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(54) **TILTING MECHANISM FOR A CHAIR.**

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Description

This invention relates to tilting mechanisms for chairs, of a kind comprising two parts, for connection, in use, to the chair seat and chair back respectively, said two parts being 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, in use, 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 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 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 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 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 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.

In GB Patent specification No. 7950 (A.D. 1913) there is disclosed a tilting mechanism for a chair in which a quadrant with internal recesses is fixed to one end of a shaft which extends transversely across a chair seat. The quadrant is contained in a side bracket forming part of one arm of the chair

and is connected by a pivotal link to a back of the chair which is hinged about a horizontal axis to the chair seat. Backward movement of the chair back against a spring causes the quadrant, through said link, to pivot on said shaft. The quadrant can be locked in a selected position by a locking spindle which forces a steel ball into one of the internal recesses of the quadrant. At the opposite end of the shaft a connecting lever and a link are provided for the back rest to stabilise it during its pivotal movement, the lever and link being provided in a side bracket forming part of the other arm of the chair.

This tilting mechanism requires a large amount of space, is of complex form, and has several of its components exposed to normal view during use.

The object of the present invention is to provide a chair tilting mechanism which enables a chair back rest to be tilted easily and reliably, provides for positive location of the chair back, and is relatively inexpensive to produce, but which overcomes the abovementioned disadvantages.

According to the invention a tilting mechanism for a chair comprises a first part and a second part for association with a chair seat part and a back of the chair respectively, the second part being angularly movable relative to the first part about a horizontal pivot, a member pivotally mounted on the first part and defining a plurality of locking positions, a link pivotally connected to both the second part and the member so that angular movement of the second part is directly transmitted to the member, and locking means engageable with said member at a selected one of said locking positions to define a selected relative angular orientation of said first and second parts, the locking means being releasable to allow relative movement between said parts to a different relative angular orientation, characterised in that the first part defines a channel between a pair of spaced apart side plates for connection to the underside of the chair seat part, that the second part is directly pivotally connected to the first part by a horizontal pivot between the side plates so that the second part can move angularly about its pivot, with a portion of the second part moving into the channel, that said member is mounted in the channel on a pivot extending between the side plates of the channel, and that said locking means extend into the channel to engage a locking 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 first above, but is instead a separate member connected thereto by a link, the movable member can be movably mounted on said first part of the mechanism so as to overcome the disadvantages referred to above.

Thus the movable member is pivotally mounted on said first part, with said link preferably being pivotally connected to the movable member at a point spaced from the pivotal mounting of the member.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a schematic perspective view of a chair fitted with a tilting mechanism constructed in accordance with the present invention,

Figure 2 is a side elevational cross-sectional view of the tilting mechanism,

Figure 3 is a cross-sectional view on the line 3—3 in Figure 2, with a torsion spring of the mechanism omitted for the sake of clarity;

Figure 4 is a view similar to Figure 2 but showing the backrest in an alternative, tilted position.

Figure 5 is a diagrammatic cross-section through an alternative form of tilting mechanism of the invention; and

Figure 6 is a top plan view of the mechanism of Figure 5.

A first embodiment of the invention will now be described with reference to Figures 1 to 4 of the accompanying drawings.

The type of chair to which the mechanism of the present invention is usually applied is that conventionally referred to as a typists' chair. Such a chair is shown in Figure 1. The chair has a base comprising five castor-supporting legs 10 extending radially outwardly from the bottom of an upright, cylindrical support column 11. The legs are equi-angularly spaced around the column in the form of a star. The column 11 has conventional gas spring height adjustment means for raising or lowering a seat 12 of the chair in accordance with the user's requirements. A backrest 13 of the chair is connected to the seat 12 by means of an oval section tube 14. By way of the tube 14 the backrest is spaced above and somewhat behind the seat 12. In addition to the facility for vertical adjustment, the column may have provision for rotary movement relative to the part of the base formed by the five legs 10.

Considering now the tilting mechanism itself, Figures 1 to 4 show a frame 15 on which an upholstered seat pad would be fitted. This frame 15 constitutes a first part of the mechanism. The tube 14 is engaged in a socket in which it can be adjusted vertically to alter the position of the backrest 13 in a vertical direction relatively to the seat 12. This adjustment facility is provided by way of a resilient sleeve 16 surrounding the tube 14. The sleeve 16 is carried in a bracket 17 in which is engaged a locking bar. The bar has a head at one end and an operating lever portion at the other end. Within the bracket 17, which is of generally U-shaped configuration as shown best in Figure 3, the locking bar has an eccentric portion which can engage and press against the sleeve 16 and thus trap the tube 14. Locking and unlocking are carried out by an overcentre action and the bar engages in the bracket 17 through enlarged holes as seen in Figure 2 to allow freedom of movement of the bar in its released position.

The U-shaped bracket 17 is therefore normally secured relatively to the backrest but the latter

can be adjusted in the vertical direction as described.

The frame 15 carrying the seat 12 is an elongated inverted channel and the bracket 17 is pivotally connected to the frame 15 by means of a horizontal pivot pin 18 extending through registering holes in the side flanges of the frame 15 and of the bracket 17. The bracket 17 constitutes a second part of the tilting mechanism.

Between the flanges of the frame 15 towards the opposite end thereof from the pivot pin 18, is welded a socket member 19 into which the upper end of a support post 20 fitted in the top of the column 11 is received in conventional manner.

Surrounding the pivot pin 18 is a coiled torsion spring 21 having one limb engaging the base of the inverted channel of the frame 15 and the other limb engaging a second pivot pin 22 at the lower extremity of the bracket 17. Connected to the pivot pin 22 are two levers 23, 24 making up a linkage mechanism, the linkage mechanism being retained in a fixed axial position on the pivot pin 22 by means of a cylindrical sleeve 22a also carried on the pivot pin 22. Each lever is made up of a first straight part and a shorter second straight part integrally connected by a short step portion. The two first straight parts of the respective levers are parallel and interconnected by a short integral lug 25. The shorter second straight parts of the respective levers are also parallel and lie close to opposite sides of a sector or quadrant shaped angularly movable member 26. These shorter straight parts of the respective levers are pivotally connected together through a pivot pin 27 to said corner of the movable member 26. Since the bracket 17 is deeper than the frame 15, the pivot 22 is below the side flanges of the frame 15.

The movable member 26 lies in a vertical plane and is pivotally mounted on a pivot pin 28 which extends between the two side flanges of the frame 15. The upper edge of the movable member 26 opposite the pivot pin 27 is formed with a series of recesses or teeth 29 lying along an arc of which the centre coincides with the pivot pin 28 for the member 26. In this arrangement the pivot pin 27 is located remote from the recesses 29 behind the pivot pin 28.

A locking bar 30 can engage in any one of the recesses 29 in the member 26. This locking bar is pivotally engaged at 31 in one of the side flanges of the frame 15 and is secured thereto by an appropriate locking device which may be a split pin or other fastening arrangement. The other end of the locking bar extends through a slot in the other side flange of the frame 15 so as to allow the bar to move up and down to a limited extent. As shown in Figure 1, the free end of the bar 30 is formed with a handle and is of such a length that the handle is accessible by a person sitting on the chair, as are also the operating portion of the locking bar for raising and lowering the backrest, and the operating means for raising or lowering the seat 12 relative to the base of the chair. The arrangement of the spring 21 is such that it biases

the movable member 26 to the position shown in Figure 2, wherein the backrest is generally upright. A coiled tension spring 32 is connected between the bar 30 and the pivot pin 28 so as to urge the bar 30 downwardly into engagement with the member 26, and in particular into one of the recesses 29, so as to lock the member 26 relative to the frame 15 and thus to fix the frame 15 and bracket 17 in a particular relative angular orientation.

Provision, not shown, is made for securing the pivot pins 18, 22, 27 and 28 in the appropriate component to prevent endwise movement. Split pins, locking washers or other devices may be used for this purpose.

When it is required to adjust the angle of the chair back in relation to the seat, the bar 30 is raised to disengage it from its recess 29 in the member 26. This raising of the bar 30 takes place against the action of the spring 32. Pressure can then be applied to the backrest of the chair to move it forwardly or rearwardly to the desired position. The pivoting movement of the bracket 17 on which the backrest is mounted takes place about the pivot pin 18 against the action of the spring 21, and this pivoting movement is transmitted through the links 23, 24 to the sector or quadrant shaped member 26 which swings about its pivot pin 28 to bring a new recess beneath the bar 30. When the back rest of the chair is in the desired new position, the bar 30 is released and is pulled downwardly by the action of the spring 32 so that it engages in the appropriate recess beneath it. As shown the sides of the recesses 29 are generally arcuate so that downward movement of the bar 30 can effect any slight necessary movement of the member 26 so that the bar can enter to the full depth of the appropriate recess.

Figure 2 shows the backrest in its most upright position with the bar 30 in its locking position in a recess 29 in the member 26. Figure 4 shows the bar 30 released from the member 26, with the backrest tilted slightly rearwardly so that a different one of the recesses is now under the bar. As can be seen from Figures 2 and 4 slightly raised portions of the member 26 are provided at opposite ends of the row of recesses, thereby to limit the permitted swinging movement of the member 26.

The tilting mechanism described provides a simple adjustment and is relatively inexpensive to produce. In addition it overcomes the disadvantages of the prior art referred to. In particular the member 26 lies wholly within the channel of the frame 15 during the whole of its possible movement. Moreover any weakening of the spring 26 will not render the mechanism inoperative or release the backrest since the bar 30 is urged downwardly by gravity into engagement with the recesses 29. Moreover accidental release of the bar 30 is unlikely as it would have to be moved upwardly against the action of the spring 32.

Figures 5 and 6 show an alternative form of mechanism, although mostly this is of a form

quite similar to that shown in Figures 1 to 4. In Figures 5 and 6 the same numerals have been used for parts which are the same as those described in Figures 1 to 4.

The main difference with this further embodiment of the invention, concerns the positioning of the pivot pin 27 on the movable member 26. As described in Figures 1 to 4, this pivot pin 27 is disposed remote from the recesses 29 behind the pivot pin 28. However as shown in Figure 5 it can be seen that in this alternative arrangement the pivot pin 27 is disposed approximately midway between the pivot pin 28 and the recesses 29. This has the effect of reversing the direction of movement of the member 26 relative to the movement of the backrest 13. In the example of Figures 1 to 4, rearward tilting of the backrest will cause the member 26 to pivot towards the bracket 17. However with the example of Figures 5 and 6 rearward tilting of the backrest will cause the member 26 to pivot towards the end of the frame 15 remote from the bracket 17.

Another difference in the embodiment of Figures 5 and 6 concerns the spring means which bias the backrest to a rest position. In Figures 1 to 4 the torsion spring 21 is provided. However with the alternative embodiment of Figures 5 and 6 a helical tension spring 33 is connected between the pivot pins 18 and 27. As can be seen from Figure 5 this tends to bias the backrest towards the seat 12. Alternatively the tension spring 33 may be connected between the pivot pin 22 and one flange of the channel shaped frame 15.

A consequence of the member 26 being pivotally mounted, is that it magnifies the movement of its recessed portion. It will be appreciated that many alternative shapes of recesses in the movable member, and of the co-operating lock bar, may be provided instead of the arrangement shown.

Claims

1. A tilting mechanism for a chair, the mechanism comprising a first part (15) and a second part (16, 17) for association with a chair seat part (12) and a back (13) of the chair respectively, the second part being angularly movable relative to the first part about a horizontal pivot (18), a member (26) pivotally mounted on the first part and defining a plurality of locking positions, a link (23, 24) pivotally connected to both the second part and the member (26) so that angular movement of the second part is directly transmitted to the member, and locking means (30) engageable with said member at a selected one of said locking positions to define a selected relative angular orientation of said first and second parts, the locking means being releasable to allow relative movement between said parts to a different relative angular orientation, characterised in that the first part (15) defines a channel between a pair of spaced apart side plates for connection to the underside of the chair seat part (12), that the second part (16, 17) is directly pivotally

connected to the first part (15) by a horizontal pivot (18) between the side plates so that the second part can move angularly about its pivot (18), with a portion of the second part moving into the channel, that said member (26) is mounted in the channel on a pivot extending between the side plates of the channel, and that said locking means (30) extend into the channel to engage a locking position.

2. A tilting mechanism as claimed in claim 1, wherein said link (23, 24) is pivotally connected to said member (26) at a point spaced from the pivotal mounting of the member in the channel.

3. A tilting mechanism as claimed in claim 1 or claim 2, wherein said member (26) is formed with a plurality of recesses (29) to provide said locking positions and said locking means is a manually operable stop member (30) which can selectively engage the recesses to retain said member (26) in a desired position, and hence retain the said two parts of the mechanism in a desired relative angular position.

4. A tilting mechanism as claimed in claim 3, wherein said recesses (29) are arranged to lie along an arc centred on the axis of pivoting (28) of said member (26).

5. A tilting mechanism as claimed in claim 4, wherein said arc lies above the axis of pivoting (28) of said member (26) so that the manually operable stop member (30) is vertically movable into and out of engagement with said recesses.

6. A tilting mechanism as claimed in any one of claims 3 to 5, wherein spring means (32) are provided to urge the stop member (30) into engagement with the recesses (29).

7. A tilting mechanism as claimed in any one of claims 3 to 6, wherein the stop member (30) comprises an elongate member pivotally mounted on the first part, 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.

8. A tilting mechanism as claimed in any one of claims 1 to 7, wherein spring means (21, 33) 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 (33) are connected between said second part and said member pivotally mounted on the first part.

10. A chair incorporating a tilting mechanism according to any one of the preceding claims.

Revendications

1. Mécanisme d'inclinaison pour chaise, constitué d'une première partie (15) et d'une seconde partie (16, 17) coopérant respectivement avec un siège (12) de chaise et un dossier (13) de la chaise, la seconde partie étant mobile angulairement par rapport à la première partie sur un pivot horizontal (18), un élément (26) monté de manière à pouvoir pivoter sur la première partie et définis-

sant une série de positions de verrouillage, une tige de liaison (23, 24) pivotant à la fois sur la seconde partie et l'élément (26) afin que le mouvement angulaire de la seconde partie soit directement transmis à l'élément, et un moyen de verrouillage (30) enclenchable avec ledit élément dans l'une des positions de verrouillage choisie pour définir une orientation angulaire relative choisie des première et seconde parties, le moyen de verrouillage étant libérable pour permettre un mouvement relatif entre lesdites parties jusqu'à une orientation angulaire relative différente, caractérisé en ce que la première partie définit une gouttière entre deux plaques latérales séparées pour la liaison avec le dessous de la partie siège (12) de la chaise, en ce que la seconde partie (16, 17) s'articule directement avec la première partie (15) par un pivot horizontal (18) entre les plaques latérales afin que la seconde partie puisse bouger angulairement autour de son pivot (18), une partie de la seconde partie étant dans la gouttière, l'élément (26) est monté dans la gouttière sur un pivot s'étendant entre les plaques latérales de la gouttière, et le moyen de verrouillage pénètre dans la gouttière pour accrocher une position de verrouillage.

2. Mécanisme d'inclinaison selon la revendication 1, dans lequel la tige de liaison (23, 24) s'articule sur l'élément (26) en un point espacé du montage pivotant de l'élément dans la gouttière.

3. Mécanisme d'inclinaison selon la revendication 1 ou la revendication 2, dans lequel l'élément (26) comporte une série d'encoches (29) pour réaliser les positions de verrouillage et le moyen de verrouillage est un élément d'arrêt (30) actionnable manuellement qui peut entrer sélectivement dans les encoches pour retenir l'élément (26) dans une position désirée, et donc retenir lesdites deux parties du mécanisme dans une position angulaire relative désirée.

4. Mécanisme d'inclinaison selon la revendication 3, dans lequel les encoches (29) sont disposées pour se trouver le long d'un arc centré sur l'axe de pivotement de l'élément (26).

5. Mécanisme d'inclinaison selon la revendication 4, dans lequel ledit arc se trouve au-dessus de l'axe de pivotement (28) de l'élément (26) afin que l'élément d'arrêt (30) manoeuvrable manuellement soit mobile verticalement pour entrer dans et sortir des encoches.

6. Mécanisme d'inclinaison selon l'une quelconque des revendications 3 à 5, dans lequel un dispositif à ressort (32) est prévu pour pousser l'élément d'arrêt (30) dans les encoches (29).

7. Mécanisme d'inclinaison selon l'une quelconque des revendications 3 à 6, dans lequel l'élément d'arrêt (30) est constitué d'un élément allongé s'articulant sur la première partie, l'élément allongé ayant une poignée de manoeuvre à une extrémité et ayant une partie pouvant passer dans les encoches entre son montage pivotant et la poignée.

8. Mécanisme d'inclinaison selon l'une quelconque des revendications 1 à 7, dans lequel des dispositifs à ressort (21, 33) sont montés entre les-

dites deux parties du mécanisme de manière élastique pour, dans un sens, s'opposer au pivotement relatif entre lesdites parties.

9. Mécanisme d'inclinaison selon la revendication 8, dans lequel le dispositif à ressort (33) est monté entre la seconde partie et l'élément s'articulant sur la première partie.

10. Chaise comportant un mécanisme d'inclinaison selon l'une quelconque des revendications précédentes.

Patentansprüche

1. Neigungsverstellmechanismus für einen Stuhl, mit einem ersten Teil (15) und einem zweiten Teil (16, 17), die einem Stuhlsitzteil (12) bzw. einer Rückenlehne (13) des Stuhls zugeordnet sind, wobei der zweite Teil relativ zum ersten Teil um eine horizontale Drehachse (18) winkelbeweglich ist, mit einem schwenkbar an dem ersten Teil befestigten Organ (26), das eine Mehrzahl Sperrstellungen definiert, mit einem Verbindungsglied (23, 24), das sowohl mit dem zweiten Teil als auch mit dem Organ (26) schwenkbar so verbunden ist, daß eine Winkelbewegung des zweiten Teils direkt auf das Organ übertragen wird, und mit einem Sperrglied (30), das mit dem Organ in einer ausgewählten Sperrstellung in Eingriff bringbar ist und eine bestimmte Winkellage des ersten und des zweiten Teils relativ zueinander definiert, wobei das Sperrglied lösbar ist, um eine Relativbewegung zwischen den Teilen in eine jeweils verschiedene relative Winkellage zu gestatten, dadurch gekennzeichnet, daß der erste Teil (15) einen Kanal zwischen zwei voneinander beabstandeten Seitenplatten zur Verbindung mit der Unterseite des Stuhlsitzteils (12) definiert, daß der zweite Teil (16, 17) direkt schwenkbar mit dem ersten Teil (15) über eine horizontale Schwenkachse (18) zwischen den Seitenplatten so verbunden ist, daß sich der zweite Teil winkelmäßig um seine Schwenkachse (18) bewegen kann, wobei sich ein Abschnitt des zweiten Teils in den Kanal bewegt, daß das Organ (26) im Kanal auf einer zwischen den Seitenplatten des Kanals verlaufenden Schwenkachse befestigt ist, und daß das Sperrglied (30) sich zum Eingriff in eine Sperrlage in den Kanal erstreckt.

2. Neigungsverstellmechanismus nach An-

spruch 1, wobei das Verbindungsglied (23, 24) mit dem Organ (26) an einer Stelle, die von der schwenkbaren Lagerung des Organs im Kanal beabstandet ist, schwenkbar verbunden ist.

3. Neigungsverstellmechanismus nach Anspruch 1 oder Anspruch 2, wobei das Organ (26) eine Mehrzahl Vertiefungen (29) zur Bildung der Sperrstellungen aufweist und das Sperrglied ein handbetätigbarer Anschlag (30) ist, der selektiv in die Vertiefungen eintreten kann, um das Organ (26) in einer erwünschten Lage und somit die beiden Teile des Mechanismus in einer erwünschten Winkellage relativ zueinander festzulegen.

4. Neigungsverstellmechanismus nach Anspruch 3, wobei die Vertiefungen (29) so angeordnet sind, daß sie auf einem Bogen liegen, der auf die Schwenkachse (28) des Organs (26) zentriert ist.

5. Neigungsverstellmechanismus nach Anspruch 4, wobei der Bogen über der Schwenkachse (28) des Organs (26) liegt, so daß der handbetätigbare Anschlag (30) in Vertikalrichtung in und außer Eingriff mit den Vertiefungen bewegbar ist.

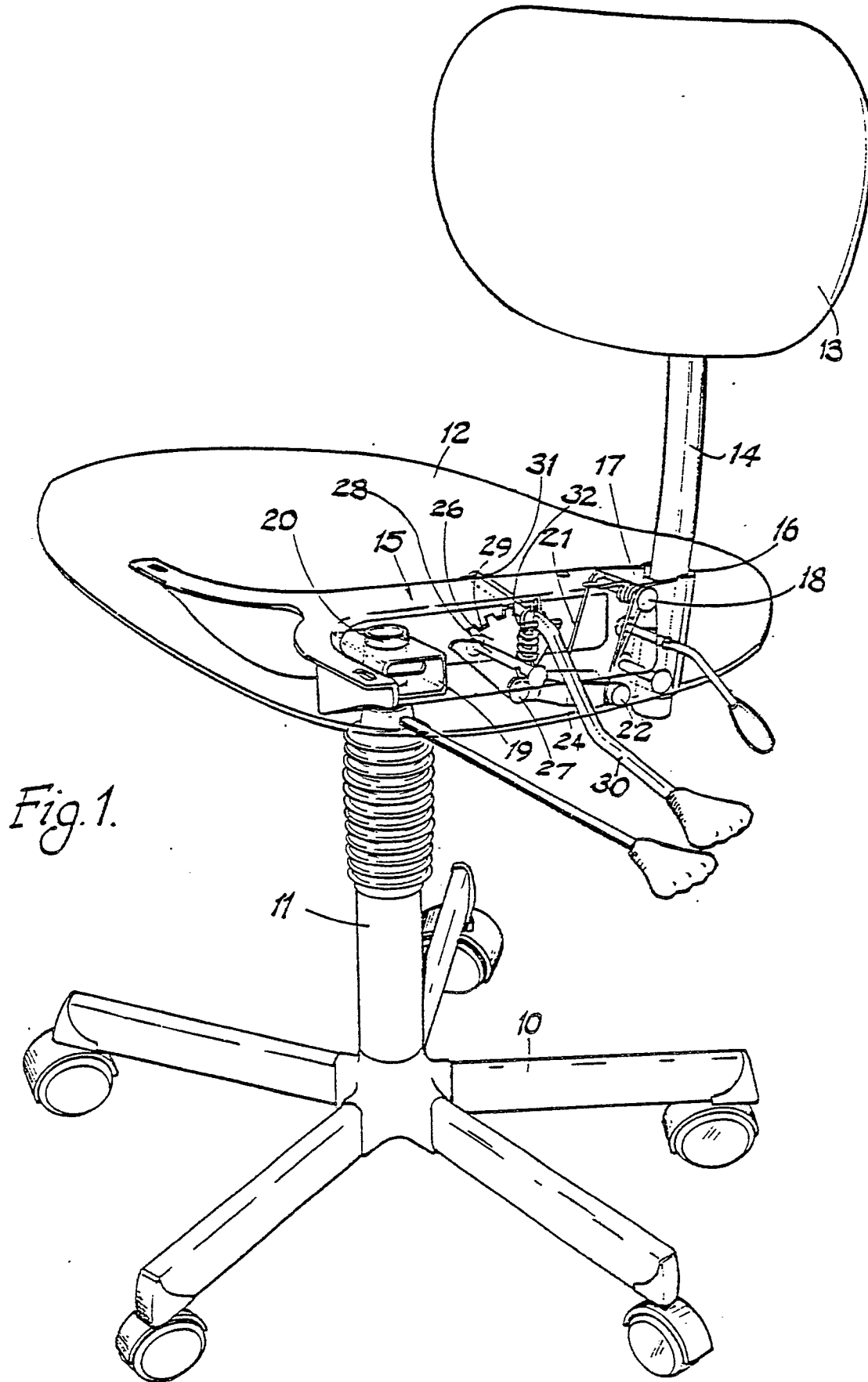
6. Neigungsverstellmechanismus nach einem der Ansprüche 3—5, wobei eine Feder (32) vorgesehen ist, die den Anschlag (30) in Eingriff mit den Vertiefungen (29) beaufschlagt.

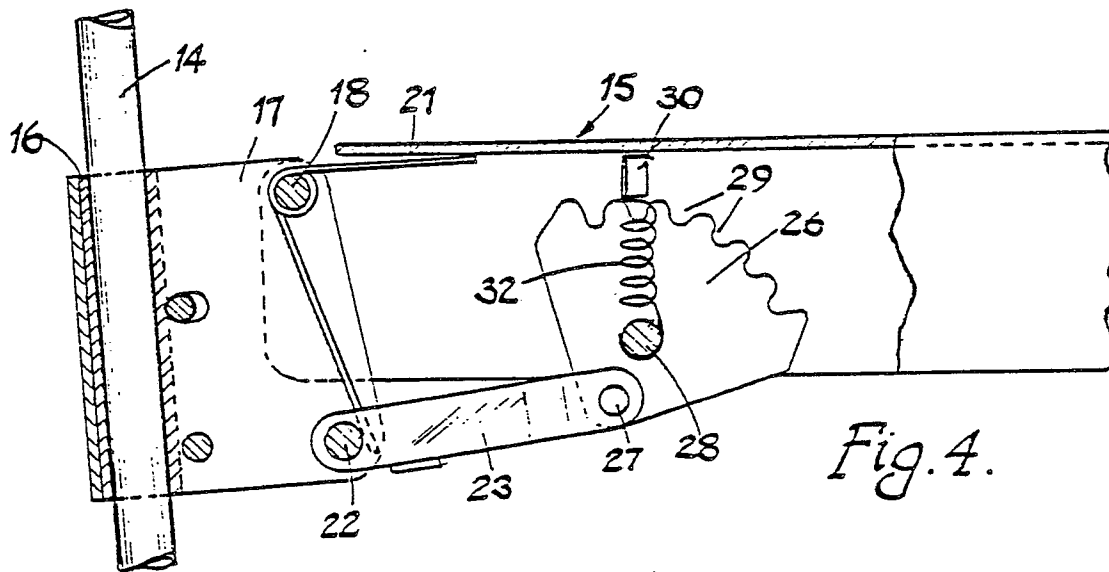
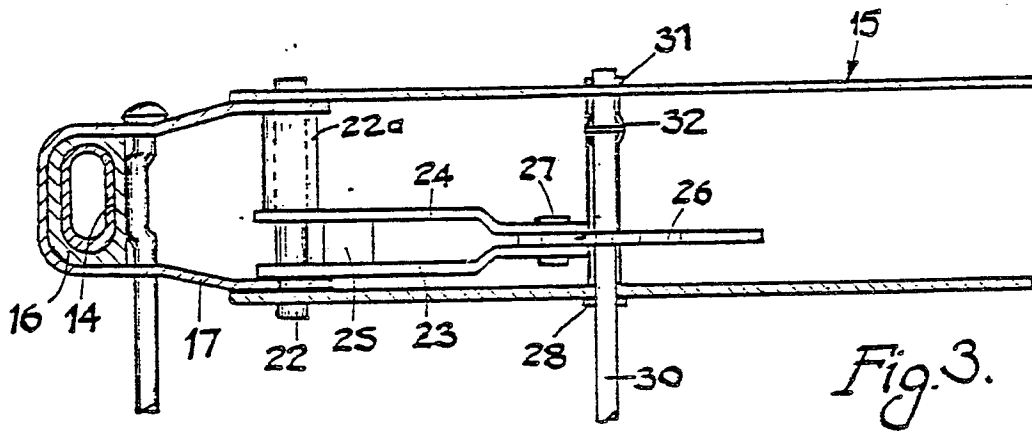
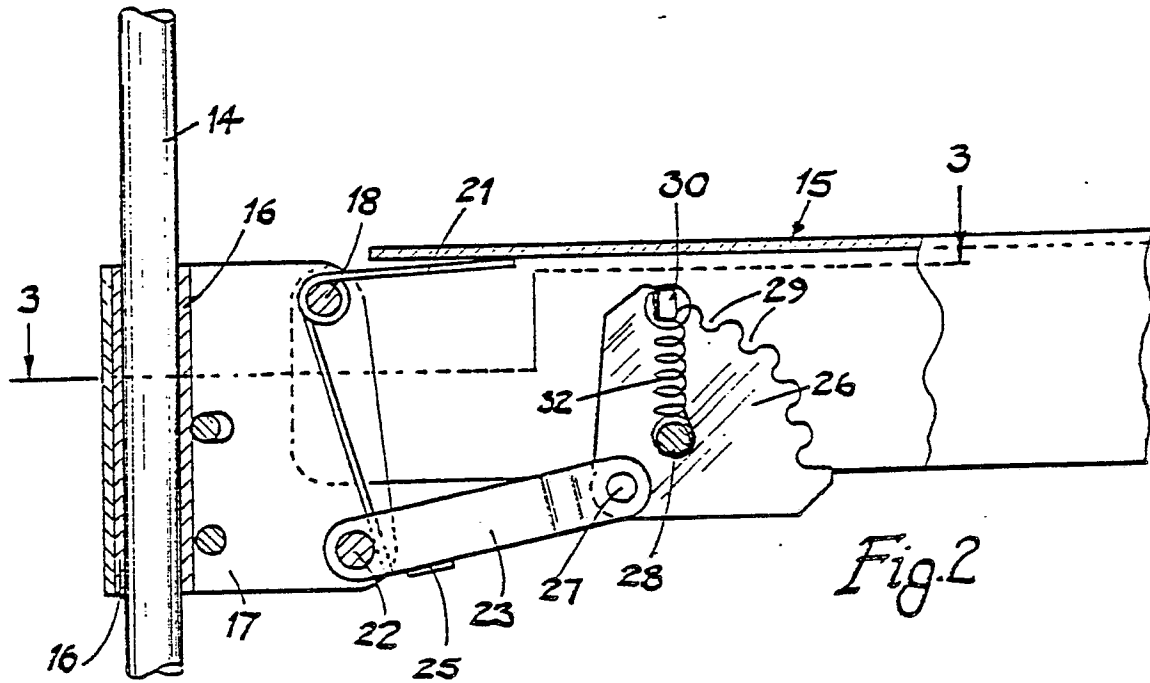
7. Neigungsverstellmechanismus nach einem der Ansprüche 3—6, wobei der Anschlag (30) ein langes Organ ist, das an dem ersten Teil schwenkbar montiert ist und das am einen Ende einen Betätigungsgriff und zwischen seiner schwenkbaren Lagerung und dem Griff einen mit den Vertiefungen in Eingriff bringbaren Abschnitt aufweist.

8. Neigungsverstellmechanismus nach einem der Ansprüche 1—7, wobei zwischen den beiden Teilen des Mechanismus Federn (21, 33) so angeordnet sind, daß sie einer relativen Schwenkbewegung zwischen den Teilen in einer Richtung federnd entgegenwirken.

9. Neigungsverstellmechanismus nach Anspruch 8, wobei die Feder (33) zwischen dem zweiten Teil und dem schwenkbar an dem ersten Teil befestigten Organ eingebaut ist.

10. Stuhl mit einem Neigungsverstellmechanismus nach einem der vorhergehenden Ansprüche.





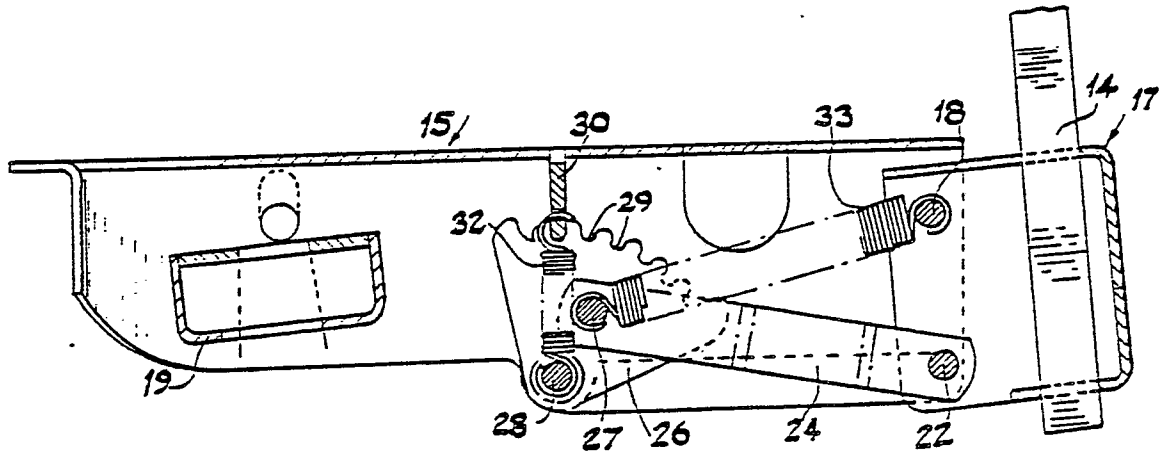


Fig. 5.

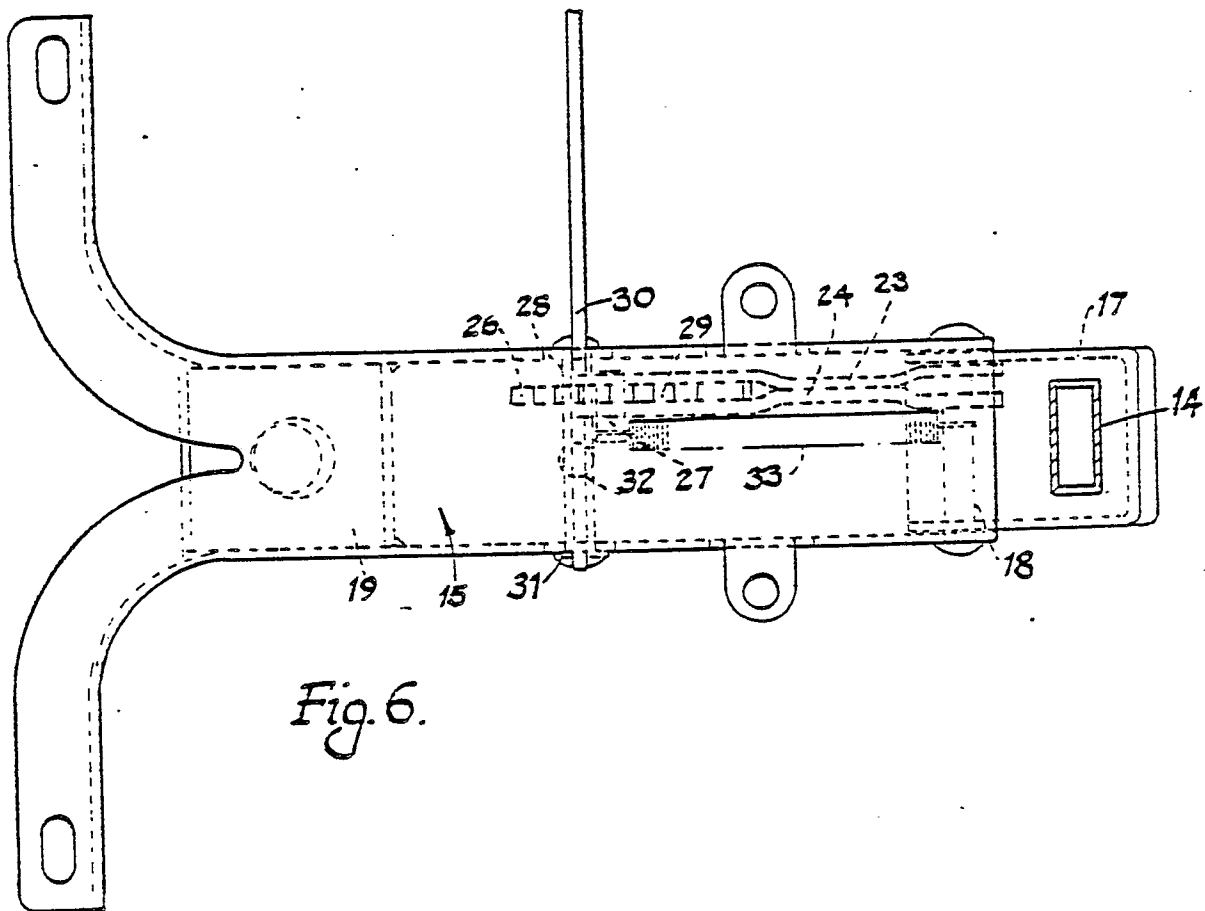


Fig. 6.