# PATENT SPECIFICATION (11) 1 480 449

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(21) Application No. 22555/75 (22) Filed 23 May 1975 (19)
(31) Convention Application No. 70260 (32) Filed 6 Nov. 1974 in
(33) Italy (IT)
(44) Complete Specification published 20 July 1977
(51) INT. CL.[2] B60N 1/06
(52) Index at acceptance
A4J 2A3A1 2A3A2A 2A3A2B 2A4J 2A5A 2A7B1 2A9H 2A9Y


## (54) DEVICE FOR ADJUSTING THE VERTICAL POSITION AND INCLINATION OF A FRONT SEAT OF A MOTOR VEHICLE


(71) We, LANCIA & C., FABBRICA AUTOMOBILI TORINO S.p.A., an Italian Joint Stock Company, of Via Vincenco Lancia 27, Torino, Italy, do hereby declare

the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to devices for adjustment of the front seats of motor vehicles, more specifically a device for adjusting the vertical position and the inclination of such seats.

An object of the invention is to provide a device as aforesaid which allows the vertical position and inclination of a vehicle seat to be adjusted to suit the different requirements of the user, so as to ensure optimum travelling comfort.

With this object in view the present invention provides an adjustable seat support device for adjusting the vertical position and the inclination of a vehicle seat, comprising two rotatable support shafts arranged parallel to each other and extending transversely to the longitudinal axis of the vehicle seat when the device is installed, each of the two support shafts bearing two spaced apart radially extending fixed arms to each of which one end of a pivoted link is articulated, four seat support brackets pivotally connected to the other ends of the said links, a further arm fixed to each said support shaft and linked to one end of a respective rod the opposite end of which has a screw coupling to a respective operating shaft, means for effecting selective rotation, in either direction, of either or both said operating shafts to rotate the support shafts selectively, and guide means engageable with a part of the seat structure in use of the device to guide the latter along a predetermined path.

Preferably, the means for effecting the selective rotation, in either direction, of said operating shafts, comprise a pair of toothed wheels, one fixed to each operating shaft and a further toothed wheel fixed to one end of a rotatable control shaft carrying at its opposite end an operating knob or handle.

Preferably elastic means are provided to restrain the rotation of each support shaft in the direction corresponding to lowering of the seat.

The invention will be further described, by way of non-restrictive example, with reference to the attached drawings illustrating a preferred embodiment of the invention, in which:

Figure 1 is a diagrammatic perspective view of a vehicle seat fitted with a device according to the invention;

Figure 2 is an axial sectional view, on an enlarged scale and in more detail, of part of the device illustrated in Figure 1, and

Figure 3 is a section taken along the line III—III of Figure 2.

In Figure 1 a front seat 1 of a motor vehicle is indicated in broken outline. Under the front portion of the seat 1 there is arranged a support shaft 2 supported rotatably, by means of end supports 2*a* fixed to the body structure (not illustrated) of the motor vehicle. The shaft 2 is arranged transversely in relation to the longitudinal axis of the motor vehicle.

Fixed to the support shaft 2 at two spaced apart positions there are two parallel crank arms 3 to the free ends of which there are pivotally connected, by means of pivot pins 3*a*, respective pairs of pivoted links 4, the pivoted links 4 of each pair being arranged side-by-side and embracing the respective crank arm 3.

Between each pair of adjacent pivoted links 4 there is hinged, by means of a respective pin 4*a*, a respective bracket 5 supporting the front portion of the seat 1.

Fixed to one end of the support shaft 2 is an arm 6. One end of a small pivoted link 7 is pivotally connected to the arm 6 by means of a pin 6*a*, the other end of the rod being pivotally connected to a cylindri-

cal rod 8 by means of a pin 7*a*. The terminal portion 8*a* of the rod 8 opposite the pivot pin 7*a* has an internally screw-threaded cylindrical axial blind bore in which a threaded end 9*a* of an operating shaft 9 is engaged. The terminal portion 8*a* of the rod and the operating shaft 9 are contained within a housing 11 supported by the body structure of the motor vehicle. The housing 11, which can be seen in Figure 2, has been omitted from Figure 1 for clarity of illustration. A toothed wheel 10 is fixed to the end of the shaft 9 opposite the threaded end 9*a*, the shaft 9 being supported rotatably in the housing 11 adjacent the toothed wheel 10.

The rear portion of the seat 1 is supported in a manner wholly similar to that described above for the front portion. Below the rear portion of the seat 1 there is placed a transverse support shaft 12 parallel to the shaft 2 which is also rotatably supported, like the shaft 2, by means of fixed end supports (not illustrated). The shaft 12 bears two crank arms 13 on the free ends of which there are articulated, by means of respective pins 13*a*, respective pairs of parallel pivoted links 14. To each pair of parallel pivoted links 14 there is in turn articulated, by means of a pin 14*a*, a respective bracket 15 for supporting the rear portion of the seat 1. Like the support shaft 2, the shaft 12 also carries at one end an arm 16 to the free end of which there is pivotally connected, by means of a pin 16*a*, a small pivoted link 17. The pivoted link 17 is in its turn pivotally connected, by means of another pin 17*a*, to one end of a shaft 18 the opposite end portion 18*a* of which has a central axial internally screw-threaded blind bore. An externally threaded end 19*a* of an operating shaft 19 is screwed into the threaded bore of the shaft 18. The end of the operating shaft opposite the threaded end 19*a* carries a toothed wheel 20. The end portion 18*a* of the rod 18 and the operating shaft 19 are contained in the housing 11.

The operating shafts 9 and 19 are arranged coaxially aligned upon a single axis parallel to the longitudinal axis of the motor vehicle, the two toothed wheels 10 and 20 being disposed side-by-side. A toothed wheel 22 is fixed to a small control shaft 21, which is rotatable and axially movable and supported by the housing 11. The shaft 21 is parallel to the shafts 9 and 19 and projects forwardly beyond the housing 11, carrying at its front end a handle or knob 23. The rear end of the small shaft 21 opposite the knob 23 is provided with three spaced annular grooves 24, 25 and 26.

In the axial position of the shaft 21 illustrated in Figures 1 and 2 in which the toothed wheel 22 meshes with both wheels 10 and 20 simultaneously the intermediate annular groove 25 is located within a bore in a lateral wall 11*a* of the housing 11. In a transverse hole 40 made in the wall 11*a* and communicating with the said bore there is housed a ball 41 which is urged into the groove 25 by a spring 42 reacting against a grub screw 43. The small shaft 21 will thus be held resiliently in the axial position illustrated.

The application, by means of the knob 23, of an axial force to the shaft 21, directed in one or the other direction longitudinally of the vehicle, sufficient to overcome the restraining action of the spring 42, moves the said shaft so as to bring about engagement of the spring-loaded ball 41 with one or the other of the two annular end grooves 24 and 26. When the ball 41 engages the groove 24 the toothed wheel 22 disengages from the toothed wheel 10 while remaining engaged with the toothed wheel 20. When the ball 41 engages in the groove 26, on the other hand, the toothed wheel 22 disengages from the wheel 20 and remains engaged with the wheel 10.

One of the side walls of the seat 1 is fitted with a plate 27 extending vertically downwards. The plate carries a pin 28 located in a vertical slot 29 made in a section iron 30 fixed to the floor of the vehicle passenger compartment. Movement of the pin 28 fixed to the seat is therefore confined to vertical movement along a predetermined trajectory defined by the slot 29.

In practice it is possible to apply two guide devices of the type described above to the two sides of the seat 1.

On to the support shaft 2 there are also affixed two axially spaced apart lever arms 31. On each arm 31 there is articulated one end of a respective helical tension spring 32, the opposite end of which is articulated to a corresponding lever arm 33 fixed to the support shaft 12. The springs 32 have, essentially, the function of counteracting the weight of the driver which would otherwise tend to bring about lowering of the seat 1.

Operation of the device is as follows: By rotating the small shaft 21 when it is in the central axial position illustrated in Figures 1 and 2 a simultaneous rotation is imparted to both the operating shafts 9 and 19. The threaded ends 9*a* and 19*a* of the shafts 9 and 19, engaging into the corresponding threaded ends 8*a* and 18*a* of the rods 8 and 18 respectively, cause the rods 8 and 18 to be moved towards each other or moved apart. Movement of the said rods brings about, in its turn, by means of the small pivoted links 7 and 17 and the arms 6 and 16, rotation of the support shafts 2 and 12 in opposite directions. This rotation of the support shafts 2 and 12

occurs in such a way as to induce, when the rods 8 and 18 are moved towards each other, simultaneous lowering of the front and the rear portion of the seat 1, and, in the opposite case, when the rods 8 and 18 are moved apart, simultaneous raising of the said front and rear portions of the said seat 1. In each case the seat is lowered and raised without changing its inclination to the horizontal. By moving the small shaft 21 axially to its extreme rear position in which the ball 41 engages the groove 24 and then rotating the shaft raising or lowering of only the rear portion of the seat can be effected, leaving the front portion of the seat unaffected. The contrary occurs when the shaft 21 is moved axially into its extreme front position, in which the ball 41 engages the groove 26, when rotation of the shaft 21 will cause raising or lowering of the front portion only of the seat, leaving the rear portion unaffected. In both of these two latter cases the inclination of the seat 1 to the horizontal is varied.

It will be understood that details of construction of practical embodiments of the invention may be varied widely with respect of what has been described and illustrated by way of example, without nevertheless going beyond the scope of this invention.

WHAT WE CLAIM IS:—

1. An adjustable seat support device for adjusting the vertical position and the inclination of a vehicle seat, comprising two rotatable support shafts arranged parallel to each other and extending transversely to the longitudinal axis of the vehicle seat when the device is installed, each of the two support shafts bearing two spaced apart radially extending fixed arms to each of which one end of a pivoted link is articulated, four seat support brackets pivotally connected to the other ends of the said links, a further arm fixed to each said support shaft and linked to one end of a respective rod the opposite end of which has a screw coupling to a respective operating shaft, means for effecting selective rotation, in either direction, of either or both said operating shafts to rotate the support shafts selectively, and guide means engageable with a part of the seat structure in use of the device to guide the latter along a predetermined path.

2. An adjustable seat support device according to Claim 1, in which the means for effecting the selective rotation, in either direction, of said operating shafts, comprise a pair of toothed wheels, one fixed to each operating shaft and a further toothed wheel fixed to one end of a rotatable control shaft carrying at its opposite end an operating knob or handle.

3. An adjustable seat support device according to Claim 2, in which the operating shafts which control the rotation of the two corresponding support shafts are aligned coaxially, the rotatable control shaft being movable axially between three different predetermined positions, so that the toothed wheel carried by the control shaft meshes, in the central position of the shaft, with both the toothed wheels fixed to the two operating shafts and, in the end positions of the control shaft, alternately with one or the other only of the said toothed wheels to drive one or the other of the operating shafts selectively.

4. An adjustable seat support device according to Claim 3, in which elastic means are provided to restrain the rotation of each support shaft in the direction corresponding to lowering of the seat.

5. An adjustable seat support device according to Claim 4, in which the said elastic means comprise at least one tension spring the ends of which are articulated to the free ends of two lever arms attached to the respective support shafts.

6. An adjustable seat support device according to any one of the preceding claims, in which the guide means for guiding the movement of the seat along a predetermined path consist of at least one member, adapted to be fixed to the fixed structure of the motor vehicle beneath one side of the seat and having a substantially vertical slot in which a pin, adapted to be affixed to the seat structure, slides to guide the vertical movement of the said one side of the seat in use of the device.

7. An adjustable seat support device for adjusting the vertical position and the inclination of a vehicle seat, substantially as herein described with reference to and as shown in the accompanying drawings.

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Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon), Ltd.—1977.
Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AY
from which copies may be obtained.

1480449 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

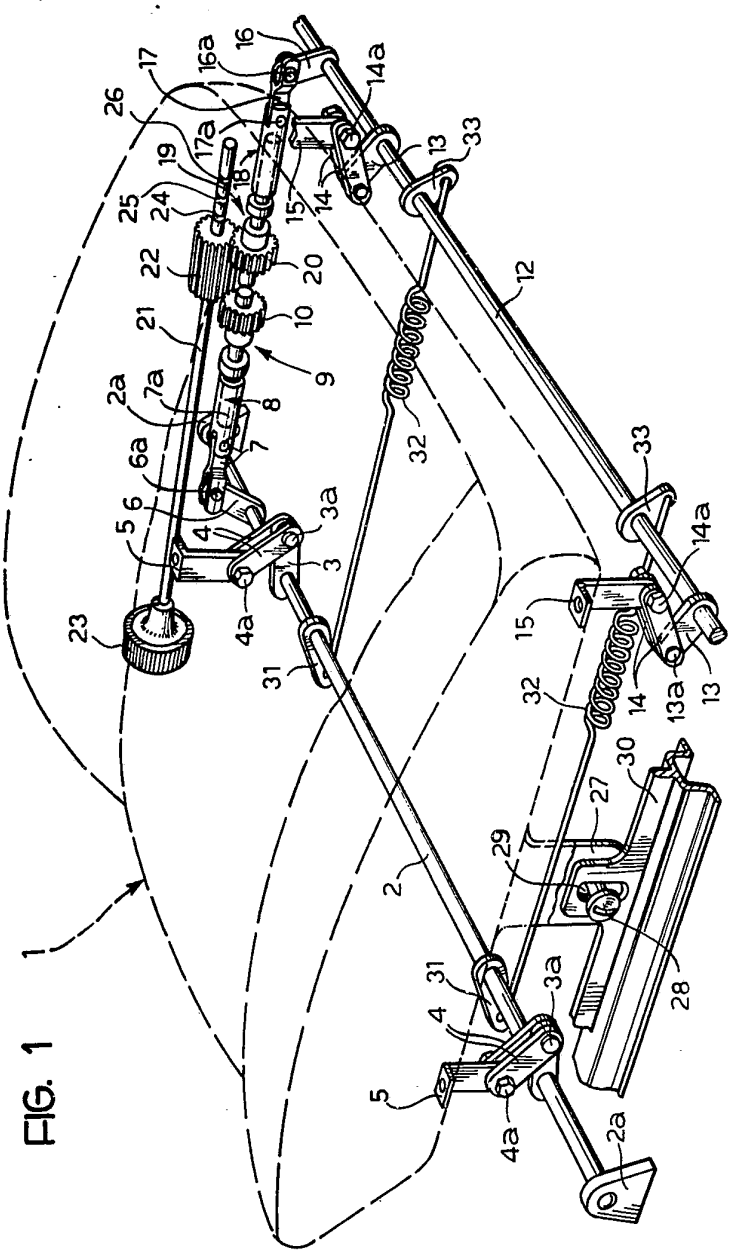


FIG. 1

1480449 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 2

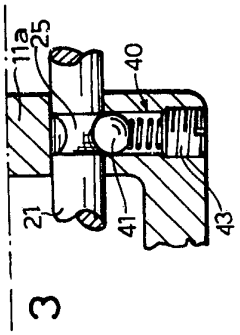


FIG. 3

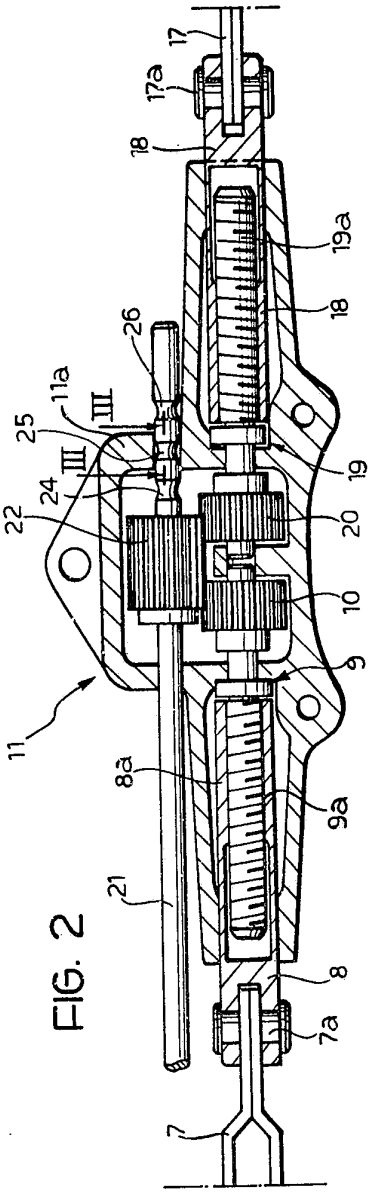


FIG. 2