Oct. 9, 1962 HANS-JOACHIM SCHNEIDER 3,057,660

VEHICLE SEAT

Filed Feb. 13, 1959

FIG. 6

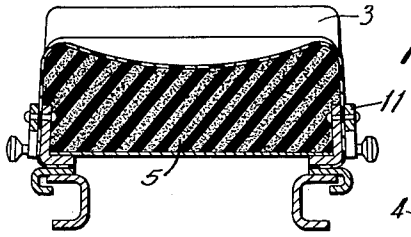


FIG. 1

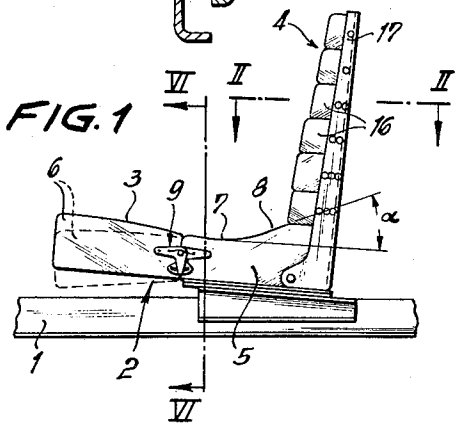


FIG. 2

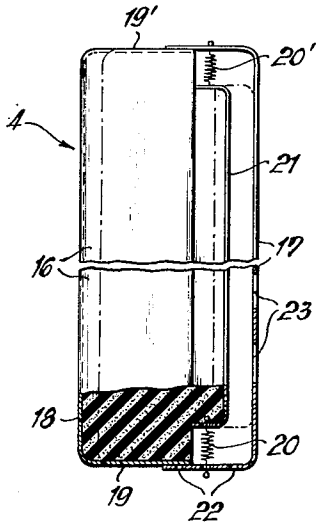


FIG. 3

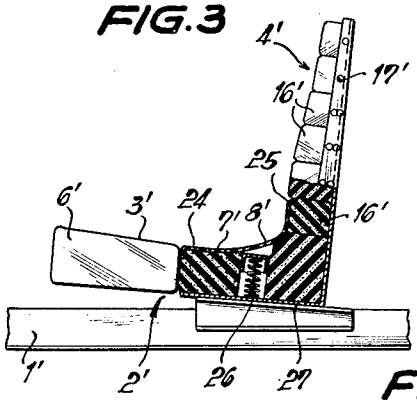


FIG. 4

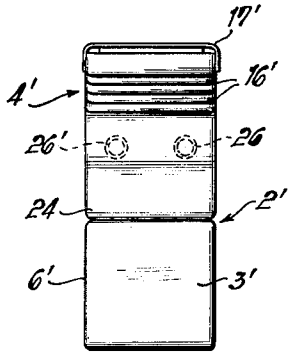


FIG. 5

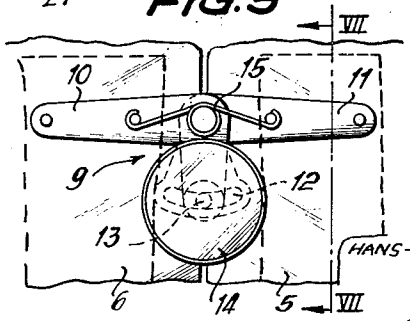
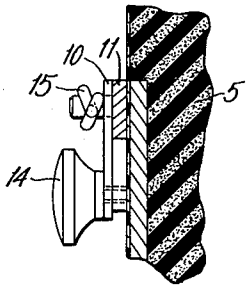


FIG. 7



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VEHICLE SEAT

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The present invention relates to a seat, especially for motor vehicles, provided with a synclinal or trough-shaped seating surface and an upholstered backrest.

Numerous seats and backrest shapes are known in the prior art which attempt to do justice to the anatomic conditions by adaptation of the seat and backrest part to the contours of the seated person. Furthermore, by the provision of high supports in the lumbar region, or of supports at the height of the lumbar vertebra, the position of the vertebral column or spine was secured. However, in these prior art constructions, no attention was paid to the fact that the pelvis of the seated person carries out tilting movements about the ischium tuberosities as points of rotation under the load of the body so that under the influence thereof tiring equalization movements take place during spring movement of the seat support between the vertebral column or spine and the back muscular system. Furthermore, local high-abutment or support pressures are noticeable within the region of the upper thighs, the ischium tuberosities as well as the lumbar vertebra which lead to a restriction of the circulatory system for the blood.

According to the present invention, these defects are avoided by the fact that the seating surface is provided with an inclined support surface for the pelvis inclined against the backrest and that the backrest consists of several cushions or groups of cushions which are movably secured in the backrest frame independently of each other in the swinging direction of the seating surface. As a result of such construction, the vertebral column of the seated person is supported on a pelvis which is supported in a stable manner, i.e., which is effectively supported, and an approximately straight shape of the vertebral column is enforced thereby whereby tilting movements of the pelvis about the ischium tuberosities are prevented. As a result of the swinging conditions of the seat surface and of the backrest in the same direction, correcting movements between the vertebral column and the back muscular system are avoided so that optimum seating conditions result therefrom in which seating injuries caused by a decrease of respiration, circulation and unilateral loads of the spinal column during long periods of time are avoided.

Local restrictions of the soft body parts within the region of the ischium tuberosities and at the upper thigh do not occur if the seating support consists of a trough-shaped member for the pelvis and an adjustable support for the thighs pivotally secured thereto. The support for the thighs is thereby adapted to be adjusted in several planes and at different angles of inclination whereby the possibility exists to adapt the support to the anatomic departures of the length of the upper thighs, of the volumes of the upper thighs and to orthopedic defects. The support for the thighs is retained by means of a hinge joint having a locking mechanism adapted to be locked in a continuous manner so as to retain the same in any selected position. By the use of such an arrangement, a simple adjustment of the thigh support is assured.

The most favorable rest position for the pelvis results if the lowermost point of the trough-shaped seat member is disposed ahead of the inclined support surface and forms the support for the ischium tuberosities of the pelvis. The supporting surface of the seat is inclined against the backrest by an angle of about 20° whereby

the correct anatomic shape of the spine is enforced. The support surface may be made, depending on the structural conditions, in one piece with the trough-shaped pelvis-support member or with the lowermost backrest cushion or may be formed in part by both the trough-shaped pelvis-support member and the backrest. However, the seating support may also be formed by a dish-shaped bowl-like member for the support of the pelvis connected with the seating frame and subjected to a spring effect. This seat construction offers the advantage that the most favorable angle of inclination of the ischium tuberosities with respect to the sacrum is maintained at all times for both the front as well as the rear seat position. The dish-shaped bowl member for the pelvis includes, starting at the lowest point thereof serving as support for the ischium tuberosities, a support surface inclined against the backrests whereby a parallel spring system acts under the support for the ischium tuberosities which is constituted by progressive, possibly adjustable coil springs. Such an arrangement results in an excellent swinging behavior of the seat whereby the seating stability is assured also under the influence of centrifugal forces while driving through curves.

The backrest consists of pillows of different depth whereby, for purposes of providing any desired shape for the contour thereof, they are interchangeable among each other in any suitable manner. As a result thereof, the backrest may be adapted to the most different anatomic conditions which may be required of the backrest by the weight and shape of the seated person. An anterior curvature of the backrest during the assembly thereof within the region of the lumbar vertebra does not serve thereby, as in the known constructions, as thigh support, but instead as a counterpressure against the formation of a round back with the aim to obtain an erect spine. Each of the backrest cushions or pillows is secured at the backrest frame in a springy manner in the vertical direction thereof and adjustably in the horizontal direction thereof. As a result thereof, a further adjusting possibility exists which, among others, may also serve for the compensation of orthopedic defects. Simultaneously therewith, the individual pillows or cushions may be readily displaced in the vertical direction under the friction effect between the body and the backrest during swinging movements of the body so that the entire backrest surface corresponds to the seat support in the swinging behavior thereof. The pillows are preferably retained in their normal position by pre-tensioned coil springs which are anchored in the pillows and in the backrest frame. The pillows or cushions consist of deformable material such as foam rubber, or any other suitable material and are provided with a cover. The backside of the backrest is provided with apertures for the passage of air to the pillows whereby a draft-free ventilation of the backrest is produced.

Accordingly, it is an object of the present invention to provide a seating arrangement, particularly for motor vehicles, which responds in a most favorable manner to the anatomic requirements and characteristics of the seated person and which assures a comfortable non-tiring drive in the vehicle.

Another object of the present invention is the provision of an adjustable seating arrangement for motor vehicles which may be readily adjusted so as to conform to the particular anatomic characteristics of the seated person.

Another object of the present invention resides in the provision of a seat which provides a most favorable support for the various parts of the vertebra to assure maintenance of the proper positions thereof even during swinging movements which may occur with the person seated while driving over unevennesses in the road.

These and other objects, features and advantages of the present invention will become more obvious from the

following description, when taken in connection with the accompanying drawing which shows, for purposes of illustration only, two embodiments in accordance with the present invention and wherein:

FIGURE 1 is a side view of a seating arrangement for a motor vehicle in accordance with the present invention;

FIGURE 2 is a cross-sectional view on an enlarged scale taken along line II—II of FIGURE 1;

FIGURE 3 is a side view of a modified embodiment of a seating arrangement for a motor vehicle in accordance with the present invention;

FIGURE 4 is a plan view of the seat illustrated in FIGURE 3 on a slightly smaller scale;

FIGURE 5 is a side view on an enlarged scale of the hinge joint for purposes of adjustably stopping the pivotal thigh support in accordance with the present invention;

FIGURE 6 is a cross-sectional view of the seat illustrated in FIGURE 1 taken along section line VI—VI; and

FIGURE 7 is a cross-sectional view of the hinge joint illustrated in FIGURE 5 taken along section line VII—VII.

Referring now to the drawing, wherein like reference numerals are used throughout the various views to designate corresponding parts, and more particularly to FIGURES 1, 2 and 6 thereof, reference numeral 1 designates the vehicle floor on which an adjustable seat generally designated by reference numeral 2 is adjustably secured in any manner known per se. The seat generally designated by reference numeral 2 consists of a seat cushion or seating surface 3 and a backrest 4. The seating surface or cushion 3 includes a trough-shaped member 5 for the pelvis and a thigh support 6 pivotally secured thereto. The trough-shaped member 5 is formed by a covered wedge-shaped foam rubber piece and is so constructed that the lowest point 7 in the outer upper configuration thereof is disposed in front of a support surface 8 which is inclined against the backrest 4 under an angle α of about 20°. The thigh support 6 is adjustable, as indicated in dotted line in FIGURE 1, in several planes and under different angles of inclination. For that purpose, a hinge joint 9 is provided which is arranged on both sides of the seating surfact 3. The hinge joint 9 consists of an angle lever 10 (FIGURES 5 and 7) suitably secured at the thigh support 6 by supporting plate 10' and of a double-armed lever 11 suitably secured at the trough-shaped support member 5 by supporting plate 11'. The lever 11 is provided with a guide groove 12 into which extends the pin 13 of a clamping nut member 14. Both levers 10 and 11 are prestressed against each other under the effect of a suitable spring 15 such as, for example, a volute buffer spring.

The backrest 4 includes, for example, six individual cushions 16 of different depth which are arranged one above the other in the backrest frame 17. Each of the cushions 16 also consists of a foam rubber piece which is covered with a cover 18 of any suitable material resistant to wear. The cushions 16 abut snugly with the side surfaces 19 and 19' thereof at the backrest frame 17 and are movably retained in the frame 17 by means of coil springs 20 and 20' arranged on both sides thereof which are pre-stressed. These springs 20 and 20' are anchored in the cushion rear side reinforced by means of a terminal sheet-metal member 21 and are tensioned with respect to the backrest frame 17. The backrest frame 17 includes several securing apertures 22 arranged at a distance from one another for receiving therein the anchoring ends of the springs 20 and 20' of the individual cushions 16, as well as apertures 23 on the rear side of the backrest for the passage therethrough of air serving to ventilate the backrest.

For purposes of adjusting the cushions 16 shown in FIGURE 2 into the position thereof shown in the drawing in dot and dash line, the springs 20 and 20' are at first lifted out of the respective apertures 22, whereupon the cushion 16 is displaced manually and thereupon the springs 20 and 20' are again inserted into other apertures, for example, into the rearmost apertures 22. The other backrest cushion 16 may be adjusted in the same manner, and more particularly in the same as well as in the opposite direction thereof so that any desired contour of the backrest 4 may be obtained. Furthermore, it is possible by loosening the securing nut member 14 to adjust the thigh support 6 corresponding to the upper thigh volume so that local pressures at the soft body parts are avoided. The arrangement is thereby selected in such a manner that upon opening of the nut member 14 the support 6 is forced automatically against the thighs by the force of the spring 15. Furthermore, the thigh support 6 may be stopped and retained in each and every plane favorable to the desired seating position with respect to the backrest inclination. If a shock caused by any unevenness in the road reaches the seat 2, then the swinging movements resulting therefrom are transmitted from the trough-shaped seating member 8 over the body to the backrest 4 and the individual cushions 16 thereof are actuated in the same direction so that the back muscular system does not have to undertake any equalization movements. The springs 20 and 20' return the cushions 16 to the initial position thereof after the swinging movements subside. The relative displacement of the cushions 16 further makes it possible that air reaches the cushions 16 through apertures 23 for purposes of ventilating the back.

In FIGURES 3 and 4 a modified embodiment of a seating construction in accordance with the present invention is shown which distinguishes itself from the embodiment of FIGURES 1 and 2 primarily by the provision of a dish-shaped bowl-like pelvis-support member. The same parts are, therefore, again designated by the same reference numerals, however, with the use of corresponding primed reference numerals. The seat generally designated by reference numeral 2' secured to the vehicle body 1' also includes a seating surface 3' and a backrest 4'. The seating surface or cushion 3' consists of a bowl-like member 24 for the pelvis and of a thigh support 6' pivotally secured thereto. The bowl-like member 24 is shaped concavely whereby, as in the embodiment described hereinabove, a support surface 8' inclined against the backrest 4' is provided which begins at the lowest point 7' of the external upper contour of the bowl member 8'. The supporting surface 8' passes over into an abutment or rest 25 for the thighs which is supported against the lowermost backrest cushion 16'. The bowl member 24, properly speaking, which is made, for example, of synthetic material, is supported by coil springs 26 and 26' arranged parallel to each other which act thereon at the lowest point 7', i.e., within the region of the ischium tuberosities. The coil springs 26 and 26' are provided with a pitch which becomes increasingly smaller in the direction toward the seat frame 27 and are secured at the bottom thereof on the seat frame 27. The pivotal connection of the thigh support 6', as well as the securing of the individual cushions 16' in the backrest frame 17', takes place in the same manner as described hereinabove in connection with the embodiment of FIGURES 1 and 2. For that reason, a more full description is believed unnecessary herein.

Under the effect of centrifugal forces when driving through curves, a shifting of the weight takes place whereby the body is forced out of the most favorable seating position thereof. The progressive coil springs 26 prevent, by the increasing spring force thereof, an excessive seat inclination and simultaneously maintain, together with the pelvis bowl member 8', the optimum seating conditions for the spine.

The present invention is not limited to the particular embodiments illustrated hereinabove. Thus, for example, any other securing means may be selected in the place of the one shown herein utilizing the spring 20 and 20', as long as the cushion movement is resiliently supported and aided. Furthermore, the individual cushions 16 or 16' of the backrest may be subdivided in any suitable manner and may be manufactured for that purpose of any suit-

able material. Addtiionally, the pivotal connection of the thigh supports 6 or 6' may be realized by other types of hinges while the bowl member 8' may be inserted as pressed or stamped part, for example, between suitable spring means and the seat cover, properly speaking.

Thus, it is obvious that the present invention is not limited to the particular embodiments and details described and shown herein but is susceptible of many changes and modifications. Furthermore, the seat construction in accordance with the present invention is not limited to individual seats but may also be used in connection with seat benches or entire seat rows as are used in vehicles. Consequently, I do not wish to be limited to the details shown and described herein but intend to cover all such changes and modifications as are encompassed by the scope of the appended claims.

I claim:

1. A seat arrangement, especially for motor vehicles, comprising seat means including a trough-shaped part having an upwardly and rearwardly inclined supporting surface adjacent the rear thereof forming a support for the pelvis of the person sitting on said seat means, the lowest point in the contour of said trough-shaped part being disposed in front of and adjacent to said inclined surface and forming a support for the ischium tuberosities of the pelvis, and upholstered back rest means including a plurality of individual cushion means, back rest frame means, and means individually securing each of said cushion means in said back rest frame means to enable independent movements thereof.

2. A seat arrangement according to claim 1, wherein said backrest means includes a plurality of cushions of different depth adapted to be interchanged with each other so as to provide the desired contour for the backrest.

3. A seating arrangement according to claim 2, further comprising means for securing each cushion to be adjustable in the horizontal direction thereof and for resiliently supporting the same in the vertical direction thereof.

4. A seating arrangement according to claim 3, wherein said last-mentioned means includes springs for retaining each cushion in the respective position thereof, and a backrest frame, said springs being anchored in respective cushions and in said backrest frame under tension.

5. A seat arrangement according to claim 1, wherein said seat means includes another part forming a support for the thighs of the person sitting on said seat means, the pelvis-supporting part and the thigh-supporting part being formed by separate elements, and means for adjustably and pivotally securing said thigh-supporting part to said pelvis-supporting part at the front end thereof, the width of said thigh-supporting part and said pelvis-supporting part being substantially equal.

6. A seat arrangement according to claim 5, wherein said backrest means includes a plurality of cushions arranged one above the other, and wherein said inclined supporting surface is formed integral with at least one of the two parts consisting of said pelvis-support part and the lowermost cushion of said backrest means.

7. A seat arrangement according to claim 5, wherein said trough-shaped part includes a separate pelvis-support surface member, and spring means spring-supporting said pelvis-support surface member against the seat frame.

8. A seat arrangement according to claim 7, wherein said spring means include a plurality of springs having progressive spring characteristics, and wherein said springs act on said pelvis-support surface member at the place thereof forming the support for the ischium tuberosities of the passenger seated thereon.

9. A seating arrangement, especially for motor vehicles, comprising seat means and upholstered backrest means, said seat means including a trough-shaped support means having a supporting surface adjacent said backrest means inclined upwardly against said backrest means and adapted to support thereon the pelvis of the person sitting thereon, and a supporting means in front of and adjacent to said first-mentioned support means for supporting the thighs of said person.

10. A seating arrangement according to claim 9, wherein the pelvis-supporting means and the thigh-supporting means are separate elements, said pelvis-supporting element being formed by a trough-shaped pelvis-support member, and said thigh-supporting element being formed by an adjustable thigh-support member pivotally secured to said pelvis-support member at the front thereof, said thigh-support member and said pelvis-support member being of substantially the same width.

11. A seating arrangement according to claim 10, wherein the lowest point in the contour of said trough-shaped support means is disposed in front of and adjacent said inclined surface of said pelvis-supporting means, said lowest point forming a support for the ischium tuberosities of the pelvis, and wherein said inclined supporting surface is inclined adjacent said backrest means at an angle with respect to the horizontal of approximately 20°.

12. A seat arrangement, especially for motor vehicles, comprising seat means including means for supporting the pelvis of the person sitting thereon, said last-mentioned means including an upwardly-inclined supporting surface means adjacent the rear of said seat means and inclined upwardly toward the rear thereof, the lowest point in the contour of said supporting means being disposed in front of and adjacent to said inclined supporting surface means and forming a support for the ischium tuberosities of the pelvis, a second means for supporting the thighs of the person sitting thereon, the pelvis-supporting means and the thigh-supporting means being formed by separate elements, and means for adjustably and pivotally securing said thigh-supporting means to said pelvis-supporting means at the front end thereof, the width of said thigh-supporting means and said pelvis-supporting means being substantially equal.

13. A seat arrangement according to claim 12, wherein said means for adjustably and pivotally securing said thigh-supporting element to said pelvis-supporting element includes means for locking said thigh-supporting element in one of several planes and under different angles of inclination with respect to said pelvis-supporting element, said last-mentioned means including spring means normally urging said thigh-supporting element in the direction toward the thighs of the passenger sitting thereon and means adjustably securing, in a stepless manner, said thigh-supporting element in any angular position with respect to said trough-shaped part.

14. A seat arrangement, especially for motor vehicles, comprising seat means and backrest means, said seat means including a trough-shaped support means having a supporting surface adjacent said backrest means inclined upwardly against said backrest means and adapted to support thereon the pelvis of the person sitting thereon, and a supporting means in front of and adjacent to said first-mentioned support means for supporting the thighs of said person.

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