIG 4





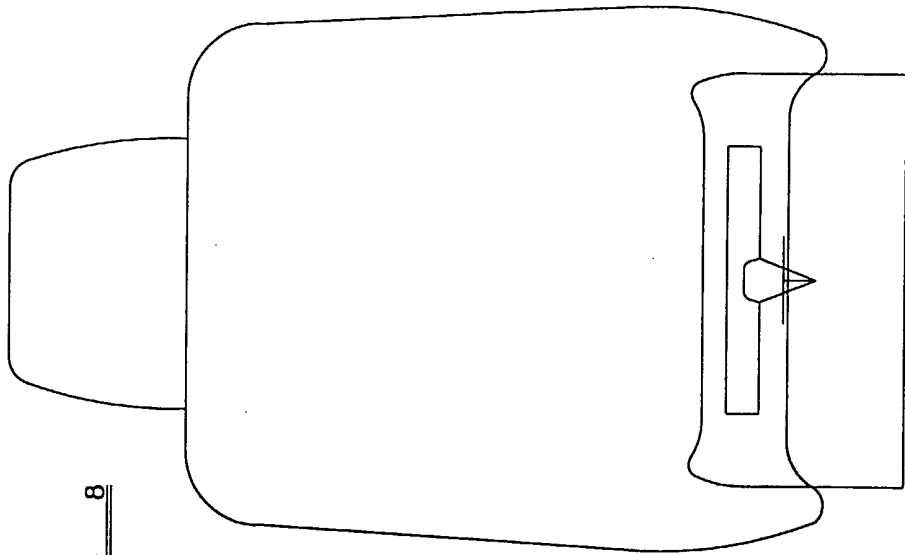


FIG 8

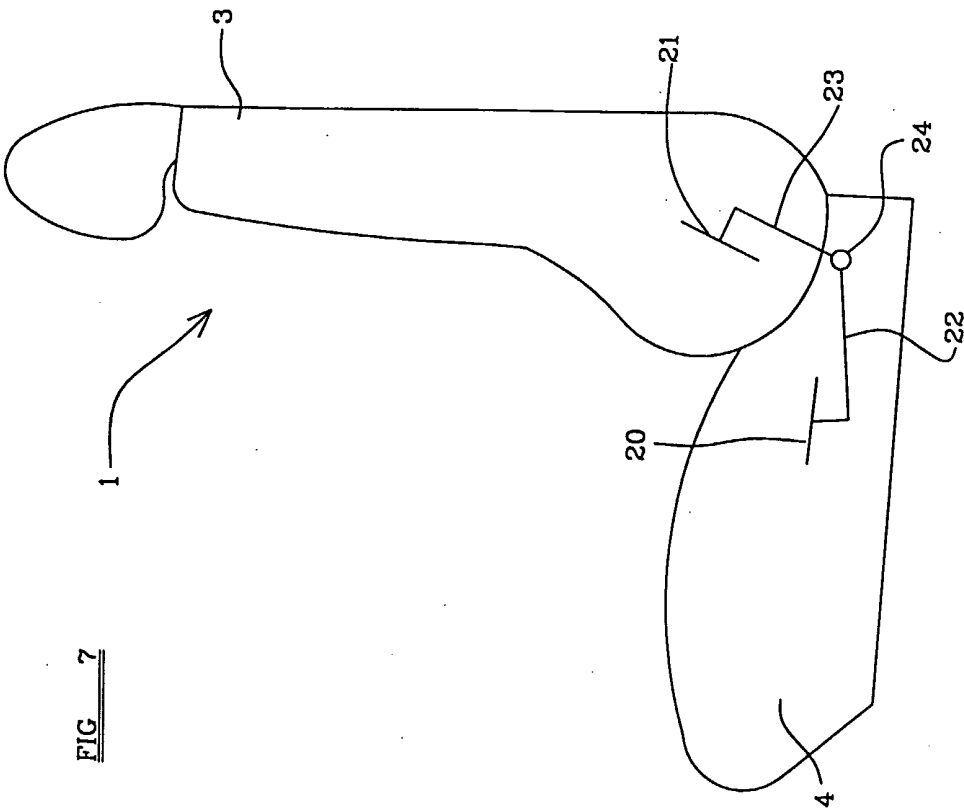
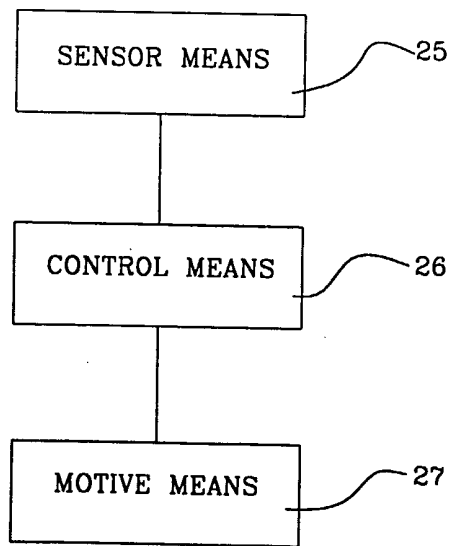


FIG 7

FIG 9



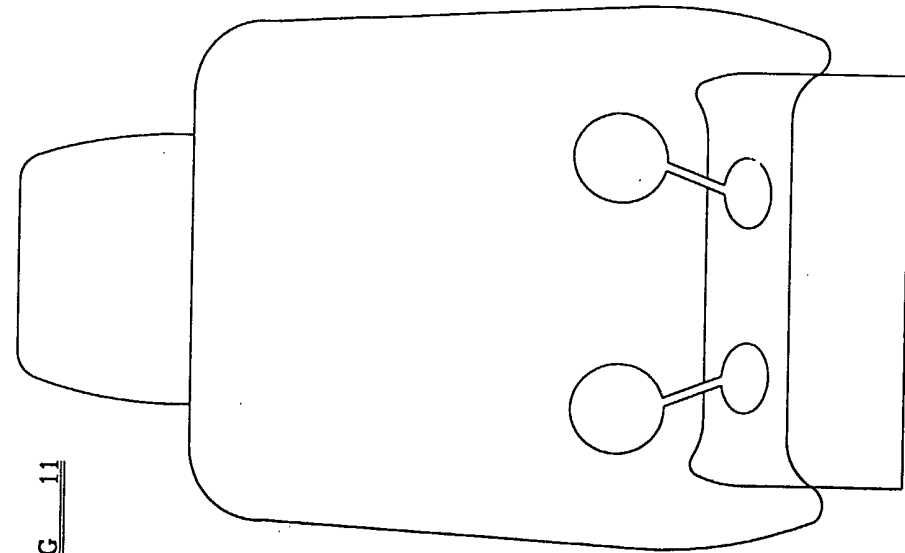


FIG 11

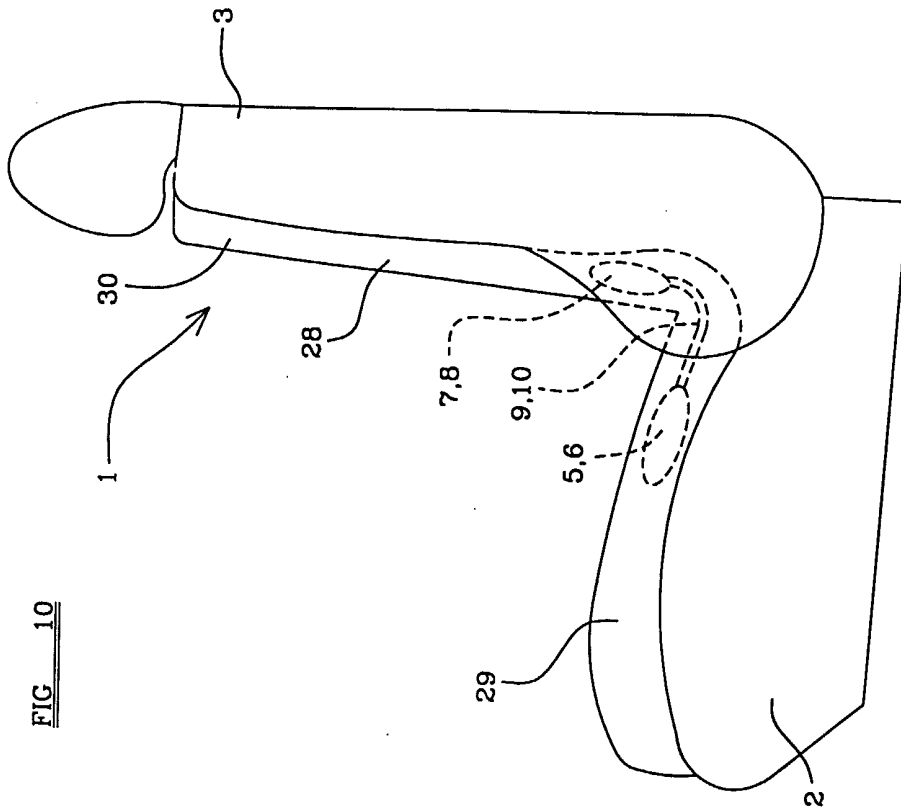


FIG 10

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 01/02734

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B60N 2/66

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)

IPC7: B60N, A47C

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, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5558398 A (SANTOS), 24 Sept 1996 (24.09.96), figures 5,6, see the whole document --	1-3,6-10,12, 13
X	US 5860705 A (RIDDER), 19 January 1999 (19.01.99) --	1-3,8,10
X	US 4514010 A (SABATER GONZÁLEZ), 30 April 1985 (30.04.85) --	1-3,9,10,12
A	US 5975629 A (LORBIECKI), 2 November 1999 (02.11.99), column 27, line 36 - column 28, line 35, figures 20,21 --	

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

* Special categories of cited documents:

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Authorized officer

Erik Wiss/js
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INTERNATIONAL SEARCH REPORT

International application No.

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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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A	US 4615563 A1 (KOBAYASHI), 7 October 1986 (07.10.86) -- -----	

INTERNATIONAL SEARCH REPORT

Information on patent family members

28/01/02

International application No.

PCT/SE 01/02734

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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