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"A Tilting Mechanism for a Chair"

The invention relates to tilting mechanisms for chairs, of the kind comprising two parts, for connection to the chair seat and chair back respectively, pivotally connected together for relative pivotal movement about a horizontal axis, means being provided for securing the two parts of the mechanism in a required relative angular position, whereby the angle of the chair back with respect to the chair seat can be adjusted. Such a mechanism is frequently used in what are commonly referred to as "typists' chairs".

In one known form of mechanism of this type, the part for connection to the chair back is provided with a fixed extension which lies in a vertical plane, projects forwardly and is formed along its forward edge with an arcuate row of notches centred about the axis of pivoting of the chair back. Engageable with the notches is part of an operating arm mounted for horizontal swinging movement on the chair seat, a spring being provided to urge the arm rearwardly into engagement with the

extension. Thus, the angle of the chair back in relation to the seat may be adjusted by swinging the arm forwardly out of engagement with the extension, against the action of the spring, tilting the chair back to the required
5 angle and then releasing the arm so that it is urged by the spring into engagement with a new notch in the extension.

Such an arrangement has the advantage that it provides for positive location of the chair back with
10 respect to the seat, and does not rely on frictional engagement as is the case in other known designs. However, the described arrangement suffers from two major disadvantages. Firstly, in order to provide a row of notches of sufficient length, the dimensions of the extension
15 normally require to be such that a part of the extension projects beyond the chair seat part at the upper and lower limits of its pivoting movement. The upward projection must be accommodated in the design of seat, whereas the downward projection of the extension below the seat makes
20 for an unsightly appearance.

Secondly, the horizontal swinging movement of the operating arm, necessitated by the up-and-down swinging movement of the extension, means that there is, in practice, a risk of accidentally knocking the arm out of
25 engagement with the notched extension so that the chair back is free to fall backwards under the weight of a person sitting in the chair. Also, any weakening or failure of the spring urging the operating arm into

engagement with the extension may also permit the arm to slip out of engagement with the notches, again permitting movement of the chair back.

5 The present invention sets out to provide a chair tilting mechanism providing for positive location of the chair back but in which the above-mentioned disadvantages may be overcome.

10 According to the invention a tilting mechanism for a chair comprises two parts, for connection to the chair seat and chair back respectively, pivotally connected together for relative pivotal movement about a horizontal axis, one of said parts having two spaced apart side plates defining a channel therebetween, a member movably mounted between said side plates, a link 15 pivotally connected to said movable member and also pivotally connected to the other of said parts to transmit angular movement of said other of said parts to said movable member, in use, the movable member defining a plurality of locking positions, a locking means extending into the channel for engagement with 20 the movable member at one of said locking positions to lock said other of the parts in a required angular position relative to said one part, the locking means being movable out of engagement with the movable member which is then movable by free angular movement of said 25 other of said parts until a different relative angular position of said two parts is reached, in use, whereupon re-engagement of said locking means with the movable member at said different locking position locks 30 the parts at said new relative angular position. .

Since the member which is locked in the required position is not an extension pivotable with said one part of the mechanism, as in the earlier known arrangement described above, but is instead a separate 35 member connected thereto by a link, the movable member

may be movably mounted on the other part of the mechanism in any convenient fashion so as to overcome the disadvantages referred to above.

5 Thus the movable member may be pivotally mounted between said side plates, said link being pivotally connected to the movable member at a point spaced from the pivotal mounting of the member.

10 The movable member may be formed with a plurality of recesses to provide said locking positions and said locking means is a manually operable stop member which can selectively engage the recesses to retain the movable member in a desired position, and hence retain the said two parts of the mechanism in a desired relative angular position. In the case where the
15 movable member is pivotally mounted between the side plates, said recesses are preferably arranged to lie along an arc centred on the axis of pivoting of the movable member. Preferably said arc lies above the axis of pivoting of the movable member so that the manually
20 operable stop member is vertically movable into and out of engagement with said recesses.

Preferably spring means are provided to urge the stop member into engagement with the recesses.

25 The stop member may comprise an elongate member pivotally mounted on the part on which the movable member is mounted, the elongate member having an operating handle at one end and having a portion engageable with said recesses between its pivotal mounting and said handle.

30 In any of the above arrangements the movable member is preferably mounted on the part of the mechanism for connection to the chair seat.

The following is a more detailed description, by way of example, of an embodiment of the invention, reference being made to the accompanying drawings in which:

5 Figure 1 is a diagrammatic vertical section through part of a chair tilting mechanism in accordance with the invention, and

Figure 2 is a plan view of the mechanism shown in Figure 1.

10 Referring to the drawings, the mechanism comprises a part 10, in the form of a channel with a base and a pair of spaced apart side plates, for connection to the underside of a chair seat, and a generally U-shaped part 11 pivotally connected to the part 10 by means of a horizontal pivot pin 12 extending through registering
15 holes in the side flanges of the part 10 and of the part 11.

Between the side plates of the channel-section part 10, adjacent the end remote from the part 11, is welded a
20 socket member 9 in which the upper end of a support post for the chair seat is received in conventional manner.

The part 11 is shaped to receive a vertically slidable pillar 13 on the upper end of which is mounted the back rest (not shown) of the chair. Means (not shown) are
25 provided on the part 11 for releasably locating the pillar 13 in a required vertical position.

A sector shaped movable member 14 lies in a vertical plane and is pivotally mounted between the side plates of the channel-section part 10 on a pivot pin 15. the
30 upper edge of the member 14 is formed with a series of recesses 16 lying along an arc struck about the axis of the pivot pin 15.

Two parallel links 17 are pivotally connected at one end by a pivot pin 18 to the part 11, and are pivotally connected by a pivot pin 19 at their opposite ends to the sector-shaped member 14, the links 17 lying on opposite sides of the member 14. The pivot pin 19 is located between the pivot pin 15 and the two of recesses 16.

A helical tension spring 20 is connected between the pivot pins 12 and 19 so as to bias the member clockwise as viewed in Figure 1, and hence bias the back rest anti-clockwise. Alternatively, the tension spring 20 may be connected between the pivot pin 18 and one flange of the channel-section part 10.

In an alternative arrangement, not shown, the required spring bias may be provided by a helical spring encircling the pivot pin 12 and having the opposite end portions thereof extending transversely to the pin 12 and engaging abutments on the part 11 and the channel-section part 10 respectively.

A locking means in the form of a stop bar 21 passes through slots 22 and 23 in the side plates of the channel-section part 10 respectively, and is retained by a washer 24 secured to the bar. The free end of the bar 21 is formed with a handle (not shown) and is of such a length that the handle is accessible by someone sitting on the chair.

Between the side plates of the channel-section part 10 the thickness of the stop bar 21 is such that it may be received in one of the recesses 16 in the member 14, as shown in Figure 1. A helical tension spring 26 is

connected between the bar 21 and the pivot pin 15 so as to urge the bar 21 downwardly into engagement with the member 14.

Thus, when it is required to adjust the angle of the chair back in relation to the seat, the bar 21 is raised and the chair back moved forwardly or backwardly to the desired position. The swinging movement of the part 11 on which the chair back is mounted is transmitted through the links 17 to the sector-shaped member 14 which swings about the pivot 15 to bring a new recess beneath the bar 21. When the chair back is in the desired position the bar 21 is released and is pulled downwardly by the spring 26 into engagement with the appropriate recess. The recesses 16 and the cooperating portion of the bar 21 are preferably of tapered form so that the downward movement of the bar effects any slight necessary movement of the member 14 to enable the bar 21 to enter to the full depth of the appropriate recess.

Upward projections 27 are provided at each end of the arcuate row of recesses 16. The projections 27 are of such a height as to engage the bar 21 when in its raised position, and thereby limit the permitted swinging movement of the member 14.

It will be seen that since the recesses 16 lie on an upwardly facing arc the member 14 remains wholly within the channel 10 during the whole of its possible movement. Furthermore since the bar 21 is urged downwardly by gravity into engagement with the

member 14, any weakening or failure of the spring 26 will not render the mechanism inoperative or release the chair back. Also, since the bar 21 must be moved upwardly to release the mechanism the bar is much less likely to
5 be operated accidentally by someone moving past the chair, or moving the chair, than is the case with the horizontally movable operating arm used hitherto.

Instead of the member having the recesses being pivotally mounted, it could be movably mounted on the
10 part 10 by other means, for example it may comprise a member slidably movable along the channel-section part 10. However, the pivoted arrangement shown is preferred since it magnifies the movement of the recessed portion of the movable member.

15 It will be appreciated that many alternative shapes of recesses in the movable member, and of the cooperating stop member, may be provided instead of the arrangement described above.

CLAIMS.

1. A tilting mechanism for a chair comprising two parts, for connection to the chair seat and chair back respectively, pivotally connected together for relative pivotal movement about a horizontal axis, one of said parts having two spaced apart side plates defining a channel therebetween, a member movably mounted between said side plates, a link pivotally connected to said movable member and also pivotally connected to the other of said parts to transmit angular movement of said other of said parts to said movable member, in use, the movable member defining a plurality of locking positions, a locking means extending into the channel for engagement with the movable member at one of said locking positions to lock said other of the parts in a required angular position relative to said one part, the locking means being movable out of engagement with the movable member which is then movable by free angular movement of said other of said parts until a different relative angular position of said two parts is reached, in use, whereupon re-engagement of said locking means with the movable member at said different locking position locks the parts at said new relative angular position.
2. A tilting mechanism as claimed in claim 1, wherein the movable member is pivotally mounted between said side plates, said link being pivotally connected to the movable member at a point spaced from the pivotal mounting of the movable member.
3. A tilting mechanism as claimed in claim 1 or claim 2, wherein the movable member is formed with a plurality of recesses to provide said locking positions and said locking means is a manually operable stop



member which can selectively engage the recesses to retain the movable member in a desired position, and hence retain the said two parts of the mechanism in a desired relative angular position.

- 5 4. A tilting mechanism as claimed in claim 3, wherein the movable member is pivotally mounted between the side plates and said recesses are arranged to lie along an arc centred on the axis of pivoting of the movable member.
- 10 5. A tilting mechanism as claimed in claim 4, wherein said arc lies above the axis of pivoting of the movable member so that the manually operable stop member is vertically movable into and out of engagement with said recesses.
- 15 6. A tilting mechanism as claimed in any one of claims 3 to 5, wherein spring means are provided to urge the stop member into engagement with the recesses.
- 20 7. A tilting mechanism as claimed in any one of claims 3 to 6, wherein the stop member comprises an elongate member pivotally mounted on the part on which the movable member is mounted, the elongate member having an operating handle at one end and having a portion engageable with said recesses between its pivotal mounting and said handle.
- 25 8. A tilting mechanism as claimed in any one of claims 1 to 7, wherein spring means are connected between said two parts of the mechanism in a manner resiliently to oppose relative pivotal movement between said parts in one sense.



9. A tilting mechanism as claimed in claim 8, wherein said spring means are connected between said one part and said member movably mounted on the other part.
- 5 10. A tilting mechanism as claimed in any of the preceding claims, wherein the movable member is mounted on the part of the mechanism for connection to the chair seat.
- 10 11. A tilting mechanism for a chair, substantially as hereinbefore described with reference to the accompanying drawings.
12. A chair incorporating a tilting mechanism according to any of the preceding claims.
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