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Amended claims in accordance with Rule 137(2) EPC.

(54) OFFICE CHAIR

(57) An office chair comprises a seat element (3) mounted movably on a fixed support element (1) and a back support element (2). The arrangement simultaneously allows the seat element (3) to move and tilt backwards when the user leans backwards. The seat element (3) carries the chair seating panel (4) in such a way that when the user leans to a side, said chair seating panel (4) tilts to the same side according to the user's movement and independently of said chair's back element (2).

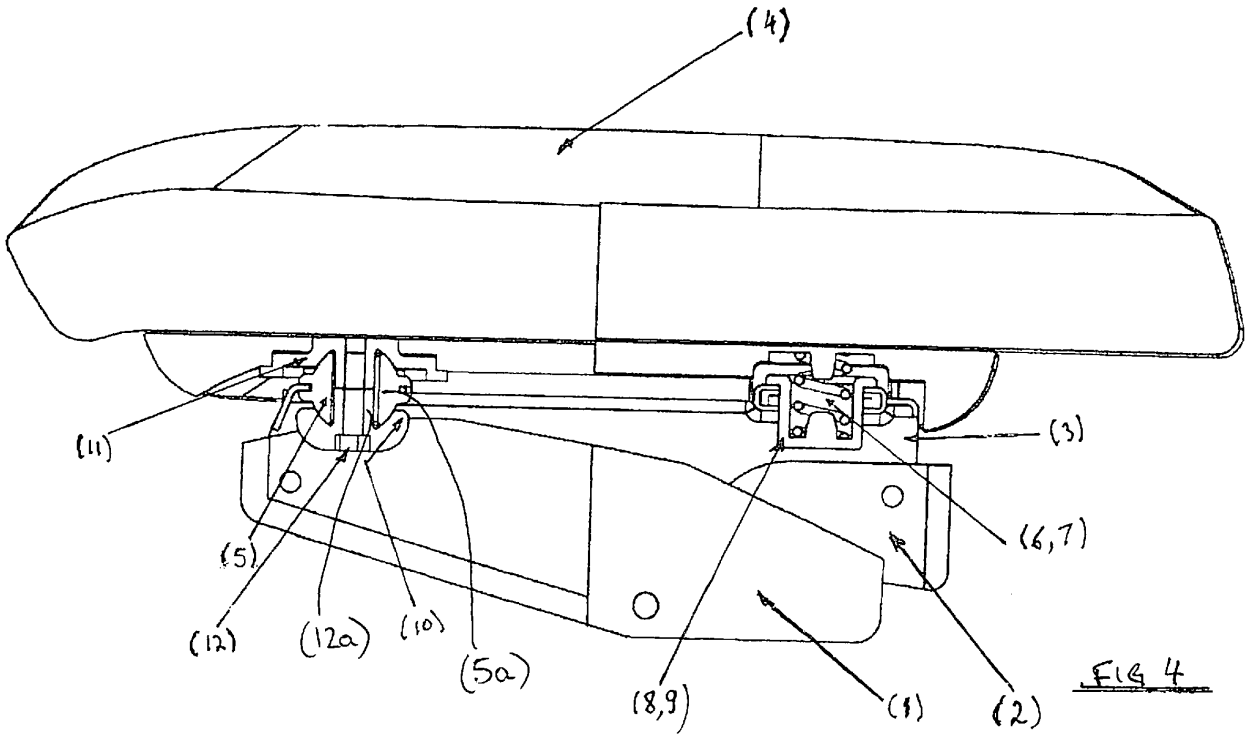

Fig 4

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Description

[0001] This invention relates to a chair, specifically to an office chair, comprising a support panel for a seat element and a substantially vertical back support element. An office chair allows the user to influence and adjust his or her seating dynamic to varying degrees.

[0002] In contrast to a rigid chair, where there is no provision for changing the relative positions of seat to backrest, the office chair has provision for adjusting those relative positions according to the requirements of the user.

[0003] The mechanisms provided in an office chair serve to encourage the user into a dynamic sitting behaviour. This entails changing his or her position regularly, thus avoiding muscular discomforts such as cramp or fatigue and thus allowing the user to sit for longer periods without experiencing the normal problems associated with prolonged sitting, or at least substantially reducing those effects.

[0004] Well known mechanisms for adjusting seating positions on office chairs allow for the tilting of the backrest, the seat panel or even a combination of both.

[0005] An example of such a chair mechanism is know from EP2725943 A1 (L & P Property Mgt) which discloses an office chair which accommodates some of the user's movements and whose seat panel tilts and moves backwards when the user leans backwards thus tilting the backrest.

[0006] To improve this situation a side to side/left to right motion can be added which promotes movement even further.

[0007] More recent improvements allow for the sideways rocking or "twisting" of the seat and chair. Such an arrangement is known from the German "Offenlegungsschrift" DE102014006058 (Grupo Forma) which discloses an office chair wherein the seat panel and the backrest can twist sideways thus allowing the user to rock sideways.

[0008] However, this disclosure involves a rigid connection between the seat panel and the backrest such that the seat and the backrest have to move together. Such an arrangement has been shown not to be favoured by many users.

[0009] A good office chair seating solution benefits the chair users by providing motion, this is to ensure that the chair users are not static for long periods of time as this is bad for the chair users' health.

[0010] One instance of where this movement is limited is for example if the chair user movement is limited to forwards & backwards then they drop something & suddenly reach for it. After being static for a long period sudden movement can lead to back injury.

[0011] The present invention discloses an office chair which alleviates the above problems and disadvantages.

[0012] An independent seat & back twist allows for user preference. The front connection is a ball joint located in the centre plane of the seat. This ball joint is formed from two half spheres forming a complementary shaped housing enclosing said ball.

[0013] The upper half of said housing is fixed directly to the lower panel of the chair seat panel the lower part is assembled by means of bolt which reaches through the ball of the joint. This arrangement essentially creates a 360 degree pivot around the centre point of said ball joint.

[0014] The ball is mounted on the top surface of the seat element and the housing surrounding the ball is mounted under the chair seating panel, thus allowing the former to lean sideways when the user leans sideways.

[0015] The rear of the seat is essentially floating on two compression springs spaced evenly away from the central plane (these could be any spring type, rubber, leaf spring etc.). These compression springs may rest in spring pockets lodged in the seat element into which pockets the compression springs may recede when coil springs are used.

[0016] The resulting motion is best described as a rolling motion where the tilting motion is strongest at the rear of the chair seating panel and reduces in amplitude the nearer it gets to the front of that panel. A useful option would be to include a means for the user to lock the twisting motion, hence precluding any sideways twisting of the chair seating panel when it is not wanted.

[0017] Since it is preferable to have chair controls at the front of the seat, for easy manipulation by the user, such a locking option should be operable at the front or the front side of the chair seating panel. To guard any fingers probing in the area of the ball joint, the top panel of the seat element is turned downwards to effectively shield the moving parts of the front joint.

[0018] This locking option can be realised by putting a sliding block either side of the ball joint which sliding blocks can be moved toward the centre of the seat panel or away from it, thus either increasing or reducing the effective space between the underside of said chair seating panel and said seat element.

[0019] At the rear of the seat, as it is essentially floating, two items could be added: guides to align the seat left to right. These could be profiled to shape the twist to the desired shape, i.e. conical surfaces could be added, if the twist were desired to be exactly conical.

[0020] Tilt limiters either side of the central point of the seat element are required to stop the seat from flipping over when leaning to the side. These tilt limiters can vary in form, they could be screws/bolts, wires or even integrated hook features, the latter of which are the preferred realisation. Straps could also be used at the front of the seat if required for strength purposes.

Statement of the invention

[0021] An office chair comprising a seat element mounted movably on a fixed support element and a back support element, which arrangement simultaneously allows the seat element to move and tilt backwards when

the user leans backwards and which seat element carries the chair seating panel in such a way that when the user leans to a side, said chair seating panel tilts to the same side according to the user's movement and independently of said chair's back element.

[0022] The sideways tilting mechanism may comprise a ball joint at the front of said chair seating panel and may comprise spring means such as two springs at the rear.

[0023] The ball joint at the front of the seat element may consist of a ball mounted in a housing comprising two half spheres fixed to said chair seating panel.

[0024] The ball joint may sit in the housing whose inside is shaped to match said ball and wherein said ball joint forms a 360 degrees pivot around its centre.

[0025] The two springs are compression springs on which the rear of the chair seating panel rests.

[0026] Each of said springs may rest in a retaining pocket which retaining pockets are set into said seat element spaced equally on either side of the centre of said seat element.

[0027] Types of suitable spring include coil, leaf or rubber springs.

[0028] The maximum tilt of said chair seating panel may be determined by a pair of tilt limiters connecting the underside of said chair seating panel with said seat element and positioned equidistant outboard from said springs.

[0029] Each of said tilt limiters may comprise two hooks which engage with each other in such a way that the tilt of the said seating panel is limited by said hooks touching.

Listing of the drawings

[0030]

Fig 1 shows a side view of the seat support structure without the chair seating panel.

Fig 2 shows a side view of the chair seating panel in place on the support structure.

Fig 3 shows a cross-sectional side view of the seat support structure with the front ball joint without the housing and one of the rear spring assemblies.

Fig 4 shows similar view as fig 3, with the seating panel in place and showing details of the front ball joint assembly as well as one rear spring assembly.

Figs 5 and **6** show a front view of the chair highlighting the front ball joint with the seat in horizontal position (fig 5) and in tilted position (fig 6).

Figs 7 and **8** show a rear cross-sectional view of the chair through both spring assemblies, with the springs relaxed in horizontal seat position (fig7) and in sideways tilt (fig 8).

Fig 9 shows the preferred realisation of one of the rear tilt limiters as hooks, formed into the lower panel of the chair seat panel engaging with a finger on the rear of the seat element

Description of the Drawings

[0031] **Figure 1** shows the basic support structure of the chair. The seat element (3) which carries the chair seating panel (4) is supported by a fixed element (1) to which a back element (2) is hinged and said seat element (3) is hinged at its front to the fixed element (1) and at its rear to the back element (2).

[0032] This basic arrangement enables the chair to be rocked backwards and apart from the back rest declining when the user leans back, the seat panel moves backwards and its rear end also tilts downwards. Thus giving the user a pleasant and relaxing position.

[0033] This figure also shows the front support for the chair seating panel (4) in the shape of a ball joint (13) and the rear support in the shape of two spring assemblies (14, 15) on which the rear end of the chair seating panel (4) floats, one of which is shown.

[0034] **Figure 2** shows a similar elevational view with the chair seating panel (4) in place and illustrating in cut out view, one of the rear seat panel spring assemblies (14, 15) on which it floats.

[0035] **Figure 3** shows side elevational view through the centre of the seat element (3). (partially in section) with the forward ball joint partially assembled (13) and one of the rear spring assemblies (14, 15)

[0036] This figure also shows the front end 3A' of the top panel (3A) to the seat element (3), which is pointed downwards as a safe-guard against fingers being trapped in the ball joint assembly immediately behind it, when manipulating an adjustment mechanism, which is located at the front of the chair seat.

[0037] **Figure 4** shows the basic construction of the chair with the chair seat element (4) in place. Illustrated are the two halves of the front ball joint housing (10, 11) held together by a sturdy bolt (12) and joining the complete housing (10, 11) to the bottom of the chair seat panel (4A) and at the same time holding the ball part (5) of the joint securely in place.

[0038] The rear support assemblies (14, 15) (one shown) are here in the form of coil springs (6, 7) which rest in pockets (8, 9).

[0039] **Figure 5** shows a cross-sectional view of the unstressed position of the front ball joint (13) with the seat in a horizontal position. It shows the ball part (5) of the ball joint fixed to the top panel (3A) of the seat element surrounded by the assembled halves of the ball housing (10, 11), which in turn, is attached to the lower panel (4A) of the chair seat panel.

[0040] **Figure 6**, on the same sheet, shows the chair seat panel (4) tilted to one side and the front ball joint rotating its housing. In this figure it can be seen that the hole (5a) in ball (5) is larger in diameter than the diameter

of the tubular connection piece (12a) providing a guide for bolt (12), the bolt holding the two halves (10, 11) of the housing together.

[0041] The play, thus created, is sufficient to allow the housing (10, 11) to rotate a certain amount in relation to ball (5).

[0042] **Figure 7** shows the rear springs in rest position with the chair seat element (4) horizontal and **Figure 8** shows said chair seat element (4) leaning sideways and hence one of the springs (6, 7) being compressed and the other being stretched.

[0043] Finally, **figure 9** shows the preferred realisation of the tilt limiters between the chair seating panel (4) and the seat element (3). These limiters comprise a hook (16) depending from the chair seating panel (4) and engaging a second hook (17) attached to the seat element limiting the amount of tilt by physical contact of said two hooks at the point of maximum tilt, thus acting as a stop when the seat panel is tilted to the opposite side.

[0044] These limiters could also be in the form of straps connecting the chair seating panel with the seat element or loops which pass through holes in lower panel of the chair seating panel and whose loose ends are fixed to the seat element.

[0045] While it is acknowledged the drawings only represent one particular realisation of the invention, it is stressed that they are in no way limiting on possible variations on those realisations such as different springs at the back and different arrangements for the ball joint at the front of the chair seating panel.

Claims

1. An office chair comprising a seat element (3) mounted movably on a fixed support element (1) and a back support element (2), which arrangement simultaneously allows the seat element (3) to move and tilt backwards when the user leans backwards and which seat element (3) carries the chair seating panel (4) in such a way that when the user leans to a side, said chair seating panel (4) tilts to the same side according to the user's movement and independently of said chair's back element (2).

2. An office chair according to claim 1, wherein said sideways tilting mechanism comprises a ball joint (5) at the front of said chair seating panel (4) and two springs (6,7) at the rear.

3. An office chair according to claim 2, wherein said ball joint (5) at the front of the seat element (3) consists of a ball (5) mounted in a housing (10. 11) comprising two half spheres (10, 11) fixed to said chair seating panel (4).

4. An office chair according to claim 3, wherein said ball joint (5) sits in the housing (10, 11) whose inside is shaped to match said ball (5) and wherein said ball joint forms a 360 degrees pivot around its centre.

5. An office chair according to any of claims 2 to 4, wherein said two springs (6,7) are compression springs on which the rear of the chair seating panel (4) rests.

6. An office chair according to claim 5, wherein each of said springs (6,7) rest in a retaining pocket (8, 9) which retaining pockets are set into said seat element (3) spaced equally on either side of the centre of said seat element (3).

7. An office chair according to any of claims 2 to 6, wherein said springs may be coil, leaf or rubber springs.

8. An office chair according to any preceding claim, wherein the maximum tilt of said chair seating panel (4) is determined by a pair of tilt limiters connecting the underside of said chair seating panel with said seat element and positioned equidistant outboard from said springs (6,7).

9. An office chair according to claim 8, wherein each of said tilt limiters comprises two hooks (16, 17) which engage with each other in such a way that the tilt of the said seating panel is limited by said hooks touching.

Amended claims in accordance with Rule 137(2) EPC.

1. An office chair comprising a seat element (3) mounted movably on a fixed support element (1) and a back support element (2), which arrangement simultaneously allows the seat element (3) to move and tilt backwards when the user leans backwards and which seat element (3) carries the chair seating panel (4) in such a way that when the user leans to a side, said chair seating panel (4) tilts to the same side according to the user's movement and independently of said chair's back support element (2) and wherein said sideways tilting mechanism comprises a ball joint (5) at the front of said chair seating panel (4) and two springs (6,7) at the rear **characterised in that** the maximum tilt of said chair seating panel (4) is determined by a pair of tilt limiters connecting the underside of said chair seating panel with said seat element and positioned equidistant outboard from said springs (6,7), and **in that** each of said tilt limiters comprises two hooks (16, 17) which engage with each other in such a way that the tilt of the said seating panel is limited by said hooks touching.

2. An office chair according to claim 1, wherein said ball joint (5) at the front of the seat element (3) consists of a ball (5) mounted in a housing (13) comprising two half spheres (10, 11) fixed to said chair seating panel (4).

3. An office chair according to claim 2, wherein said ball joint (5) sits in the housing (13) whose inside is shaped to match said ball (5) and in that said ball joint forms a 360 degrees pivot around its centre.

4. An office chair according to any preceding claim, wherein said two springs (6,7) are compression springs on which the rear of the chair seating panel (4) rests.

5. An office chair according to claim 4, wherein each of said springs (6,7) rest in a retaining pocket (8, 9) which retaining pockets are set into said seat element (3) spaced equally on either side of the centre of said seat element (3).

6. An office chair according to any preceding claim, wherein said springs may be coil, leaf or rubber springs.

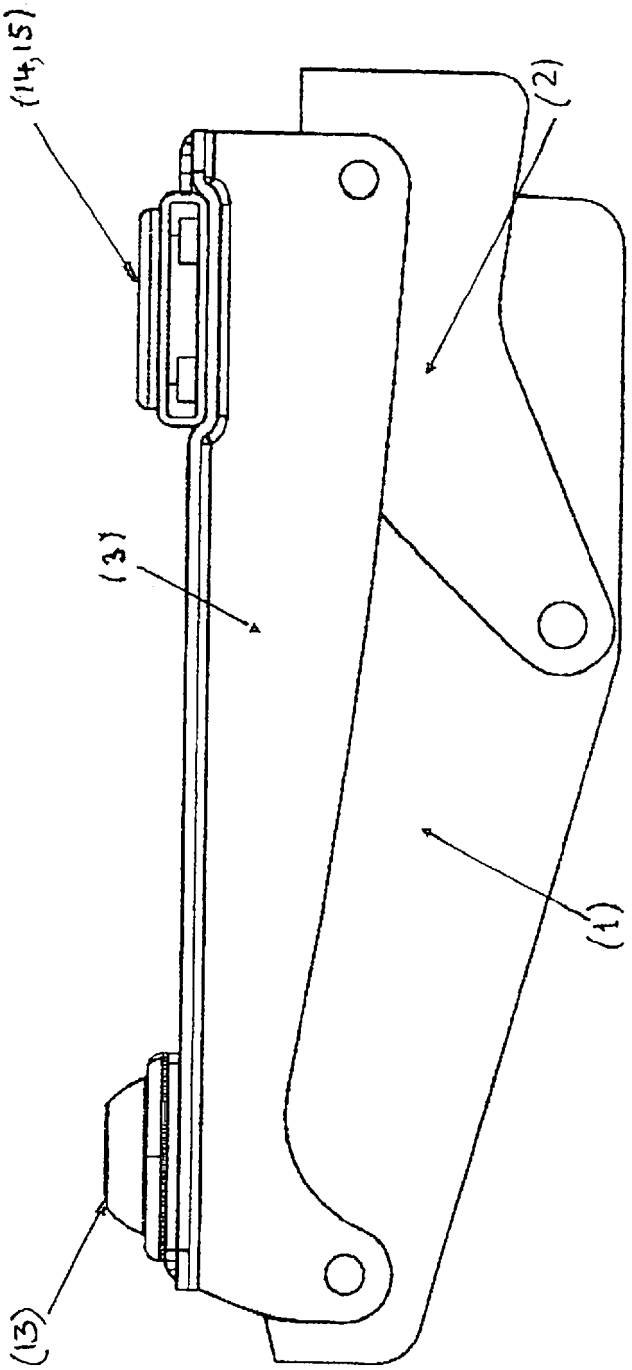


Fig 1

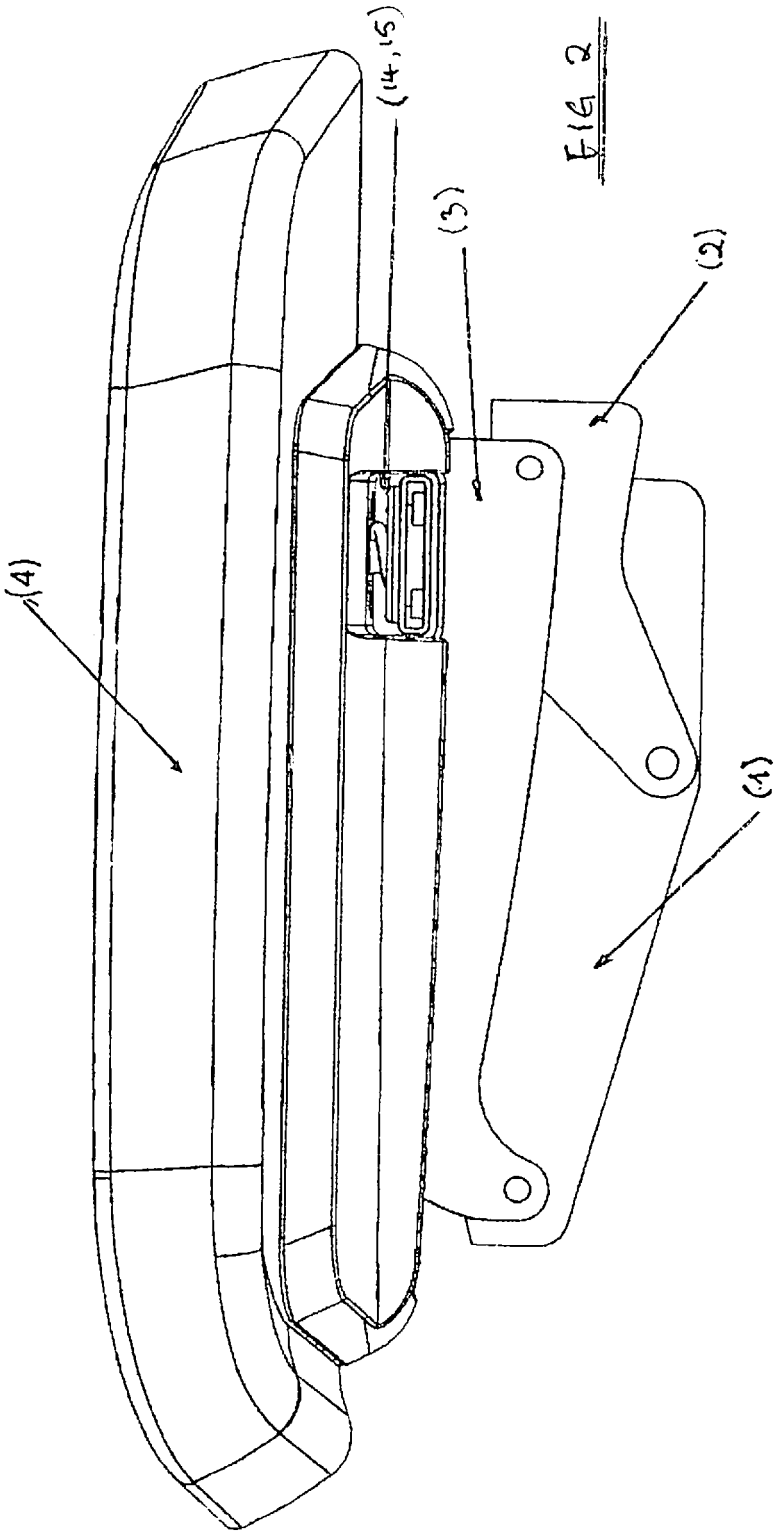


FIG 2

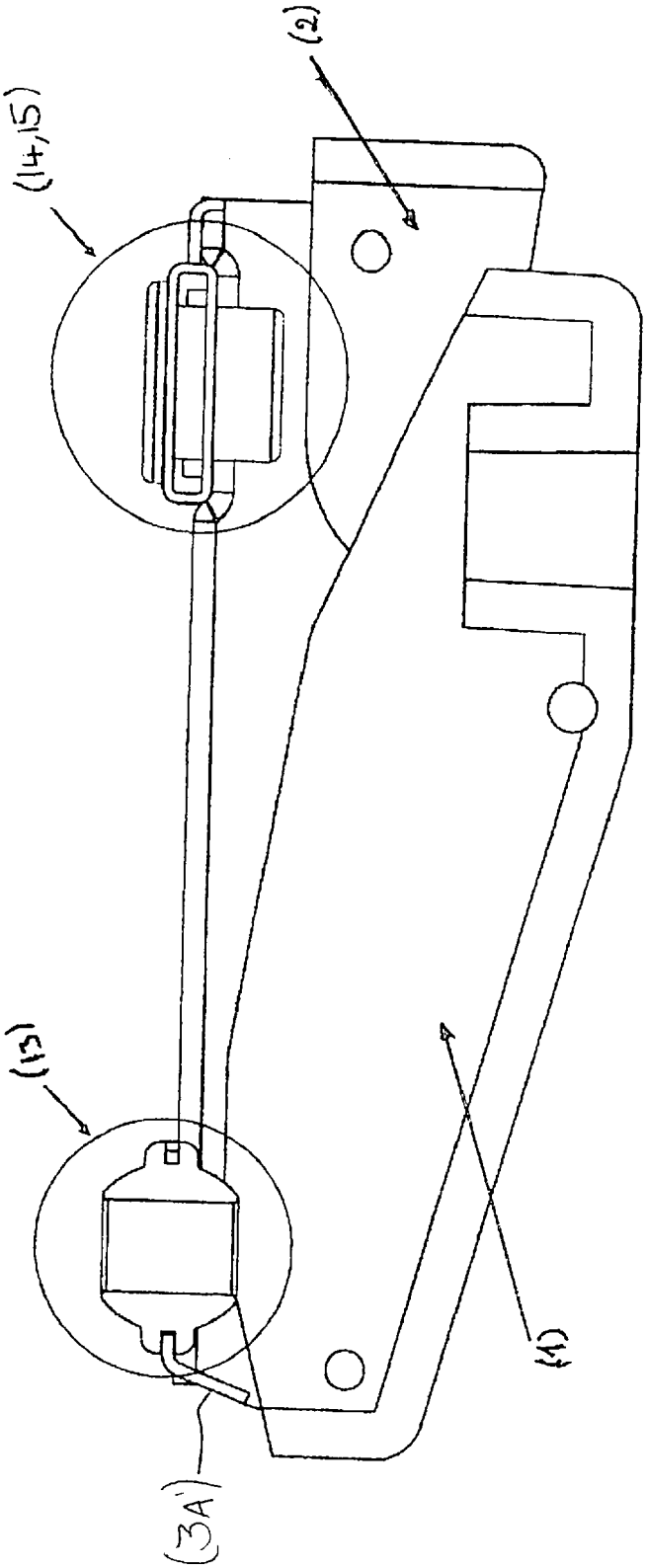


FIG 3

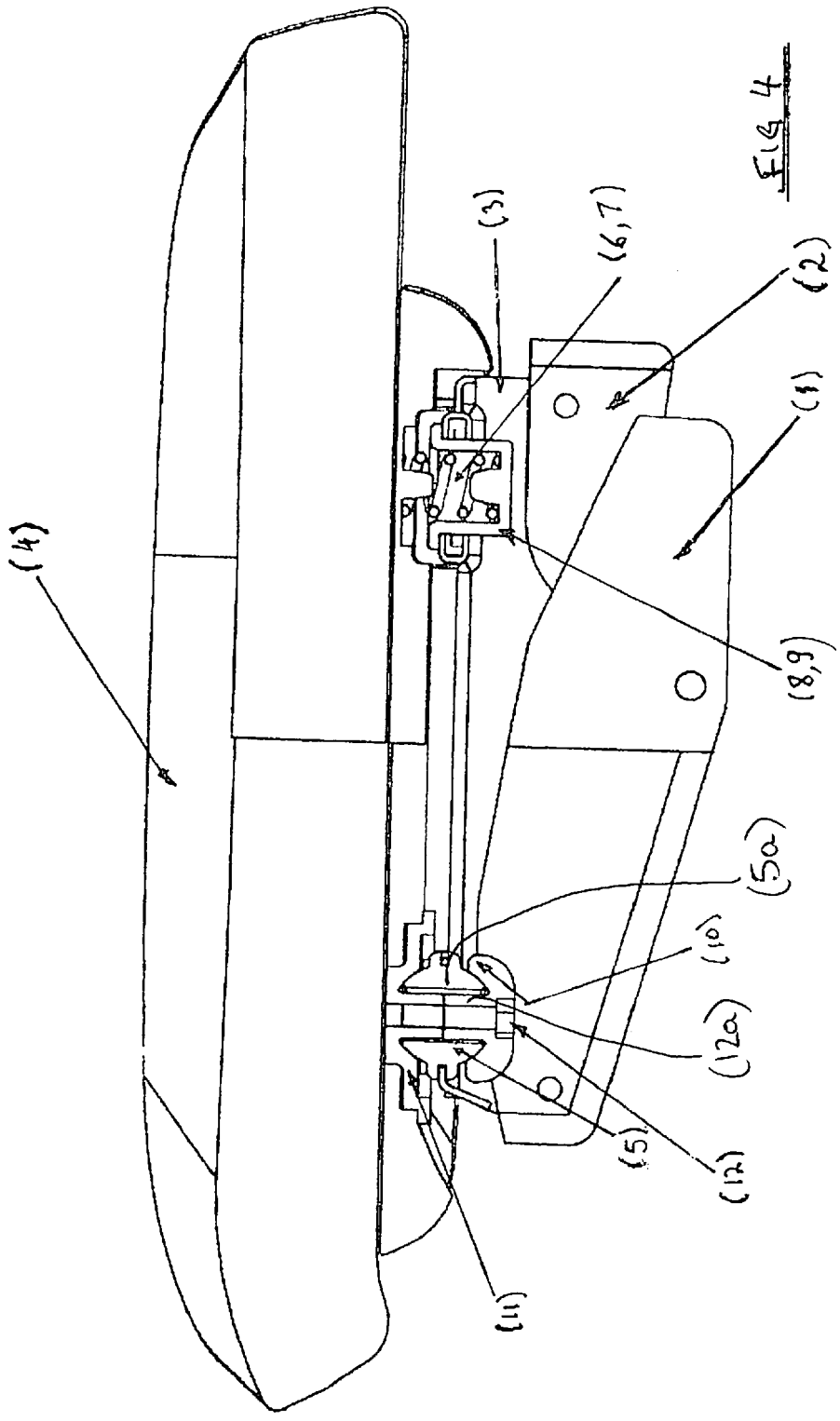


Fig 4

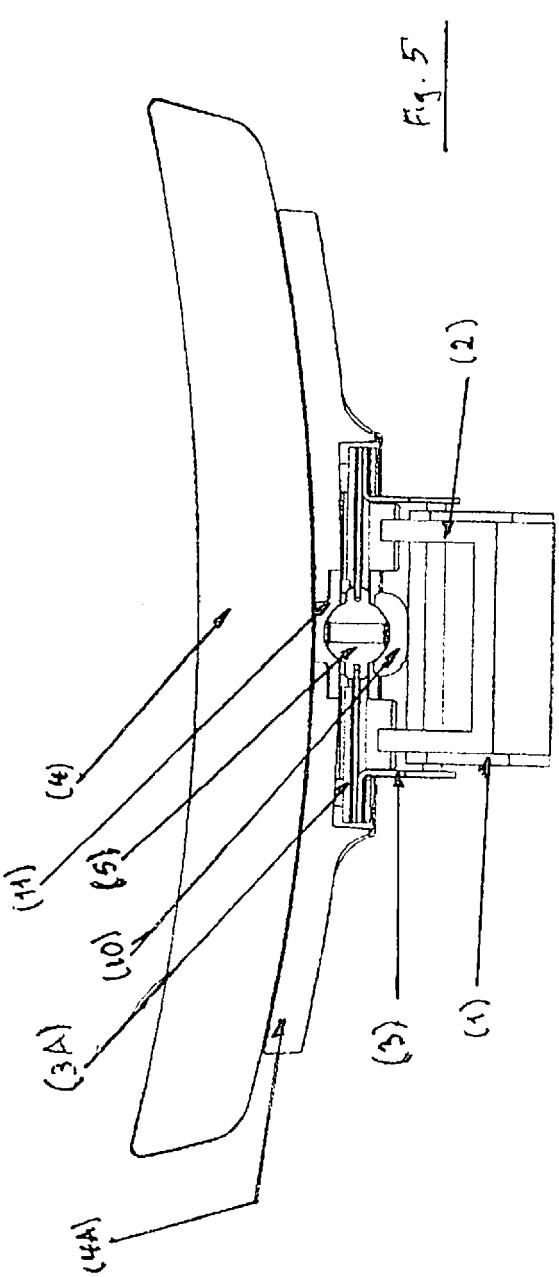


Fig. 5

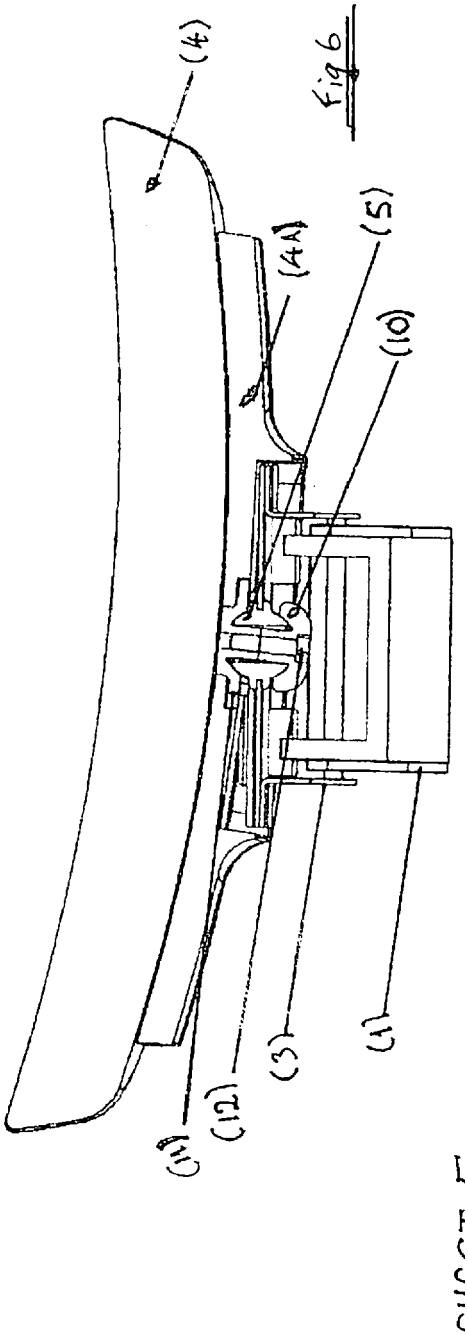
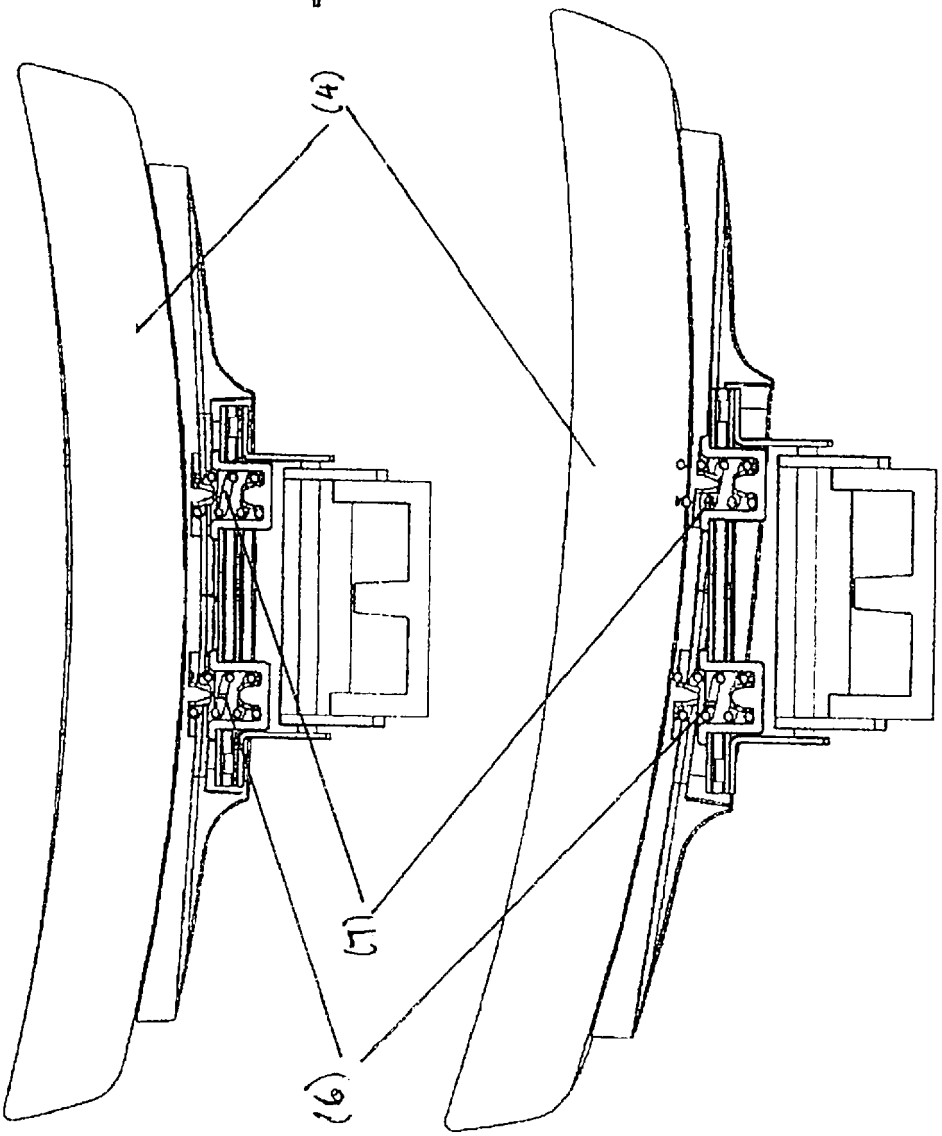


Fig 6

Fig 7

Fig 8



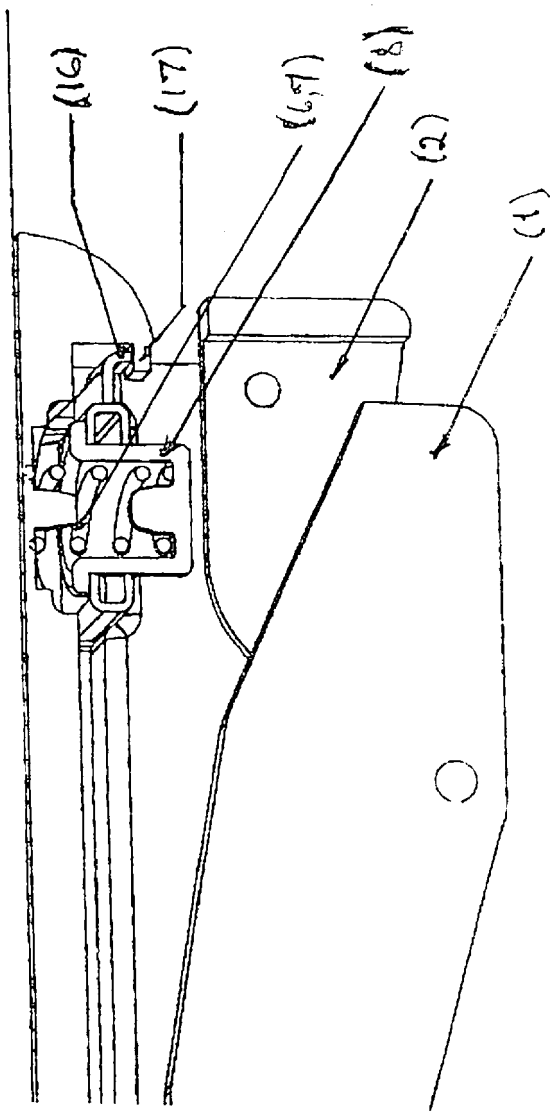


Fig. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 18 20 6591

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Y	* paragraph [0027] - paragraph [0029];	1-8	
A	claims 2,4; figures 5,6,8 *	9	

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A	* paragraph [0013]; figures 1,4,5 *	9	

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A	* paragraphs [0356], [0380] - paragraph [0383]; figures 6,11 *	9	

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TECHNICAL FIELDS SEARCHED (IPC)

A47C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	19 February 2019	Pössinger, Tobias

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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REFERENCES CITED IN THE DESCRIPTION

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