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(54) **VEHICLE SEAT**

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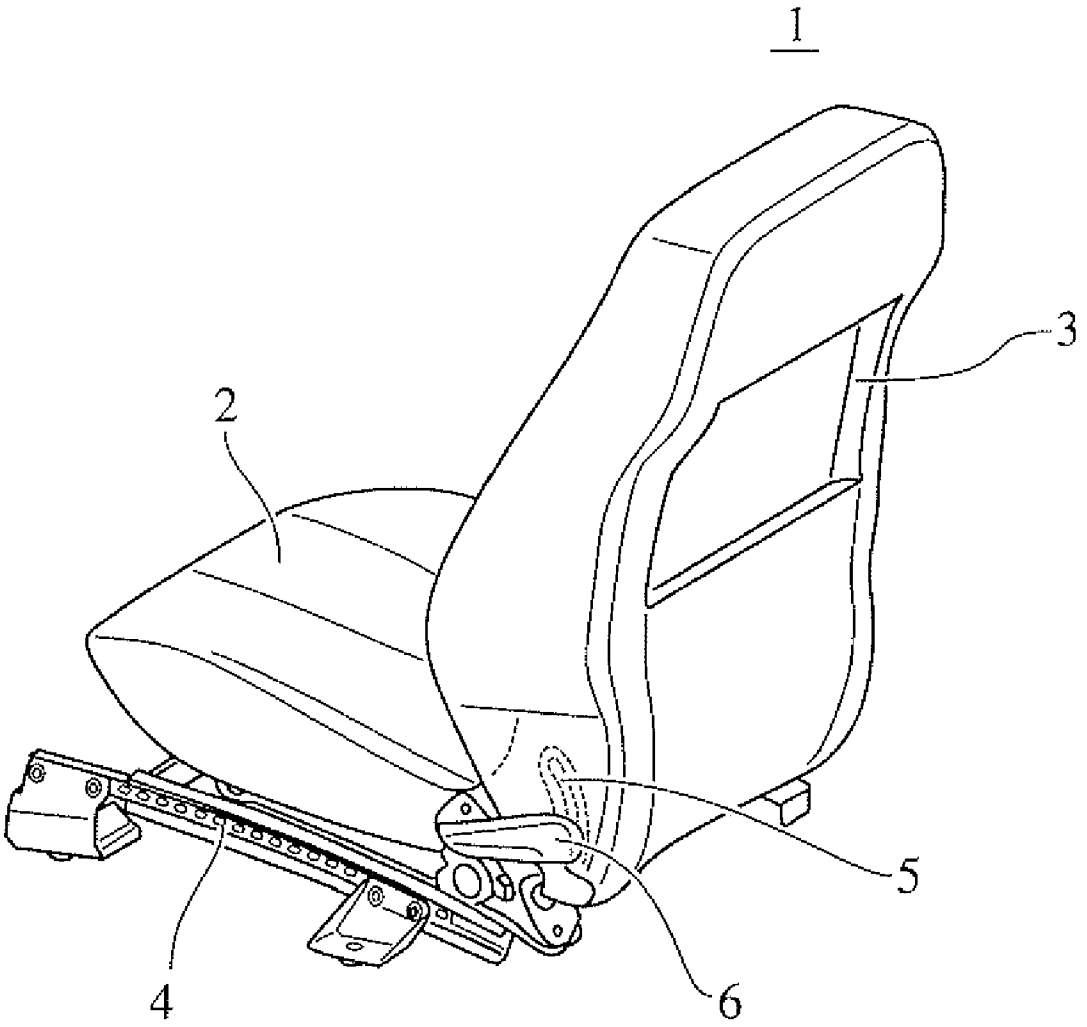
(57) **ABSTRACT**

The present invention relate to a vehicle seat (**1**) having a backrest (**3**) which is provided to be pivotable on a seat part about a pivot axis.



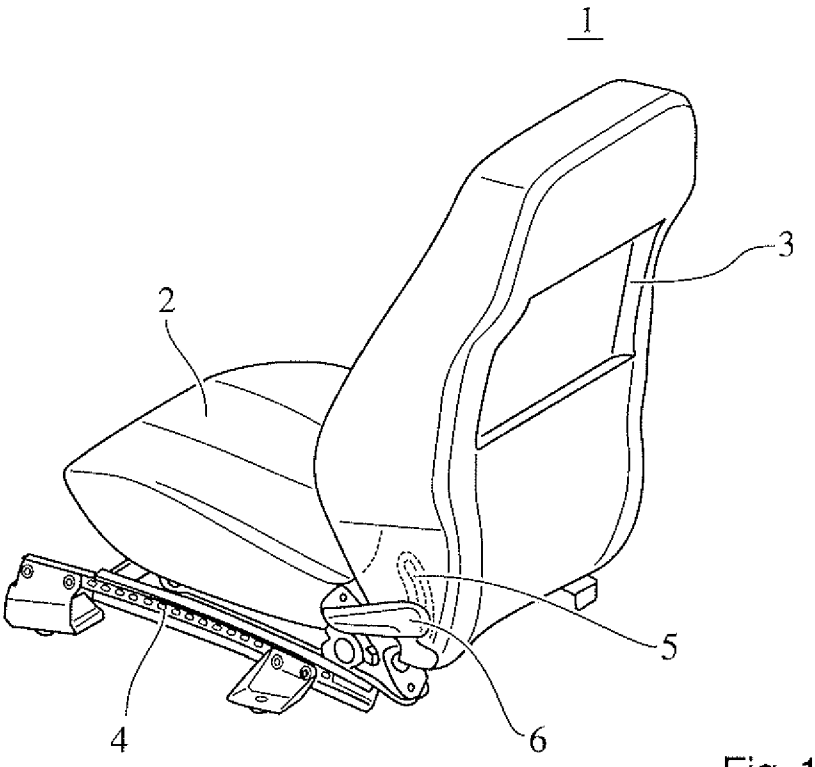


Fig. 1

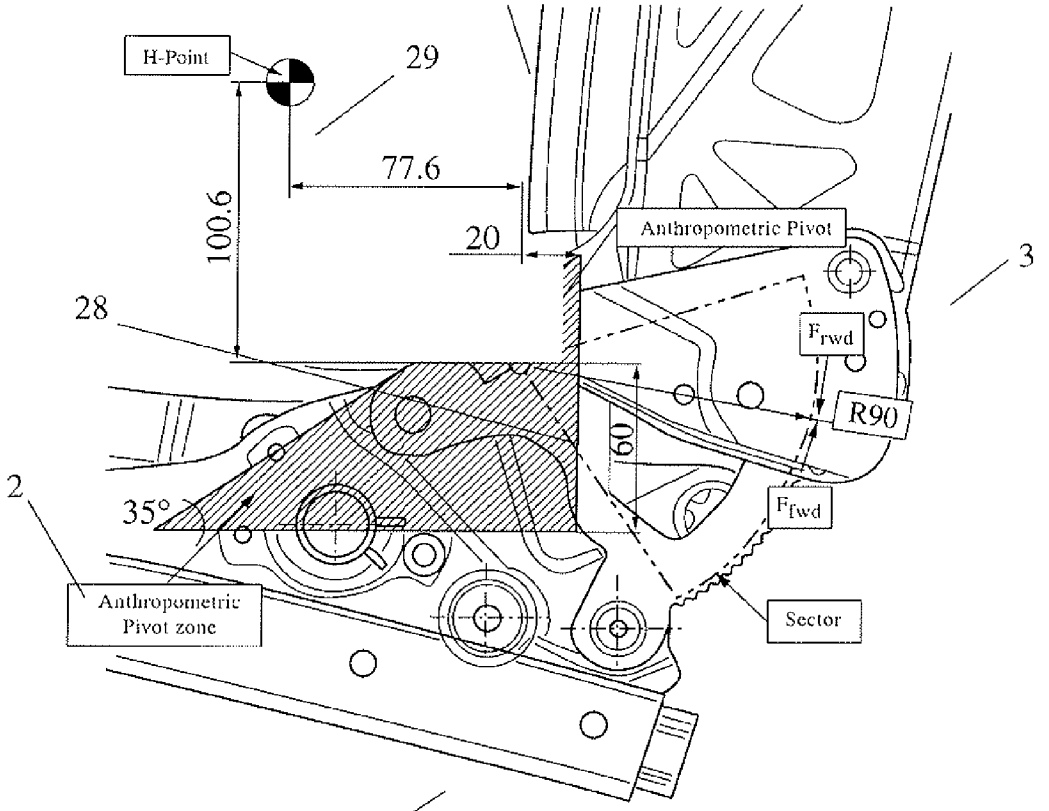

H-Point
29
77.6
100.6
20
Anthropometric Pivot
3
28
F_{rwd}
R90
60
2
35°
F_{fwd}
Anthropometric Pivot zone
Sector
27

Fig. 2

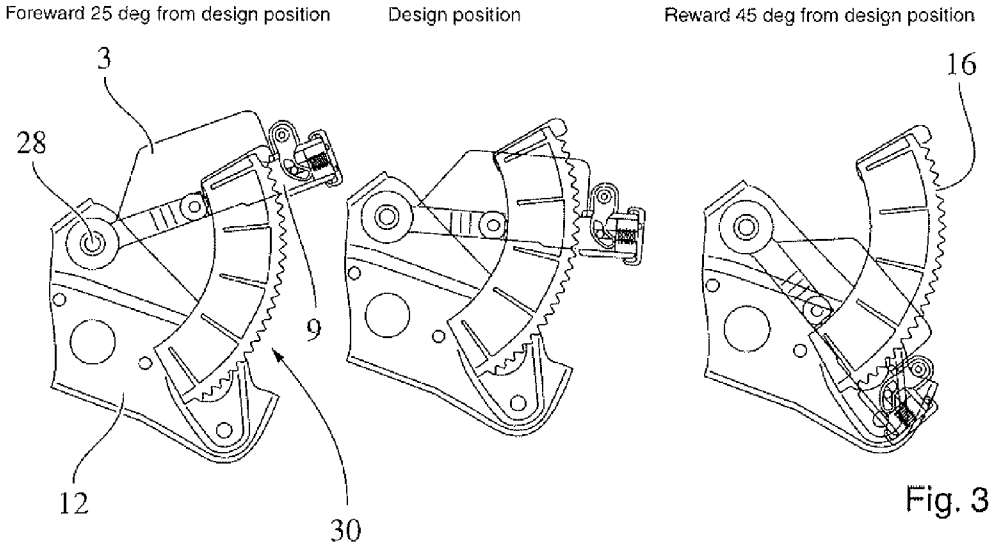

Foreward 25 deg from design position
Design position
Reward 45 deg from design position
3
28
9
16
12
30

Fig. 3

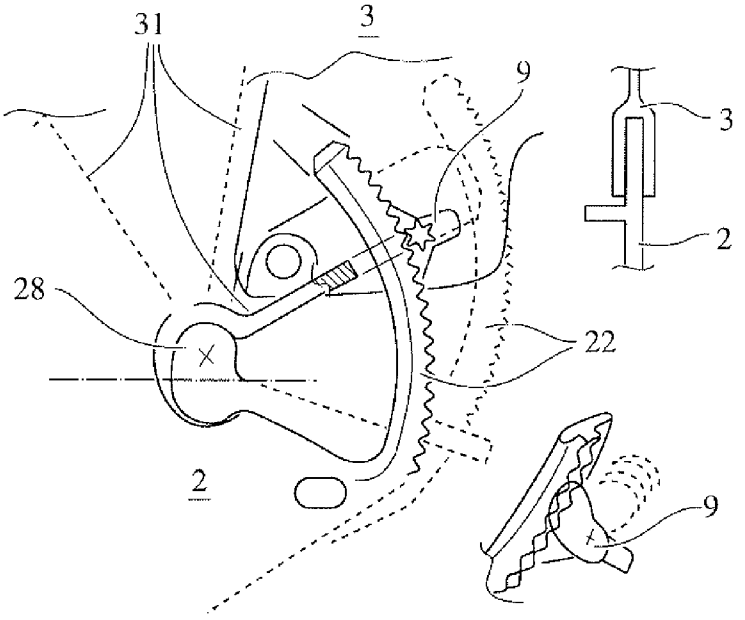

31
3
9
3
2
28
22
2
9

Fig. 4

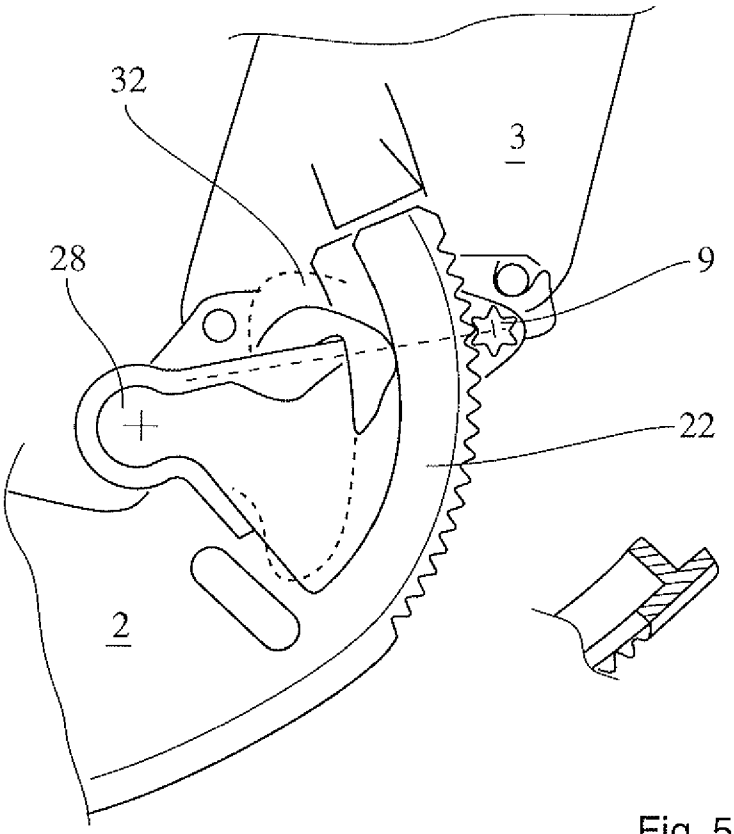


Fig. 5

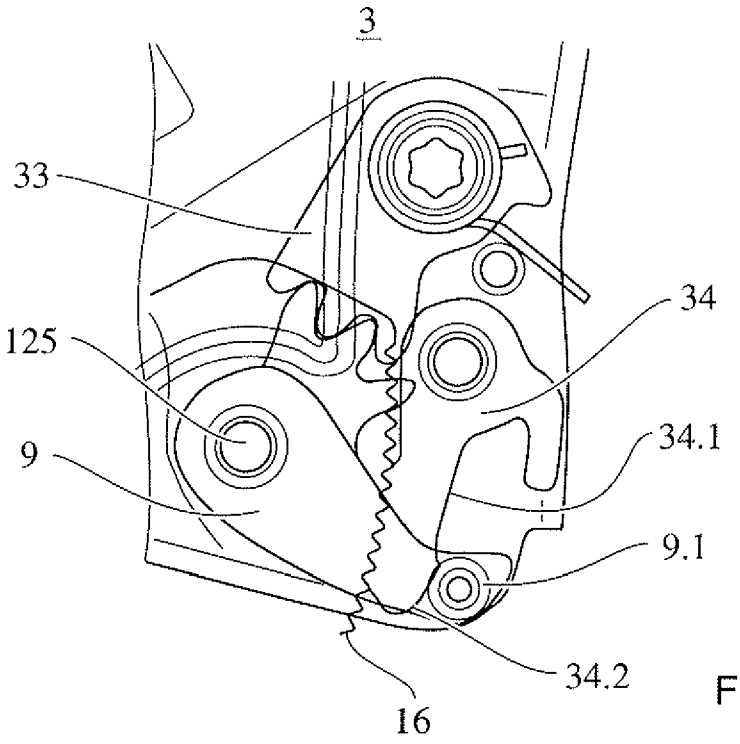


Fig. 6

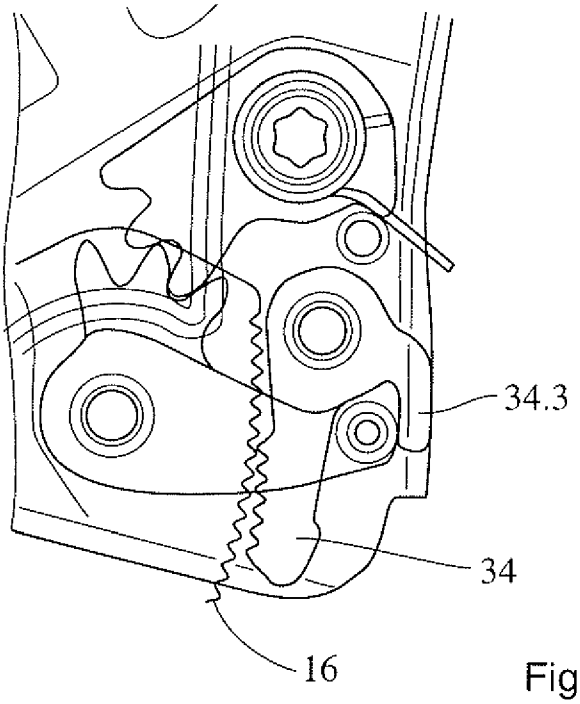


Fig. 7

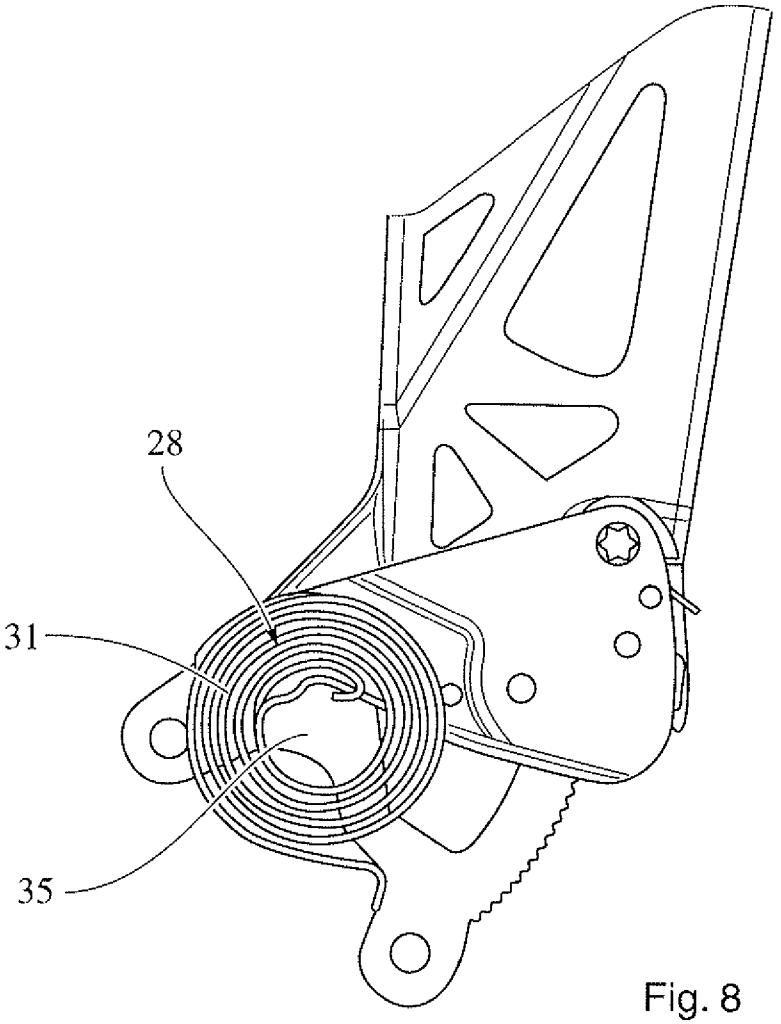


Fig. 8

VEHICLE SEAT

[0001] This application claims priority to U.S. Application Ser. No. 61/643,587, filed May 7, 2012, the entire contents thereof are incorporated herein by reference.

[0002] The present invention relates to a vehicle seat having a backrest which is provided to be pivotable on a seat part about a pivot axis.

[0003] In automotive engineering, there is a continuous desire to be able to produce a vehicle seat more easily and/or cost-effectively and/or to provide a vehicle seat with improved safety.

[0004] It was therefore the object of the present invention to provide a vehicle seat or individual components of a vehicle seat which meet(s) the abovementioned requirements.

[0005] The object is achieved by a vehicle seat having a backrest which is provided to be pivotable on a seat part about a pivot axis, wherein an occupant having an H-point sits on the vehicle seat and wherein the pivot axis of the backrest is provided below the H-point.

[0006] The disclosure made for this subject matter of the present invention applies in equal measure to the other subject matters of the present invention, and vice versa.

[0007] This subject matter of the present invention relates to a vehicle seat having a backrest which is arranged in a pivotable manner on a seat part. On the vehicle seat according to the invention there is a seat occupant who has what is known as an H-point, which corresponds to the position of the hip joint of the occupant. According to the invention, it is now provided that the pivot point of the backrest is arranged below the H-point of the seat occupant. As a result, considerably improved ergonomic seat surfaces and/or, in the event of an accident, improved safety properties of the vehicle seat according to the invention are achieved.

[0008] Preferably, the pivot axis of the backrest is arranged behind the H-point of the occupant in relation to the direction of forward travel of the vehicle, more preferably, the pivot axis is provided between the H-point and the backrest of the vehicle seat.

[0009] Yet a further or preferred subject matter of the present invention is a vehicle seat in which the backrest is lockable at a particular inclination angle in relation to the seat part by way of a locking element, wherein the locking element is provided at least partially in the peripheral region of the side part of the seat part and/or of the backrest.

[0010] The disclosure made for this subject matter of the present invention applies in equal measure to the other subject matters of the present invention, and vice versa.

[0011] Preferably, a form- and/or force-fit-means, in particular a toothing, is integrally provided in the peripheral region of the side past of the seat part and/or the sidepart of the backrest. This form- and/or force-fit-means is preferably part of what is known as a recliner, by way of which the inclination of the backrest can be fixed in a particular position and/or by which the inclination of the backrest of a vehicle seat can be adjusted. Preferably, the form- and/or force-fit-means is provided in a part-circular manner, i.e. segment of a circle, wherein the center of the circle is preferably identical with the pivot point of the backrest of the vehicle seat. The side part of the seat part can be produced from metal and can be for example stamped out, wherein the form- and/or force-fit-means is produced during stamping. The side part may, however, also be a plastics part, in particular a fibre-reinforced plastics part. The form and/or force-fit-means is then preferably part of the mould.

[0012] Therefore, a further or preferred subject matter of the present invention is a vehicle seat in which the side part of the backrest and/or the sidepart of the seat part integrally has a form- and/or force-fit-means, in particular a toothing.

[0013] The disclosure made for this subject matter of the present invention applies in equal measure to the other subject matters of the present invention, and vice versa.

[0014] Preferably, the form- and/or force-fit-means is provided in a resilient manner. As a result, noise development can at least be reduced and it is ensured that the form- and/or force-fit-means interacts, for example in a locking manner, with a corresponding form- and/or force-fit-means.

[0015] Preferably, the form- and/or force-fit-means is part of a recliner. Particularly preferably, the form- and/or force-fit-means is provided in a part-circular manner.

[0016] A further subject matter according to the invention or preferred subject matter of the present invention is a vehicle seat in which the side part of the backrest and/or the sidepart of the seat part integrally has a spring means.

[0017] The disclosure made for this subject matter of the present invention applies in equal measure to the other subject matters of the present invention, and vice versa.

[0018] The spring means can be part of a backrest inclination adjuster, in order to bias one form- and/or force-fit-means against a corresponding (form- and/or force-fit-means. Alternatively or in addition, the spring means can be part of a height adjuster, for example in order to reset the seat surface of the occupant into a raised or lowered position, in the present case, too, the side part can be produced from a metal material or from plastics material, in particular fibre-reinforced plastics material.

[0019] Alternatively or additionally, the spring means can be the bearing for the backrest at the seat part.

[0020] The spring can be arranged between the seat part and the backrest.

[0021] According to a further or preferred subject matter of the present invention, the inclination of the backrest of a vehicle seat is adjustable in relation to a seat part and the backrest is lockable in its respective position byway of a latching pawl, wherein a locking element secures the latching pawl in its locking position and the locking element pulls the latching pawl into the looking position.

[0022] The disclosure made for this subject matter of the present invention applies in equal measure to the other subject matters of the present invention, and vice versa.

[0023] Preferably, the side part of the seat part integrally has a form- and/or force-fit-means, in particular a toothing, which interacts in a latching manner with a form- and/or force-fit-means, in particular a toothing, of the latching pawl.

[0024] Yet a further subject matter according to the invention or preferred subject matter of the present invention is a vehicle seat in which the inclination of the backrest is adjustable in relation to a seal part-and the backrest is lockable in its respective position by way of a latching pawl and which has a spring means which is provided between the seat part and the backrest, wherein the spring means is a spiral spring which is arranged in a non-concentric manner with the pivot axis of the backrest.

[0025] The disclosure made for this subject matter of the present invention applies in equal measure to the other subject matters of the present invention, and vice versa.

[0026] The inventions are explained in the following text on the basis of FIGS. **1-8**. These explanations are merely by way

of example and do not limit the general concept of the invention. The explanations apply to all subject matters of the present invention likewise.

[0027] In the figures:

[0028] FIG. **1** schematically shows a perspective illustration of a vehicle seat,

[0029] FIG. **2** schematically shows the position of the pivot axis of the backrest in relation to the H-point of the seat occupant.

[0030] FIGS. **3-5** schematically show a form- and/or force-fit-means as part of the side part of the seat part.

[0031] FIGS. **6** and **7** schematically show a recliner.

[0032] FIG. **8** schematically shows a spring element between the seat part and the backrest.

[0033] FIG. **1** schematically shows a perspective illustration of a vehicle seat **1**. The vehicle seat **1** is a conventional vehicle seat and comprises at least a seat part **2** and a backrest **3**. Furthermore, the vehicle seat **1** has a conventional longitudinal adjustment device **4**, by means of which the vehicle seat **1** is preferably coupled to a bodywork structure of a vehicle (not illustrated).

[0034] The seat part **2** and the backrest **3** are coupled in a pivotable manner by means of an inclination adjusting apparatus **5**, wherein a vehicle user can actuate the inclination adjusting apparatus **5**, for example by means of an adjusting lever **6** or the like. By means of the adjusting lever **6**, the inclination adjusting apparatus **5** can be actuated such that it is possible to set a backrest inclination of the vehicle seat **1**. A person skilled in the art will understand that the adjustment of the backrest can also take place in a motorized manner. Furthermore, the inclination adjusting apparatus can operate continuously or discontinuously.

[0035] FIG. **2** shows a first embodiment of the vehicle seat according to the present invention, which in the present case has a seat part **2** and a backrest **3** which is mounted on the seat part in a pivotable manner about the pivot axis **28**. In the vehicle seat according to the invention there sits an occupant whose hip joint is located at what is known as the H-point. According to the invention, the pivot axis of the backrest is now provided below this H-point, and in the present case 100.6 mm below the H-point. Preferably, the pivot axis **28** is located behind the H-point, in the present case 77.6 mm behind the H-point, with respect to the direction of forward travel of the vehicle. Due to this arrangement of the pivot axis **28** relative to the H-point of the seat occupant, the vehicle seat according to the invention is much more ergonomic than vehicle seats according to the prior art. Furthermore, the risk of injury, in particular in the event of a rear-end impact, is reduced, because for example the pelvis of the seat occupant sinks more deeply into the seat in the event of a rear-end impact and/or the backrest **3** deforms less. Alternatively or in addition, the distance between the pivot axis **28** of the backrest and the lock of the inclination adjuster of the back rest is as large as possible. Preferably, this distance is at least 50, preferably at least 60, particularly preferably at least 80 and very particularly preferably at feast 90 mm. Preferably, the distance is at most 180 mm, preferably at most 160 mm.

[0036] FIG. **3** shows a further embodiment of the vehicle seat according to the invention, in the present case, a toothing **16** is provided, preferably integrally, in the peripheral region **30** of the side part **12** of the structure of the seat part **2**, said toothing **16** being part of a recliner, by way of which the inclination of the backrest **3** is adjusted. Furthermore, it can be seen in the present case that the locking element **9** of the backrest is arranged as far as possible away from the pivot point **28** of the backrest **3**. As a result, the forces to be absorbed by the recliner are reduced. In the left-hand part of FIG. **3**, the backrest is illustrated in the easy-entry position. The central part of FIG. **3** shows the backrest in its use position and, in the right-hand part, a position of the backrest inclined to the rear is illustrated. The backrest can be locked in a releasable manner in any desired position in relation to the seat part by means of the lock **9**. In the present case, the toothing is designed as a circle segment, wherein the center of the circle is identical with the pivot point **28**. Here, the toothing **16** and the side plate **12** are designed as two parts which are connected together. However, it is also possible to design the the toothing **16** and the side plate **12** as one single part. The locking element is connected to the backrest of the vehicle seat and pivots together with the backrest **3** around the pivot point **28**.

[0037] FIG. **4** shows an embodiment in which the backrest **3** is mounted to the seat part by spring means **31**. In the present case the spring means **31** and the side plate **12** of the seat part **2** are made from one single piece, for example metal or plastic, particularly fiber reinforced plastic. The fitting of the backrest **3** on the seat part **2** can be carried out as follows: Prior to this fitting, the backrest is brought in its easy-entry position and then fixed to the spring element **31**, which is, in this position at least essentially without tension. The backrest is then pivoted, here in the clockwise direction about the pivot axis **28** and the spring element **31** is tensioned at the same time. At the same time or beforehand, the toothing **22**, which is, in the present case, provided in a resilient manner and is preferably provided integrally with the side part **12** of the seat part **2**, is tensioned here by a movement in the anticlockwise direction and in the process the locking element **9**, which is arranged at the end of the spring element **31**, is pushed over the toothing **22**. Due to the resilient action of the toothing **22**, the latter is always pressed against the locking element **9**, and so noise development is at least reduced. The tensioned spring element **81**, which, preferably, is likewise provided integrally with the side part of the seat part, supports the movement of the backrest from its easy-entry position into its use position due to its energy storage during tensioning. In order to adjust the backrest into a new position, the locking element **9** is released, for example by rotating the locking element **9**, this being illustrated in the lower right-hand part of FIG. **4**.

[0038] FIG. **5** illustrates an alternative embodiment of the vehicle seat according to the invention as per FIG. **4**. In the present case, the side part **12** of the seat part **2** has a cam **32** which presses the toothing **22** against a locking element **3**. In order to release the lock, the cam **32** is rotated in the anticlockwise direction, as a result of which the toothing **22**, which is again provided in a resilient manner on the side part of the seat part, likewise moves in the anticlockwise direction and as a result disengages from the locking means **9**, and so the backrest **3** can be adjusted in relation to the seat part **2**. In the present case, the toothing is tensioned away from the locking means **9**.

[0039] FIGS. **6** and **7** show a further embodiment of a recliner of the vehicle seat according to the invention. In the present case, there is again provided a toothing **16**, which is preferably provided integrally with the side part of the seat part **2**. In order to lock the backrest in relation to the seat part, there is provided a latching pawl **34**, which has on the inside a toothing corresponding to the toothing **16**. In order to prevent the latching pawl **34** from detaching from the toothing

16, the recliner has a locking element **9** which pulls the latching pawl **34** in the direction of the toothing **18** and is arranged in a pivotable manner on the side part of the seat part. In the locked state, latching pawl **34** loads against inside of toothing plate **16**. This makes a constrained loop of the parts **16**, **34**, **9**. This removes all looseness/clearances and makes a structurally sound system. A balanced system of tension and compression with no bending moments is provided. The locking element **9** is driven by a drive means **33**. In FIG. **8**, the recliner is illustrated in its locked state. Preferably, the latching pawl comprises at its backside **34.1**, i.e. opposite from the toothed side a curved surface with a cam **34.2** which is preferably provided opposite from the rotation axis of the latching pawl. A contact element **9.1**, for example a rotating contact element, moves along the backside **34.1** of the latching pawl **34**. As soon as this contact element reaches the cam, the latching pawl is pushed towards the toothing **16**. In order to be able to adjust the inclination of the backrest in relation to the seat part, this locking element **9** has to be released, as is illustrated in FIG. **7**. For this purpose, the locking element **9** is rotated in the anticlockwise direction in a manner driven by the rotatably provided drive element **33** and in the process runs along the outer contour of the latching pawl **34**, in the process rotating the latter, likewise in the anticlockwise direction, away from the toothing **16**. During this movement, the contact element touches the opening means **34.2**, here a nose, and thereby opens latching pawl **34**. Thus, the lock between the side part **2** and the backrest **3** is released and the inclination of the latter can be moved into a new desired position in which it is then locked again, in that the locking element **9** is rotated in the clockwise direction and as a result pulls the latching pawl **34** into the toothing plate **16**.

[0040] FIG. **8** illustrates yet another embodiment of the vehicle seat according to the invention. This seat again has a seat part and a backrest, which is provided in a pivotable manner on the seat part. Arranged between the seat part and the backrest is a spring element **31**, in the present case a spiral spring. According to the invention, the centre-point **35** of this spiral spring is not arranged concentrically with the pivot axis **28** of the backrest. This results in particular in space savings.

LIST OF REFERENCE SIGNS

[0041] Vehicle seat
[0042] Seat pert
[0043] Backrest
[0044] Longitudinal adjusting device
[0045] Inclination adjusting apparatus
[0046] Adjusting lever
[0047] **9** locking element
[0048] **9.1** contact element wheel
[0049] Side part
[0050] Toothing
[0051] Form- and/or force-fit-means toothing
[0052] Longitudinal adjustment rail
[0053] Pivot axis
[0054] H-point, hip joint
[0055] Peripheral region of the side part of the seat part or of the backrest
[0056] Spring means
[0057] Actuating means, actuating cam
[0058] Drive means
[0059] Latching pawl
[0060] **34.1** backside of the pawl
[0061] **34.2** cam
[0062] **34.3** opening means
[0063] Centre-point of the spring means
[0064] **125** locking pin

1. A vehicle seat comprising a backrest which is pivotable on a seat part about a pivot axis, wherein an occupant having an H-point sits on the vehicle seat, wherein the pivot axis is provided below the H-point.

2. The vehicle seat according to claim **1**, wherein the pivot axis is arranged behind the H-point.

3. The vehicle seat according to claim **1**, wherein the backrest is lockable at a particular inclination angle in relation to the seat part by way of a locking element, wherein the locking element is provided at least partially in the peripheral region of a side part of the seat part and/or of the backrest.

4. The vehicle seat according to claim **3**, wherein the side part of the backrest and/or of the seat part integrally has a form and/or force-fit-means.

5. The vehicle seat according to Claim **4**, wherein the form- and/or force-fit-means is provided in a resilient manner.

6. The vehicle seat according to claim **4**, wherein the form- and/or force-fit-means (**16**) is provided in a part-circular or non-part-circular manner.

7. The vehicle seat according to claim **3**, wherein the side part of the backrest and/or of the seat part integrally has a spring means.

8. The vehicle seat according to claim **1**, wherein the inclination of the backrest is adjustable in relation to the seat part and the backrest is lockable in its respective position by way of a latching pawl and a locking element secures the latching pawl in its locking position, wherein the locking element pulls the latching pawl into the locking position.

9. The vehicle seat according to claim **8**, wherein the side part of the seat part integrally has a form- and/or force-fit-means, in particular a toothing, which interacts in a latching manner with a form- and/or force-fit-means, in particular a toothing, of the latching pawl.

10. The vehicle seat according to Claim **1**, wherein the inclination of the backrest is adjustable in relation to a seat part and the backrest is lockable in its respective position by way of a latching pawl and which has a spring means which is provided between the seat part and the backrest, wherein the spring means is a spiral spring which is arranged in a non-concentric manner with the pivot axis of the backrest.

11. The vehicle seat according to Claim **4**, wherein the form- and/or force-fit-means comprises a toothing.

12. The vehicle seat according to Claim **7** wherein the spring means, wherein the spring means is a joint, particularly preferably the pivot point for the backrest, and/or is an energy storage.

13. The vehicle seat according to Claim **12** wherein the spring means is the pivot point for the backrest, and/or is an energy storage.

14. The vehicle seat according to Claim **8**, wherein the side part of the seat part integrally has a form- and/or force-fit-means comprising a toothing which interacts in a latching manner with a toothing of the latching pawl.

* * * * *