ABSTRACT: A seating structure which is adjustable and designed particularly for automobiles and the like. The seating structure includes a lower frame fixed to the floor of the vehicle and an upper seating frame situated over and spaced from the lower frame. An intermediate adjustable assembly is situated between the upper frame and the lower frame and is carried by the lower frame while being adjustable to adjust the elevation of the upper seating frame with respect to the lower frame. An adjustable spring assembly is operatively connected with the lower frame to provide for the latter a resilient resistance to a given load so that by adjusting the yieldability of the lower frame with respect to a given load it is possible for an individual to be very comfortably seated.

At the same time the elevation of the seat can be adjusted independently of the adjustment for the particular load.
ADJUSTABLE SEATING STRUCTURE, PARTICULARLY FOR AUTOMOBILES

BACKGROUND OF THE INVENTION

The invention relates to seating structures, particularly for automobiles, trucks and the like.

In particular, the present invention relates to that type of seating structure which is provided with a yieldable, springy lower frame the springy resistance of which can be adapted so as to be variable according to different loads carried by a particular seat.

For example, with one known construction of this latter type the adjustment of the seating structure, which is carried by a parallelogram linkage, to a given load is brought about by way of a compression spring and shock absorber assembly forming a springy unit the inclination of which can be adjusted by a threaded spindle, so that in this way it becomes possible to adapt the frame formed by the parallelogram linkage to carry a given load. With this particular arrangement the actuation of the spindle changes the location of the point of engagement of the load-carrying arm, so that in this way it is possible to adapt the particular spring and damping actions of the assembly to accommodate a given load carried by the seat. However, when this kind of adjustment is performed it is clear that is not always a satisfactory solution to the problem of achieving an adjustment in elevation independently of an adjustment for load.

SUMMARY OF THE INVENTION

It is accordingly a primary object of the present invention to provide a construction which will avoid the above drawbacks by making it possible to adjust the elevation independently of the adjustment for load.

In particular, it is an object of the present invention to provide a structure which will solve this problem while at the same time being relatively simple while still having a highly effective range of adjustment for the elevation of the seat.

Thus, it is an object of the present invention to provide a construction which will enable a seat to be adjusted in elevation without influencing the adjustment for the load which is to be carried by the seat.

In accordance with the invention there is a lower frame means and an upper seat frame means situated over and spaced from the lower frame means. An intermediate means is carried by the lower frame means and the upper frame means for adjustment in elevation with respect to the lower frame means. An adjustable spring means is operatively connected with the lower frame means to adjust the latter to yieldably resist a load of a given magnitude, so that in this way after this latter adjustment is made the upper seat frame means can be adjusted in elevation with respect to the lower frame means without in any way disturbing the adjustment of the spring means.

Thus, it is possible to achieve with the invention a seat which is adjustable in elevation while having the elevation adjustment and the load adjustment maintained independent of each other in a fool-proof manner so that, for example, the adjustment for the load can be set in its adjusted position and the adjustment for elevation of the seat can be made without requiring any further adjustment of the spring means, after the elevational adjustment has been carried out. With the structure of the invention it is possible to achieve an extremely large range of adjustment while carrying out the adjustment in a stepless and finely adjusted manner.

BRIEF DESCRIPTION OF DRAWINGS

The invention is illustrated by way of example in the accompanying drawings which form part of this application and in which:

FIG. 1 is a side elevation of a seat structure of the invention which is adjustable in elevation while provided with a springy yieldable lower frame assembly which can be adapted to different loads to be carried by the seat;

FIG. 2 is a fragmentary elevation, at an enlarged scale as compared to FIG. 1, showing the intermediate means between the upper seat frame means and lower frame means of the structure of the invention; and

FIG. 3 is a fragmentary transverse elevation also of that part of the structure where the intermediate frame means is located between the upper and lower frame means, FIG. 3 showing the structure of FIG. 1 as it appears when looking toward the structure from the left of FIG. 1.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to the drawings, FIG. 1 shows a lower frame means which includes a base frame member 1 fixed to the floor 2 of the vehicle. This lower frame means includes an upper supporting plate 3 provided with side plates 4 fixed to and extending downwardly from the upper plate 3. A pair of elongated links 5 and 6 are each pivotally connected to the lower base frame 1 and the side plates 4 so that components 1, 4, 5, and 6 form the equivalent of a parallelogram linkage. A spring unit supports the links 5 and 6.

This spring unit consists, in a known manner, of a compression spring 8 and a supporting leg 7 in the form of a shock absorber. The lower end of the shock-absorbing supporting leg 7 is provided with a laterally extending pin 9 guided in the inclined slot 10 of the base 1, and the location of the pin 9 along the slot 10 can be adjusted by turning the handle 11 connected to a screw threaded into a nut carried by the pin 9 or the lower end of the supporting leg 7 so that by turning the handle 11 the pin 9 will be moved along the slot 10 enabling the assembly 7,8 to be adjusted in accordance with the load to be carried by the seat.

Situated over and spaced from the lower frame means formed by elements 1 and 3-6 is an upper seat frame means 12. In order to provide for an independent elevational adjustment of the seat frame means 12 with respect to the lower frame means, an intermediate means is located between the frame 12 and the lower frame means, this intermediate means including four pairs of shear linkages 13, 13', 14, 14'.

This intermediate means includes a lower supporting frame 15 guided on rails carried by the supporting plate 3 of the lower frame means. These guide rails for the lower frame 15 of the intermediate means extend forwardly and rearwardly so that the intermediate means together with the upper seat frame means 12 can be adjusted forwardly and rearwardly. In order to maintain the intermediate frame means and seat frame means in their position of adjustment, forwardly and rearwardly, a releasable toothed rack structure 16 is provided to coact with stationary teeth carried by the lower frame means. The toothed releasable lock member 16 is supported for turning movement about a horizontal axis forwardly and rearwardly, in suitable bearings, and a suitably cranked handle 17 is fixed to the toothed member 16 to swing the latter about this horizontal axis. When this handle 17 is swung in a counterclockwise direction, as viewed in FIG. 3, the toothed member 16 will be displaced away from the stationary tooth member with which it coacts to hold the structure, and with the toothed member 16 thus disengaged the entire seat frame and intermediate means can be adjusted either forwardly or rearwardly. Upon release of the handle 17 a spring 18 will act to return the tooth member 16 into engagement with the stationary holding teeth.

The lower carrying frame 15 is composed of a pair of parallel transversely extending sections 15 in the form of channels
which are open at the top, and these transversely extending parallel members of the frame 15 extend across and are connected with longitudinally extending parallel frame members 15' which also are in the form of channels but which are open at the bottom. As is apparent from FIG. 3, the longitudinally extending channels 15' slidably embrace the rails carried by the support plate 3 so as to be longitudinally shiftable along these rails when the toothed member 16 is displaced to its unlocking position as pointed out above.

The longitudinally extending frame members 15' respectively fixedly carry pivot brackets 19 while the transversely extending frame members 15' respectively fixedly carry pivot brackets 20. These brackets 19 respectively carry pivot pins 21 while the brackets 20 respectively carry pivot pins 22. The four shear linkages, each include a pair of links pivoted to each other intermediate their ends so that they can swing one with respect to the other in the manner of a pair of successive blades. Thus, the shear linkage 13 includes a pair of levers 13 pivoted to each other intermediate their ends, and the same is true of the remaining three shear linkages 13', 14', and 14".

The seat frame means 12 has four sides and the four shear linkages are respectively located along these four sides, the linkages 13 and 13' respectively being situated along the lateral sides while the linkages 14 and 14' extend along the front and rear sides of the seat frame means 12. The linkage 13 has one of its levers pivotally connected to the pivot pin 21 carried by one of the brackets 19 while the parallel shear linkage 13' has one of its levers pivotally connected to the pin 21 carried by the other bracket 19. At the front and rear the linkages 14 and 14' respectively have one of their levers pivotally connected to the pins 22 of the brackets 20 respectively carried by the frame member 15'.

The upper seat frame means 12 fixedly carries pivot brackets which are respectively in alignment with and situated over the several brackets 19 and 20, and all of these brackets of the frame means 12 carry pivot pins 23 which are thus fixed with respect to the seat frame means 12. The other levers of each shear linkage are pivoted to the pins 23, respectively.

In order to maintain the seat frame means 12 at a horizontal attitude while it changes its elevation, the ends of all of the levers of the shear linkage means distant from the pivot pins 21, 22, and 23, all of which are stationary with respect to the frames to which they are fixed by the pivot bracket referred to above, are pivotally connected with slidable carriages. Thus, FIG. 2 shows the lower right end of a link 13 or 13', which is inclined downwardly toward the right, pivotally connected to a carriages carried by a horizontally slidable carriage 24, and the lower right end of the levers 14 and 14' which are directed downwardly toward the right, as viewed in FIG. 3, are respectively pivotally connected with pins carried by the horizontally slidable carriages 25. The pair of carriages 25 are guided for shifting movement along the channel-shaped frame members 15' while the shiftable carriages 24 are guided for movement along the frame members 15'. Thus, the carriages 24 will shift forwardly and rearwardly while carriages 25 will shift to the right and left with respect to the automobile.

It is to be noted that the longitudinally extending frame members 15' carry guide rails 26 for the carriages 24 while the transversely extending frame members 15' carry guide rails 27 for the shiftable carriage 25. In a corresponding manner the seat frame means 12 is provided with shiftable carriages 24' and 25' coacting with the free ends of the other levers of each shear linkage.

Situated directly next to one of the side shear linkages, namely the linkage 13', is a rotary threaded spindle 28 capable of being turned upon actuation of a laterally extending crank 29 which is available to the operator.

The above construction operates as follows. The handle 11 is actuated to adjust the yieldable spring means 7, 8 in accordance with the weight of the driver. In a manner which is completely independent of the particular elevation of the supporting plate 2 resulting from adjustment by way of the handle 11 it is possible to adjust the elevation of the frame 12 which carries the driver's seat, and this independent elevational adjustment of the seat of the driver is brought about by actuation of the crank 29.

Upon turning of this crank, through a suitable transmission 30 which is actuated by the crank, the spindle 28 is turned about its vertical axis. The threads of the spindle 28 extend into the mating threads formed in the interior of a sleeve 31 which is fixedly carried by the lower frame 15 of the intermediate means. Thus, in accordance with the extent to which the spindle 28 is threaded into or out of the sleeve 31 there will be a change in the distance between the frame 15 and the seat frame means 12.

The change in elevation of the seat frame means 12 brought about by turning of the spindle 28 in the sleeve 31 is accompanied by actuation of the shear linkages 13, 14, 13' and 14" so that they will become spread to a greater or lesser extent. Inasmuch as the pair of levers of each shear linkage are respectively swingable about axes which are fixed with respect to the frame 15 and frame means 12, it is the opposed free ends of the levers connected pivotally to the carriages which are shiftable in the manner described above. Thus, during a change in the elevation of the seat frame means 12 with respect to the lower frame means the several carriages 24, 24', 25, 25' will shift so that the seat frame means 12 can have its elevation changed while maintaining its horizontal attitude. Moreover, it will be noted that the adjustment of the elevation of the seat frame means 12 is carried out without in any way influencing the adjustment for the weight of the driver.

Also, by way of actuation of the elongated tooth member 16 it is possible to adjust the location of the seat frame means 12 and intermediate frame means forwardly and rearwardly so as to be able to regulate, for example, the distance between the seat and the steering wheel of the vehicle.

It is thus apparent that with the structure of the invention, after the spring means of the lower frame means has been adjusted in accordance with the load, which is to say the weight of the person who will be carried by the seat, it is possible to carry out an adjustment of the elevation of the seat without in any way influencing the adjustment for the load. Thus, once the adjustment for the load is made it is possible to carry out an adjustment of the elevation of the seat without requiring any further adjustment for the load to be made.

Although the invention is illustrated and described with reference to one preferred embodiment thereof, it is to be understood that it is in no way limited to the disclosure of such a preferred embodiment but is capable of numerous modifications within the scope of the appended claims.

What is claimed is:

1. Seating structure for automobiles and the like, comprising lower base frame means in the form of a parallelogram linkage, upper seat frame means situated over and spaced from said lower base frame means, vertically adjustable intermediate means shiftable forwardly and rearwardly and carried by said lower base frame means and situated between the latter and said upper seat frame means to support the latter for independent elevational movement with respect to said lower base frame means, and adjustable spring means operatively connected only to said lower base frame means for yieldably supporting the parallelogram linkage of said lower base frame means to resist a given load on said upper seat frame means, said spring means comprising a spring leg shiftable at one end of a rigid base member of said lower base frame means within the range of an angle with respect to said parallelogram linkage for a given load along a slot formed in said lower base frame means to adjust for a particular load on said seating structure, whereby after adjustment of the spring means the intermediate means can be actuated to adjust the elevation of said seat frame means independently of the adjustment of said spring means and lower frame means.

2. The combination of claim 1 and wherein said intermediate means includes a carrying frame carried by said lower base frame means, said seat frame means having four sides, and said intermediate means including four shear linkages respec-
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tively situated at said four sides of said upper seat frame means and operatively connected to the latter and to said carrying frame of said intermediate means, the latter also including an adjustable spindle extending vertically and operatively connected with said seat frame means for adjusting the elevation of the latter with respect to said carrying frame.

3. The combination of claim 2 and wherein said shear linkage means includes a pair of side shear linkage means and front and rear shear linkage means, and a laterally extending crank situated closely adjacent to one of said side linkage means and operatively connected to said spindly for turning the latter to regulate the elevation of said upper seat frame means with respect to said lower frame means.

4. The combination of claim 2 and wherein each shear linkage means includes a pair of levers crossing each other and pivotally connected to each other intermediate their ends, each pair of levers of each shear linkage means including one lever having one end pivotally connected with said lower carrying frame for movement about an axis which remains fixed with respect to said carrying frame and an opposite end pivotally connected to a carriage which is shiftable with respect to said upper seat frame means while the other lever of each shear linkage means has one end pivotally connected to said upper seat frame means for movement about an axis which does not move relative thereto while the other end of said other lever is pivotally connected with a carriage which is shiftable along said lower frame.

5. The combination of claim 2 and wherein said carrying frame is guided for movement with respect to said lower frame along rail-shaped guides, and releasable holding means for holding said carrying frame at a given position with respect to said lower frame means.