(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 271 600 B1**

(12) # EUROPEAN PATENT SPECIFICATION

(45) Date of publication of patent specification: **27.11.91** (51) Int. Cl.5: **A47C 1/032**

(21) Application number: **86117738.4**

(22) Date of filing: **19.12.86**

(54) **An adjustable chair.**

(43) Date of publication of application:
22.06.88 Bulletin 88/25

(45) Publication of the grant of the patent:
27.11.91 Bulletin 91/48

(84) Designated Contracting States:
BE CH DE FR GB LI NL

(56) References cited:
CA-A- 869 337
FR-A- 2 509 160
GB-A- 1 329 238
GB-A- 2 001 241

(73) Proprietor: **C.O.M. COOPERATIVA OPERAI MOBILIERI S.C.R.L.**
Via Castelfranco, 17
I-40017 San Giovanni in Persiceto(IT)

(72) Inventor: **Gamberini, Gino**
8, Via Santi
I-40060 Toscanella di Dozza(IT)

(74) Representative: **Prato, Roberto et al**
STUDIO TORTA Società Semplice Via Viotti 9
I-10121 Torino(IT)

EP 0 271 600 B1

Description

The present invention relates to an adjustable chair.

In particular, the present invention relates to an adjustable chair of the type described in FR-A-2 509 160, and comprising a base; a body supported by such base; and a control mechanism for controlling the position of the above body in relation to the base; and in which the body includes a frame, which comprises a first part defining a seat, a second part defining a seat back, and a hinge for connecting the above first and second parts together so as to allow relative rotation thereof about an axis; the aforementioned mechanism having a first member, a pin extending parallel with the above axis of rotation and connected to the base to form a pivot for the above first member to rotate thereabout, and a second member having a rear portion connected to the second part of the frame.

In the known chairs of the type described hereinabove, the aforementioned second member has a front end hinged to the base, and the aforementioned first member is a resilient member extending between the base and an intermediate point of the second member to resiliently control the rotation thereof in relation to the base.

The above known chairs in general, and the chair disclosed in FR-A-2 509 160 in particular, suffer from the drawback of comprising substantially one single part, that is the seat back, which is displaceable in dependence on the forces applied thereto, whereas the other part, that is the seat, remains substantially motionless whatever the distribution of the above forces may be.

In other words, the above known chairs are not real adjustable chairs, in the sense that only a part thereof is deformable in dependance on the distribution of forces applied thereto, i.e. on the position of the user; whereas the theory is perfectly known that in a real adjustable chair, all the component parts should be deformable to suit, in any case, the position of a user. In particular, in an adjustable chair, not only both the angles between seat and seat back and between the seat back and the supporting base should change to suit the user's position, but also the angle between the seat and the base should change, and the variations of the angles of the seat and the seat back in relation to the base should be dependent on one another according to a law in turn depending on the weight of the user.

In another type of known chairs disclosed in GB-A-2 001 241, the seat and the seat back are substantially rigid with each other, and are mounted on a base to pivot in relation thereto about a single pivot, so that the angles between the seat and the base, and between the seat back and the base change, but not the angle between the seat and the seat back. Also the chairs of this known type are not, therefore, real adjustable chairs.

It is an object of the present invention to provide an adjustable chair having a very simple structure and relatively low production costs.

According to the present invention there is provided an adjustable chair comprising a base; a body supported by said base; and a control mechanism for controlling the position of said body in relation to said base; said body including a frame, which comprises a first part defining a seat, a second part defining a seat back, and hinge means for connecting said first and second parts together so as to allow relative rotation thereof about an axis; said mechanism having a first member, a first pin extending parallel with said axis and connected to said base to form a pivot for said first member to rotate thereabout, and a second member having a rear portion connected to said second part, characterized in that said first member has a front end rigidly connected to said first part; a second pin parallel to said first pin being carried by a central portion of said first member, and said second member having a front end coupled to said second pin for rotation thereabout in relation to said first member, and against the action of spring means.

In the adjustable chair set forth above, the seat is hinged to the seat back, and is connected to the first member of the mechanism for rotating substantially therewith in relation to the base and about a first axis, whereas the seat back is connected to the second member of the mechanism and hinged to the first member of the mechanism to rotate in relation to the above first member about a second axis. Owing to the presence of such second axis, the seat and the seat back on one hand, and the first and the second member of the mechanism on the other hand substantially define an articulated parallelogram allowing movement of the seat and the seat back in relation to each other and to the base as theoretically required in an adjustable chair.

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

- Figure 1 is a perspective view of a preferred embodiment of the adjustable chair according to the present invention;
- Figure 2 is a longitudinal partial section, on an enlarged scale, of the chair of Figure 1;
- Figures 3 and 4 are a plan view and a front view respectively of a particular of the chair of Figure 1; and
- Figure 5 is a perspective view of the chair of Figure 1 in which the possible movements thereof are illustrated.

As illustrated in Figure 1, an adjustable chair is generally indicated with the reference numeral 1 and comprises a body 2 having a metal frame 3 (Figure 2) completely embedded in a layer of polyurethane which will be described better hereinbelow. The body 2 rests on a base 4 of the type having five radial arms 5 to the free ends of which are fixed respective wheels 6. The body 2 is defined by a seat back 7 and a seat 8 which can assume a respective inclination according to the position assumed by the user. The chair 1 can be adjusted in dependence on the fundamental anthropometric parameters of the user such as height and weight. The chair 1 is able automatically to favour the position assumed by the user in that it includes mechanisms which allow the inclination of the seat back 7 and of the seat 8 and which are actuated by the pressure of the body of the user.

With reference to Figures 2, 3 and 4, the part of the frame 3 relating to the seat 8 is indicated 9 and includes a rod bent into a U in such a way as to define tow lateral bars 11 and a front bar 12. The free ends of the bars 11 are connected together by a rear bar 13 parallel to the bar 12. The free ends of the bars 11 are pivoted to a respective pin 15. The part of the frame 3 associated with the seat back 7 is indicated 10 and comprises two rods folded to form a parallelogram. These rods define a respective outer lateral bar 16, a respective inner lateral bar 18 and two bars 22 and 23 which are, respectively, upper and lower bars, joining the bars 16 and 18, which are parallel to one another. The bar 18 has a length less than that of the bar 16 and the bars 22 and 23 are oblique with respect to the bars 16 and 18. The free ends of the bars 16 are pivoted to the pins 15. The bars 18 are connected together by a bar 21 whilst the bars 22 are connected together by a spring 24.

As illustrated in Figures 2, 3 and 4 a mechanism mounted on the frame 3 is generally indicated 31 and is able to allow the inclination of the seat back 7 and the seat 8. The mechanism 31 comprises a plate 32 having a front end fixed to a bar 33 rigidly connected to the bar 12. A plate 32 has, starting from the bar 33, a first section 34 which extends downwardly, a central second section 35 which also extends downwardly but with a different inclination from that of the section 34, and a third section 36 lying in a plane substantially parallel to the support plane of the chair 1. In the section 36 there is formed a central through hole 37 housing an upper end 38 of the base 4 within which there is mounted, in a manner not illustrated, a gas cylinder by actuating of which one can regulate the longitudinal extension of the base 4 and therefore the height of the body 2 above the support plane. The end 38 of the base 4 engages a sleeve 41 having above and below the plate 32 respective sections 42 and 43. The section 43 supports, close to the junction between the sections 35 and 36 of the plate 32, a small bar 44 the axis of which is parallel to the support plane and to the bar 12. From the section 36 of the plate 32 two pierced projections 49 extend downwardly, by means of which the plate 32 is pivotally connected to the bar 44. The plate 32 can therefore rotate about the axis of the bar 44. The section 43 has an outer diameter greater than that of the section 42. Along the section 43 of the sleeve 41 there is formed a through hole 45 coaxial with the through hole 46 formed in the section 36 of the plate 32 close to the free end of this. The holes 45 and 46 house a screw 47 and stem of which extends upwardly and out from the hole 46 and lodges in a sleeve 48 formed of resilient material. To the stem of the screw 47 there is screwed a nut 51 which, by means of a washer, compresses the sleeve 48 onto the upper face of the plate 32 which has two lateral projections 52 which extend upwardly. In correspondence with the connection between the sections 35 and 36 there is fixed to the lateral projection 52 a pin 53 around the two ends of which there is wound a respective spring 54. The mechanism 31 further includes two parallel bars 55 having a first end fixed to a U-shape element 56 the concavity of which faces upwardly. From the bars 18 extend respectively pins 57 which lodge in corresponding ends of the element 56. The bars 55 are thus hinged to the pins 57. The element 56 is engaged by a strip 58 of plastics material fixed thereto by means of screws not illustrated. The strip 58 prevents the escape of the pins 57 from the element 56. The bars 55 have a first section 61 positioned between the bars 18, a second section 62 which extends from the first beneath the part 9, and a third section 63 which is parallel to and positioned above the section 36 of the plate 32. At the free ends of the sections 63 there is fixed one end of a corresponding spring 54 a second end of which is folded and housed in a sleeve 65 also housing a second end of the spring 54. The sleeve 65 has an axis parallel to that of the pin 53 and is positioned between the projections 52 extending from the section 35 of the plate 32. The sleeve 65 has a central diametral threaded hole 66 in which is screwed the shank of a screw 67 the head of which rests beneath the section 35 and which extends upwardly through a through hole 71 formed in the section 35. At the junction between the second section 62 and the section 63 of the bars 55 these are connected by bars 72 from which extend two parallel plates 73 which have at their free ends respective holes housing the pin 53. The springs 54 are compressed between a plate 73 and a corresponding projections 52. The part 9 can be provided with a network of elastic belts 75 illus-

trated in broken outline (Figure 3). As illustrated in Figures 1 and 2, in use, once the frame 3 has been prearranged, the parts 9 and 10 are embedded in respective layers of polyurethane 80 and 81 in such a way as to define together therewith the seat back 7 and the seat 8. The layer of polyurethane 80 of the seat back 7 has a U-shape cut 82 corresponding to the element 56 and to the bars 55. These latter, in correspondence with their first section 61, are embedded in a layer of polyurethane 83 having a plurality of corrugations parallel to the support planes. The layer 81 has a central portion 84 having a plurality of corrugations parallel to those of the layer 83. The portion 84 extends from the bar 13 into the bar 12 and has for a substantial section the same width as the layer 83 and subsequently an increasing width. It is to be noted moreover that the sections 62 and 63 of the bars 55 and the space defined by the plate and by the projections 52 are also embedded in a layer of polyurethane 86 which also covers the lower face of the plate 32 (Figure 2). The layer 86 is formed as a continuation of the layer 83. Along the whole of the junction between the layers 80 and 81 there is formed an open slot 87. The layers 80 and 81 finally have a lateral edge 88 of greater thickness.

With reference to Figure 5, the inclination of the seat back 7 and of the seat 8 is a function of the distribution of the weight of the body of the user. In particular, when almost all of the weight of the user is exerted on the seat 8 separating its back from the seat back 7 a rotation of the plate 32 in a clockwise sense takes place about the axis of the bar 44. This rotation causes rotation in a clockwise sense also of the whole of the body 2. The free end of the plate 32 in correspondence with the hole 46 will also turn in a clockwise sense compressing the sleeve 48. As soon as the pressure of the body on the seat 8 ceases, as has just been described, the whole body 2 returns to the original position by the action of the sleeve 48 which presses the free end of the plate 32 downwardly making this latter turn in a clockwise sense. With the back engaging on the seat back 7 rotation of the bar 55 about the axis of the pin 53 takes place by deformation of the springs 54. Finally the seat back 7, and in particular the part 10 of the frame 3, turns about the axes of the pins 57 and draws the pins 15 downwardly with a movement of pantograph type. Consequently this increases the relative angle between the seat 8 and the seat back 7. By means of the screw 67 the springs 54 can be calibrated, that is to say more or less preloaded for the purpose of adjusting the rotation of the bars 55 in relation to the weight of the user. The chair 1 can be provided with a covering 91 (Figure 5).

The numerous advantages following on the structure of the present invention will be evident. In particular, the chair 1 can be personalised by adjusting the mechanisms 31 (screws 67) in dependence on the weight of the user. Moreover, in dependence on the position assumed, the inclination of the seat back 7 and of the seat 8 which accompanies the body of the user takes place automatically. The mechanism 31 which permits such inclination is of simple construction in that it is formed with a small number of components. It is to be noted that the frame 3 and the mechanism 31 are embedded in polyurethane which forms the aesthetic outline of the chair 1, which for the considerations just explained is of reduced production costs.

The parts 9 and 10 can have lateral projections in such a way as to be able to widen the body 2 at will starting from a base model of the frame 3. In place of the polyurethane there can be used other resilient and/or deformable materials such as a different plastics material, rubber or a sponge layer.

Claims

1. An adjustable chair comprising a base (4); a body (2) supported by said base (4); and a control mechanism (31) for controlling the position of said body (2) in relation to said base (4); said body (2) including a frame (3), which comprises a first part (9) defining a seat (8), a second part (10) defining a seat back (7), and hinge means (15) for connecting said first and second parts together so as to allow relative rotation thereof about an axis; said mechanism (31) having a first member (32), a first pin (44) extending parallel with said axis (15) and connected to said base (4) to form a pivot for said first member (32) to rotate thereabout, and a second member (55,56) having a rear portion (61) connected to said second part (10), characterized in that said first member (32) has a front end rigidly connected to said first part (9); a second pin (53) parallel to said first pin (44) being carried by a central portion (35) of said first member (32), and said second member (55,56) having a front end coupled to said second pin (53) for rotation thereabout in relation to said first member (32), and against the action of spring means (54).

2. A chair as claimed in Claim 1, characterized in that said first member (32) includes a plate (32) having a pair of first lateral projections (52) on which said second pin (53) is mounted; said spring means (54) being wound about said second pin (53) and coupling together said second member (55) and the central portion (35) of said first member (32).

3. A chair as claimed in Claim 2, characterized in that the said second member (55) includes bars (63) having respective free ends; said spring means (54) being connected to said free ends; and adjustable-length link means (67) being provided to connect said spring means (54) to the central portion (35) of said first member (32).

4. A chair as claimed in any one of the preceding Claims, characterized in that said first pin (44) is coupled to said first member (32) substantially at the central portion (35) thereof; said first member (32) including a rear portion (36) extending beyond said first pin (44), and resilient means (45,48) being provided to couple said rear portion (36) to said base (4) to control rotation of said first member (32) about said first pin (44) in relation to said base (4).

5. A chair as claimed in any one of the preceding Claims, characterized in that an intermediate pin member (57) parallel with said axis is provided on said second part (10) of said frame (3), being hinged to said intermediate pin member (57).

6. A chair as claimed in any one of the preceding Claims, characterized in that a pair of first layers (81,80) of polyurethane are provided, in which said first and second parts (9, 10) are respectively embedded.

7. A chair as claimed in Claim 6, characterized in that a second layer (83,86) of polyurethane is provided, in which said mechanism (31) is embedded.

8. A chair as claimed in Claim 7, characterized in that that (80) of said first layers (81,80) which embeds said second part (10) is provided with an aperture (82) along which the rear portion (61) of said second member (55) extends together with a relevant rear portion (83) of said second layer (83,86); a number of corrugations parallel with said axis (15) being provided on a front surface of said rear layer-portion (83).

9. A chair as claimed in Claim 8, characterized in that said first layer (81) in which the said first part (9) is embedded has a central portion (84), which is aligned with said rear layer-portion (83), and on which a number of further corrugations are formed parallel with said axis (15).

Revendications

1. Chaise réglable comprenant un socle (4); un corps (2) supporté par le socle (4); et un mécanisme de contrôle (31) pour contrôler la position du corps (2) par rapport au socle (4); le corps (2) comprenant un cadre (3), lequel comprend une première partie (9) définissant le siège (8), une deuxième partie (10) définissant le dossier (7), et des moyens d'articulation (15) pour relier ensemble les première et deuxième parties et pour permettre leur rotation relative autour d'un axe; le mécanisme (31) présentant un premier organe (32), une première cheville (44) s'étendant parallèlement à l'axe (15) et étant reliée au socle (14) pour former un pivot permettant la rotation du premier organe (32), et une deuxième organe (55, 56) présentant une partie arrière (61) reliée à la deuxième partie (10), caractérisé en ce que le premier organe (32) présente une extrémité frontale reliée de façon rigide à la première partie (9); une deuxième cheville (53) parallèle à la première cheville (41), le deuxième organe (55, 56) présentant une extrémité frontale reliée à la deuxième cheville (53) pour permettre sa rotation par rapport au premier organe (32), contre l'action de moyens élastiques de rappel (54).

2. Chaise selon la revendication 1, caractérisée en ce que le premier organe (32) comprend un plateau (32) présentant des premières saillies latérales (52) sur lesquelles est montée la seconde cheville (53), les moyens élastiques de rappel (54) étant enroulés autour de le deuxième cheville (53) et assujettissant ensemble le deuxième organe (55) et la partie centrale (35) du premier organe (32).

3. Chaise selon la revendication 2, caractérisée en ce que le deuxième organe (55) comprend des barres (63) présentant des extrémités libres respectives, les moyens élastiques de rappel (54) étant reliés aux extrémités libres, et des moyens de liaison (67) ajustables en longueur étant prévus pour relier les moyens élastiques de rappel (54) à la partie centrale (35) du premier organe (32).

4. Chaise selon l'une des revendications précédentes, caractérisée en ce que la première cheville (44) est assujettie au premier organe (32) sensiblement à la partie centrale (35) de celui-ci, le premier organe (32) comprenant une partie arrière (36) s'étendant au-delà de la première cheville (44) et les moyens élastiques (45, 48) étant prévus pour assujettir la partie arrière (36) au socle (4) afin de contrôler la rotation du premier organe (32) autour de la

première cheville (44) par rapport au socle (4).

5. Chaise selon l'une des revendications précédentes, caractérisée en ce qu'elle comprend sur la deuxième partie (10) du cadre (3) un élément de cheville intermédiaire (57) parallèle à l'axe, le cadre étant articulé à l'élément de cheville intermédiaire (57).

6. Chaise selon l'une des revendications précédentes, caractérisée en ce qu'elle comprend une paire de premières couches (81, 82) de polyuréthane, dans laquelle les première et deuxième parties sont respectivement noyées.

7. Chaise selon la revendication 6, caractérisée en ce qu'elle comprend une seconde couche (83, 86) de polyuréthane, dans laquelle le mécanisme est noyé.

8. Chaise selon la revendication 7, caractérisée en ce que les premières couches (81, 80) qui noient la deuxième partie (10) sont munies d'une ouverture (82) le long de laquelle la partie arrière (61) du deuxième organe (55) s'étend avec la partie arrière correspondante (83) de la deuxième couche (83, 86), des striures parallèles à l'axe étant disposées sur la surface frontale de la partie arrière (83) de la couche.

9. Chaise selon la revendication 8, caractérisée en ce que la première couche (81) dans laquelle la première partie (9) est noyée, présente une partie centrale (84) qui est alignée avec la partie arrière (83) de la couche , et sur laquelle sont formées d'autres striures parallèles avec l'axe (15).

Patentansprüche

1. Verstellbarer Stuhl mit einem Untergestell (4), mit einem von dem Untergestell (4) getragenen Korpus (2) und mit einem Steuermechanismus zur Einstellung der Position des Korpus (2) in Bezug zum Untergestell (4), wobei der Korpus (2) einen Rahmen (3), der aus einem einen Sitz (8) definierenden ersten Teil (9) und einem eine Rückenlehne (7) definierenden zweiten Teil (10) besteht, und Gelenkmittel (15) zur Verbindung des ersten und zweiten Teiles miteinander umfaßt, um deren Relativdrehung um eine Achse zu gestatten, wobei der Mechanismus (31) ein erstes Glied (32), einen ersten Bolzen (44), der sich parallel zu der Achse (15) erstreckt und mit dem Untergestell (4) verbunden ist, um einen Drehzapfen für die Drehung des ersten Gliedes (32) auszubilden, und ein zweites Glied (55, 56) besitzt, welches einen hinteren Abschnitt (61) aufweist, der mit dem zweiten Teil (10) verbunden ist, dadurch gekennzeichnet, daß das erste Glied (32) ein fest mit dem ersten Teil (9) verbundenes vorderes Ende aufweist, daß ein zweiter, zum ersten Bolzen (44) paralleler Bolzen (53) von einem zentralen Abschnitt (35) des ersten Gliedes (32) getragen ist, und daß das zweite Glied (55, 56) ein mit dem zweiten Bolzen (53) verbundenes vorderes Ende zur Drehung um diesen bezüglich des ersten Gliedes (32) und gegen Wirkung einer Federeinrichtung (54) aufweist

2. Stuhl nach Anspruch 1, dadurch gekennzeichnet, daß das erste Glied (32) eine Platte (32) beinhaltet, die ein Paar von ersten seitlichen Vorsprüngen (52) aufweist, an denen der zweite Bolzen (53) montiert ist, daß die Feder (54) um den zweiten Bolzen (53) herumgewunden ist und das zweite Glied (55) und den zentralen Abschnitt (35) des ersten Gliedes (32) miteinander verbindet.

3. Stuhl nach Anspruch 2, dadurch gekennzeichnet, daß das zweite Glied (55) Stangen (54) umfaßt, die jeweils freie Enden aufweisen, daß die Feder (54) mit diesen freien Enden verbunden ist, und daß längenverstellbare Verbindungsmittel (67) vorgesehen sind zur Verbindung der Feder (54) mit dem zentralen Abschnitt (35) des ersten Gliedes (32).

4. Stuhl nach irgendeinem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der erste Bolzen (44) mit dem ersten Glied (32) im wesentlichen im zentralen Abschnitt (35) desselben gekuppelt ist, daß das erste Glied (32) einen hinteren Abschnitt (36) beinhaltet, der sich hinter den ersten Bolzen (44) erstreckt, und daß federelastische Mittel (45, 48) vorgesehen sind, um den hinteren Abschnitt (36) mit dem Untergestell (4) zu verbinden, um die Drehung des ersten Gliedes (32) um den ersten Bolzen (44) in Bezug zum Untergestell (4) zu steuern.

5. Stuhl nach irgendeinem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß ein zu der Achse paralleler Zwischenbolzen (57) an dem zweiten Teil (10) des Rahmens (3) vorgesehen ist, der an dem Zwischenbolzen (57) angelenkt ist.

6. Stuhl nach irgendeinem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß ein Paar von ersten Schichten (81, 80) aus Polyu-

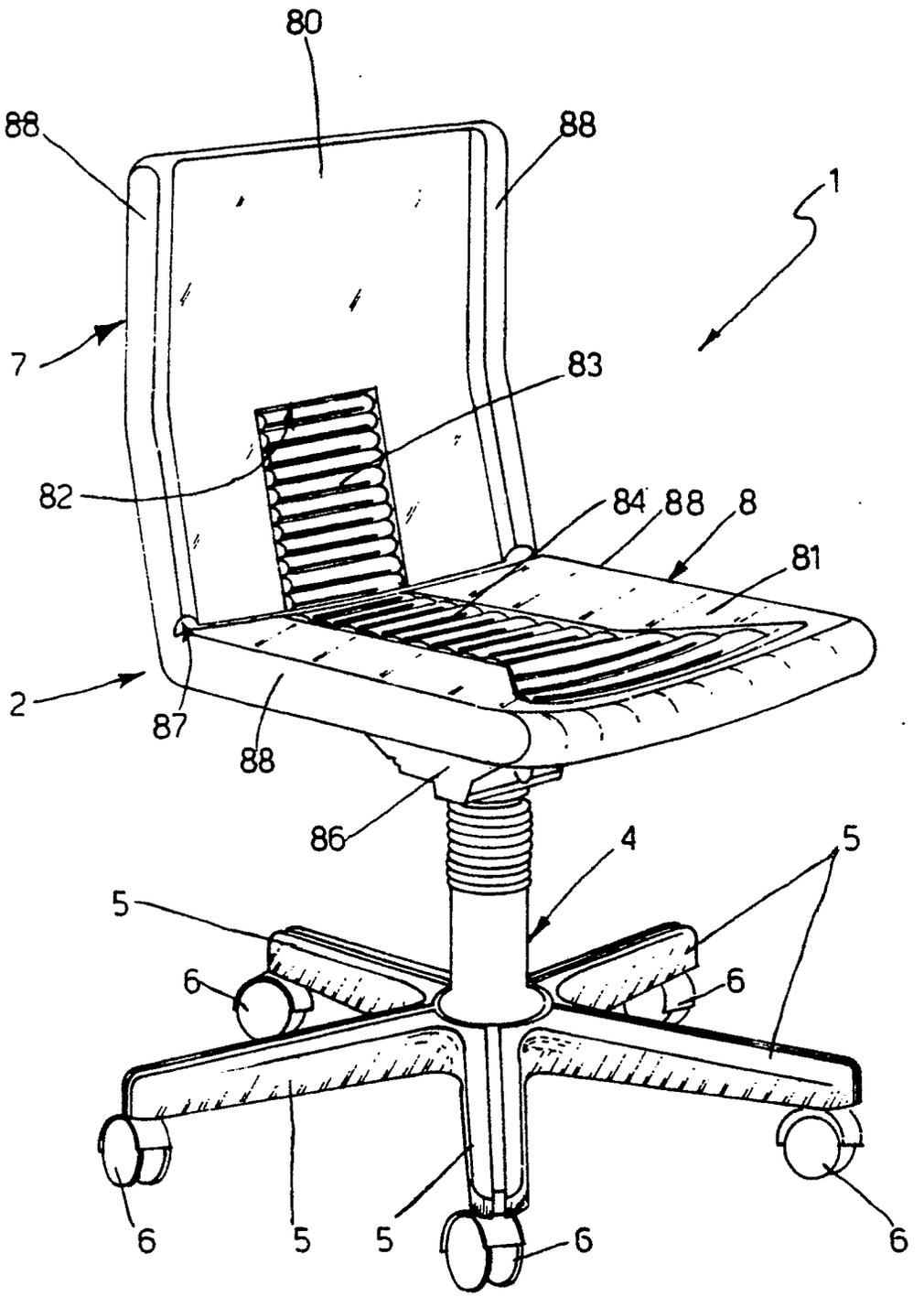
rethan vorgesehen ist, in die das erste und das zweite Teil (9, 10) eingebettet sind.

7. Stuhl nach Anspruch 6, dadurch gekennzeichnet, daß eine zweite Schicht (83, 86) aus Polyurethan vorgesehen ist, in die der Mechanismus (31) eingebettet ist.

8. Stuhl nach Anspruch 7, dadurch gekennzeichnet, daß die Schicht (80) der ersten Schichten (81, 80), welche den zweiten Teil (10) einbettet, mit einer Öffnung (82) versehen ist, längs der sich der hintere Abschnitt (61) des zweiten Gliedes (55) zusammen mit einem entsprechenden hinteren Abschnitt (83) der zweiten Schicht (83, 80) erstreckt, und daß eine Anzahl von parallel zu der Achse (15) verlaufenden Wellungen auf einer Vorderfläche des hinteren Schichtabschnitts (83) angeordnet ist.

9. Stuhl nach Anspruch 8, dadurch gekennzeichnet, daß die erste Schicht (81), in die der erste Teil (9) eingebettet ist, einen mittleren Abschnitt (84) aufweist, der mit dem hinteren Schichtabschnitt (83) ausgerichtet ist, und auf dem eine Anzahl weiterer zur Achse (15) paralleler Wellungen ausgebildet ist.

Fig.1



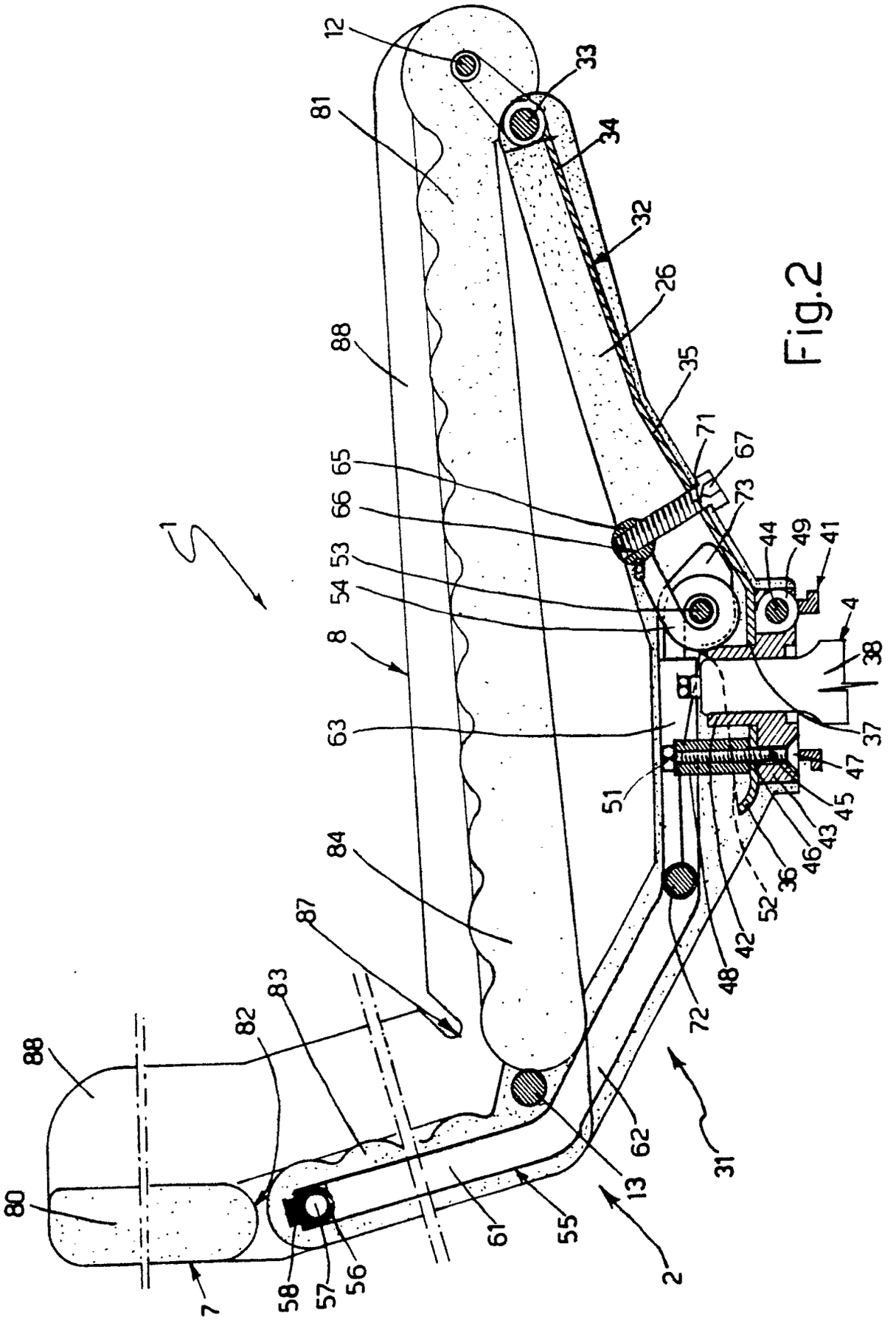

1
2
4
7
8
12
13
26
31
32
33
34
35
36
37
38
41
42
43
44
45
46
47
48
49
51
52
53
54
55
56
57
58
61
62
63
65
66
67
71
72
73
80
81
82
83
84
87
88

Fig.2

Fig.3

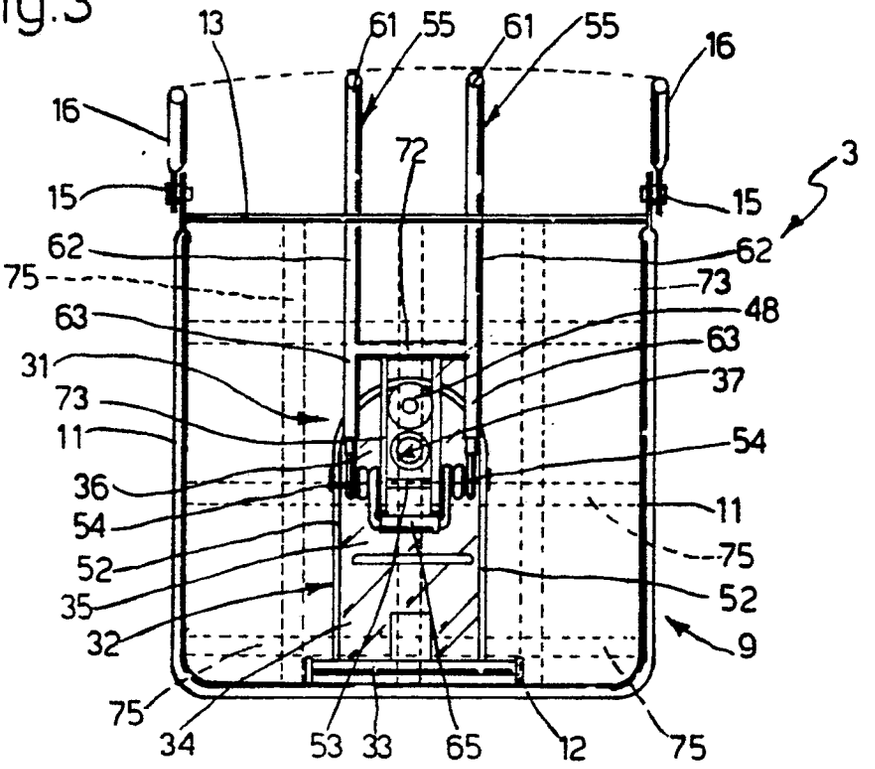
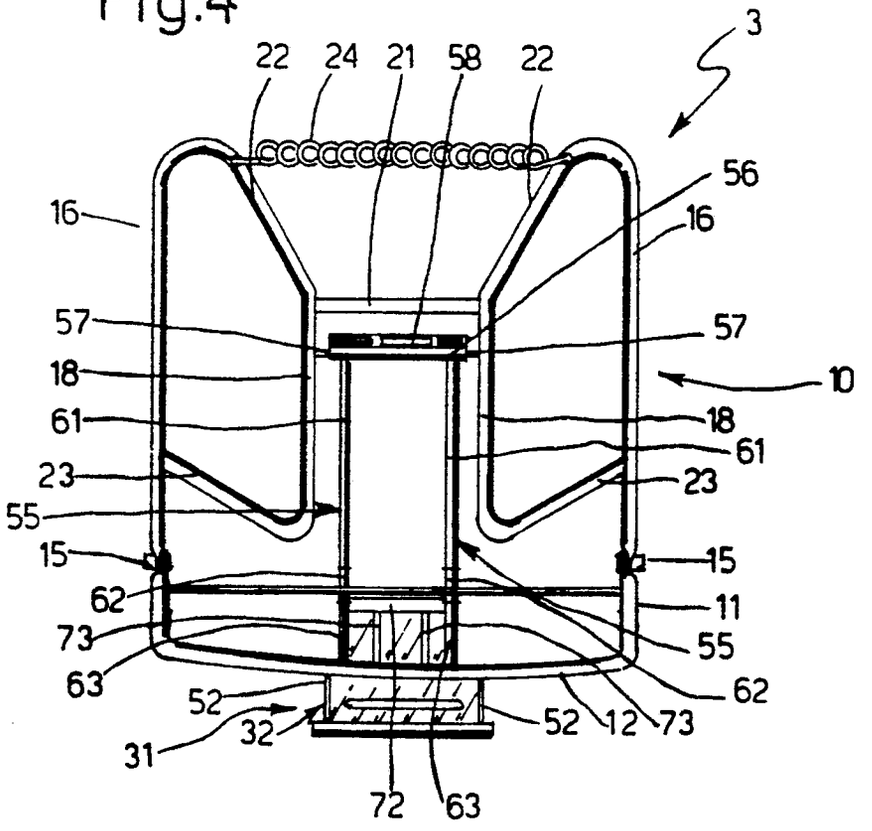

13
61
55
61
55
16
16
72
3
15
15
62
62
75
73
48
63
63
31
37
73
11
54
36
11
54
75
52
52
35
9
32
75
34
53
33
65
12
75

Fig.4


3
22
24
21
58
22
56
16
16
57
57
18
10
61
18
61
23
23
55
15
15
62
11
73
55
63
62
52
52
12
73
32
31
72
63

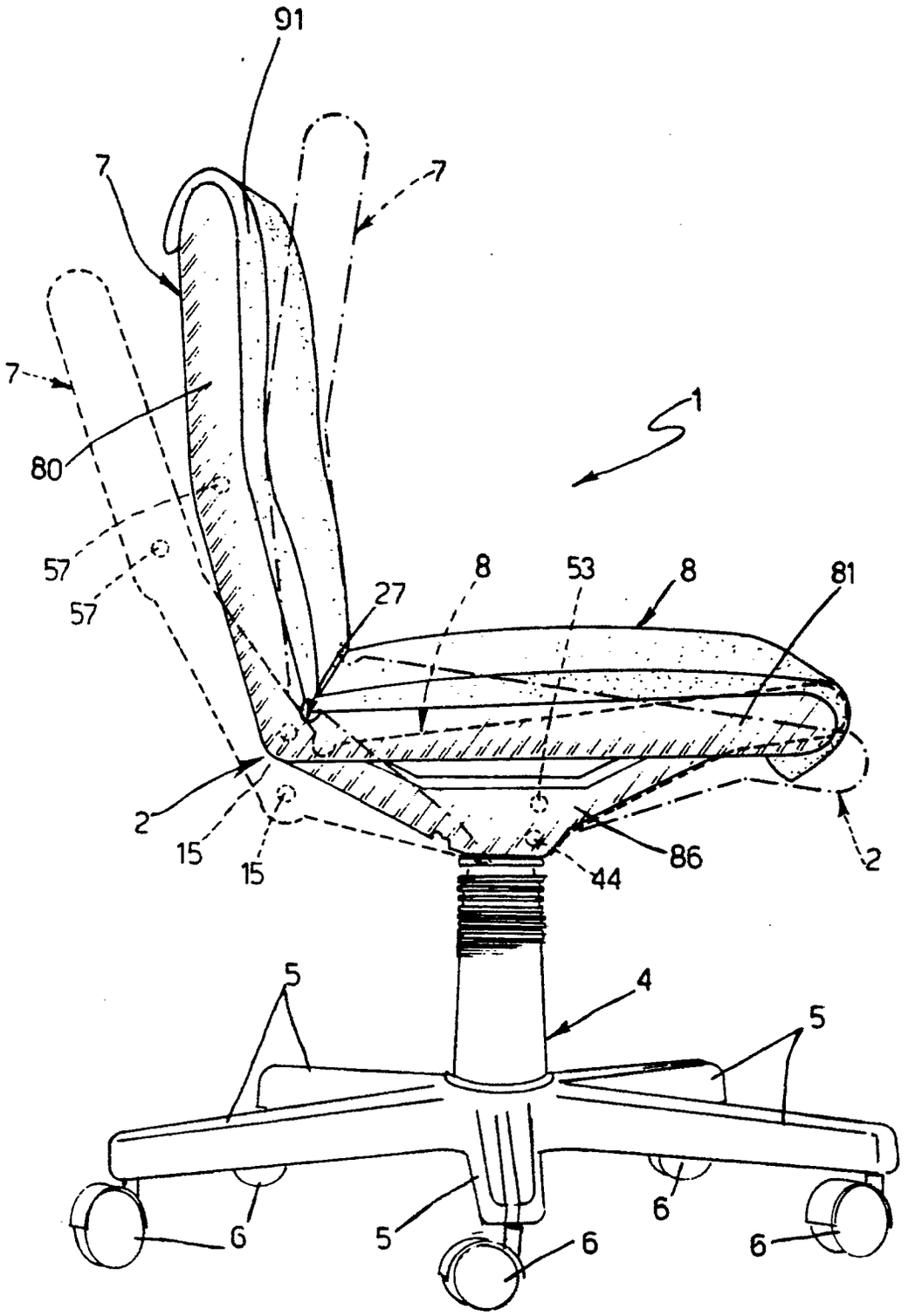


Fig.5