

(21) Application No: 0525524.5  
(22) Date of Filing: 15.12.2005

(71) Applicant(s):  
**R G E Engineering Company**  
(Incorporated in the United Kingdom)  
**Bridge Works, Godmanchester,**  
**HUNTINGDON, Cambridgeshire, PE29 2AF,**  
**United Kingdom**

(72) Inventor(s):  
**Mark Temple**

(74) Agent and/or Address for Service:  
**Maguire Boss**  
**24 East Street, ST IVES, Cambridge,**  
**PE27 5PD, United Kingdom**

(51) INT CL:  
**A47C 7/14** (2006.01) **A47C 1/023** (2006.01)  
**A47C 1/025** (2006.01) **A47C 7/24** (2006.01)  
**A47C 31/02** (2006.01)

(52) UK CL (Edition X ):  
**A4L LBSD LCC LC1 LC35 LC4 LC52 LC53 LC55**  
**A4M M4C**

(56) Documents Cited:  
**EP 0172340 A1** **US 4660887 A1**  
**US 4418958 A1**

(58) Field of Search:  
UK CL (Edition X ) **A4L**  
INT CL **A47C**  
Other: **Online: EPODOC, WPI**

(54) Abstract Title: **Padded seat with integral resilient bending region**

(57) A padded seat 14 for a chair 10, comprising: a member 20 including a first part 19 for attachment to a body 12 of a chair 10, and a second part 18 extending from the first part 19 and moveable relative thereto for relieving pressure on a user's legs when a user is sat in the seat 14, wherein the first and second parts 19,18 are one piece with a resilient integral bending region (26, Fig.3B) formed therebetween. One or both of the first and second parts may be substantially rigid, and may include a peripheral flange (34,35, Fig.3B).

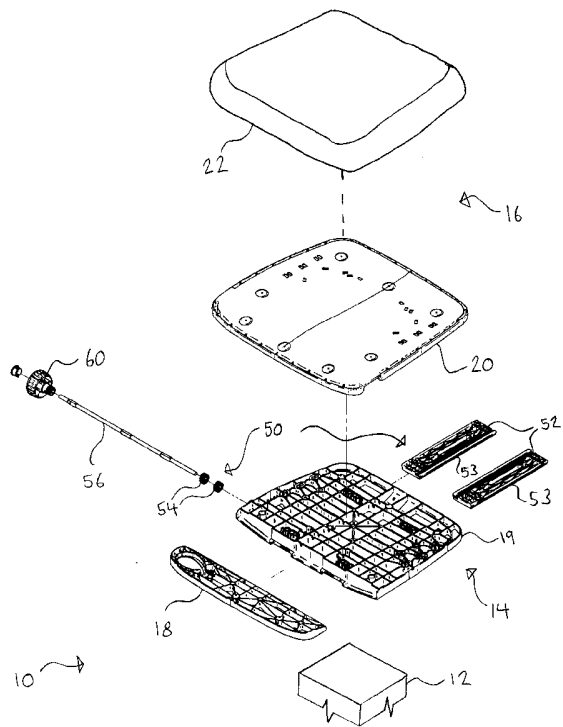


FIGURE 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

Original Printed on Recycled Paper

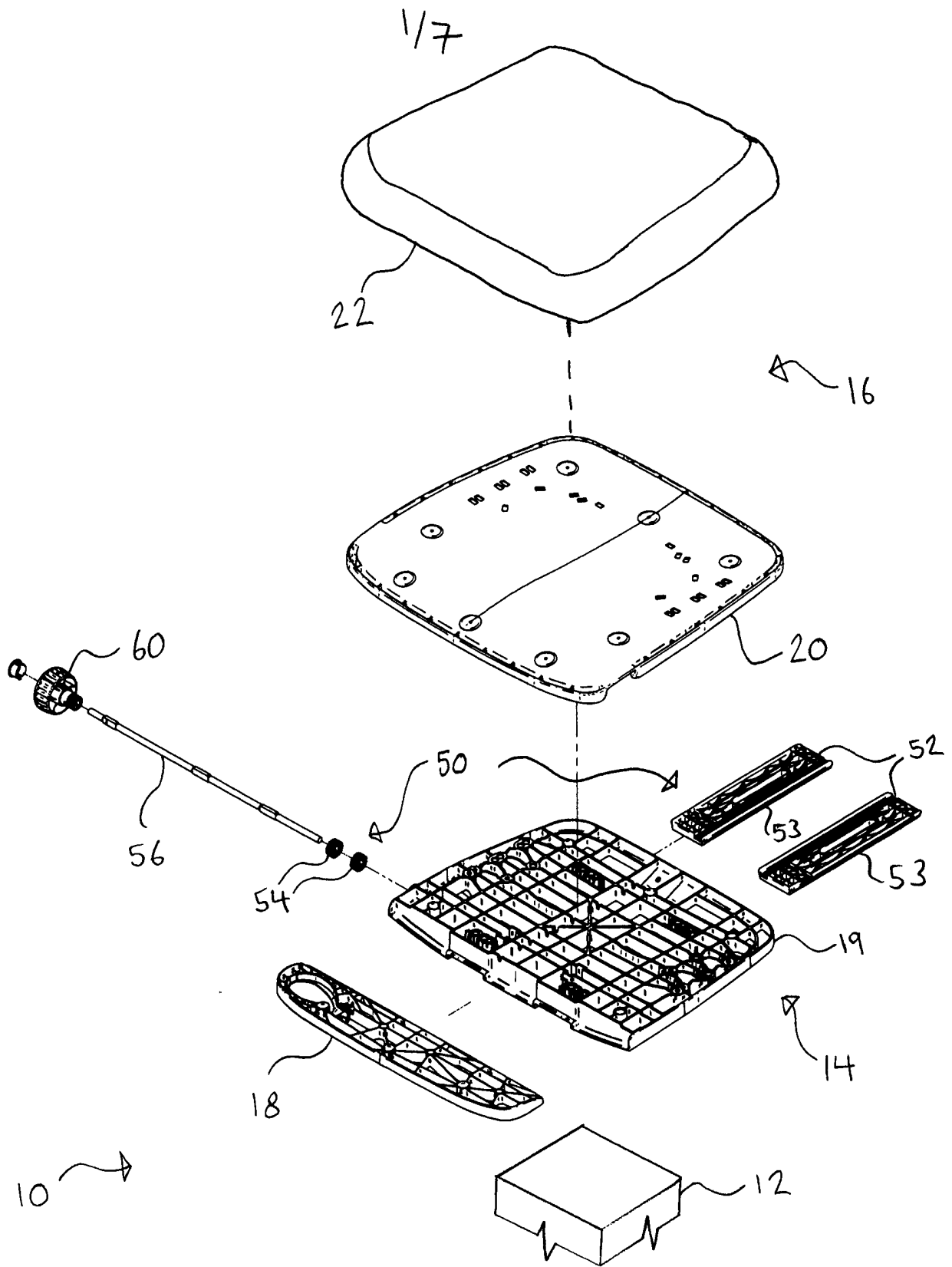


FIGURE 1

2/7

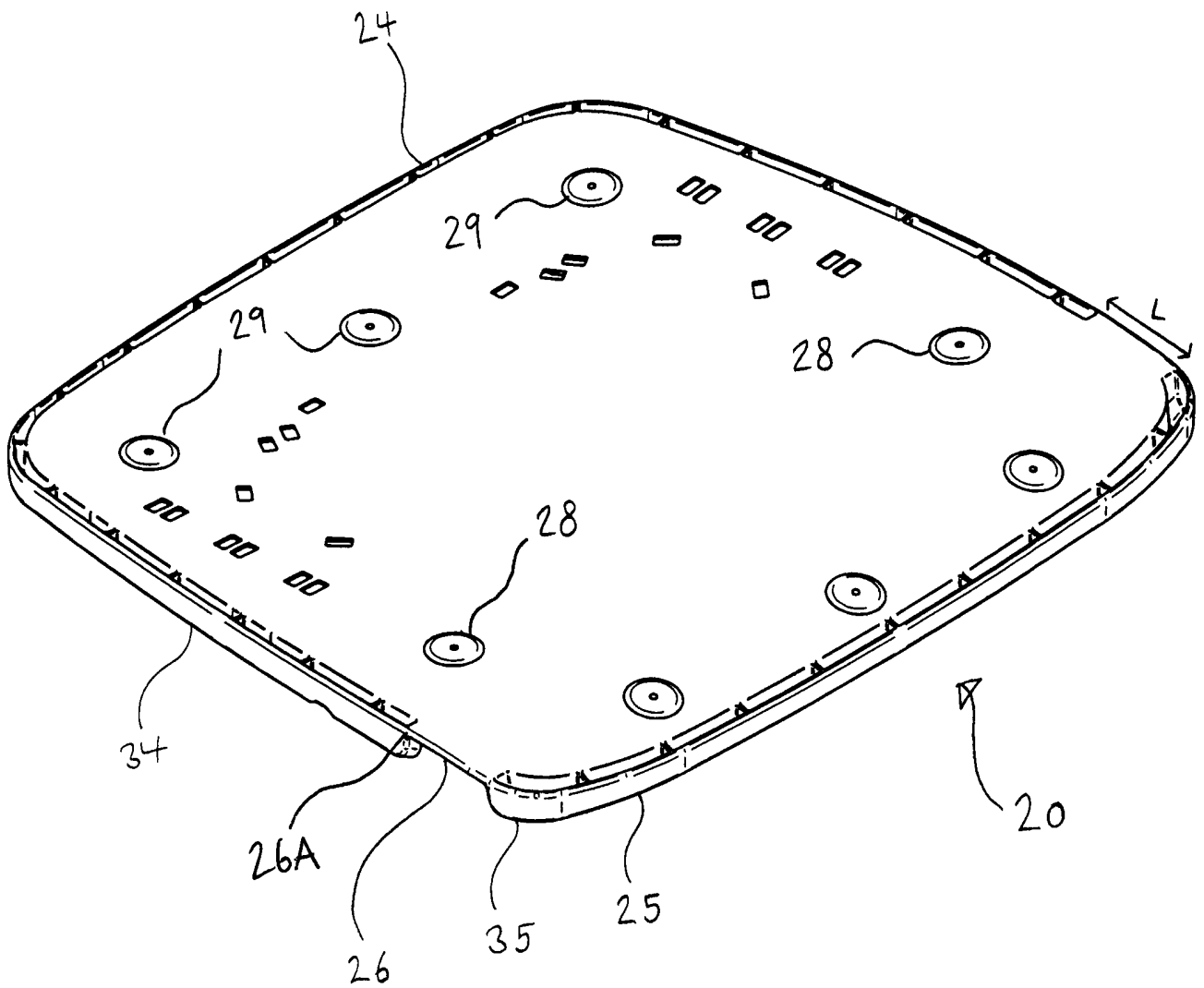


FIGURE 2

3/7

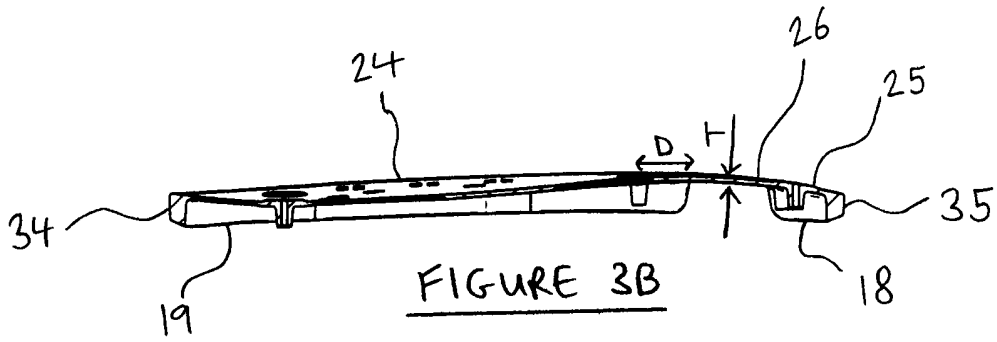


FIGURE 3B

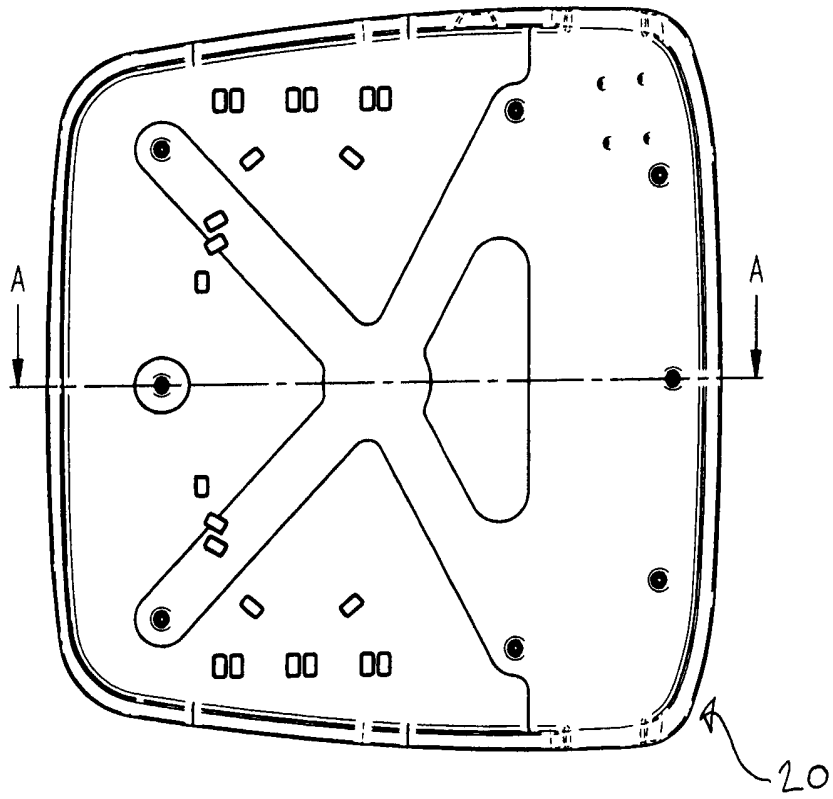


FIGURE 3A

4/7

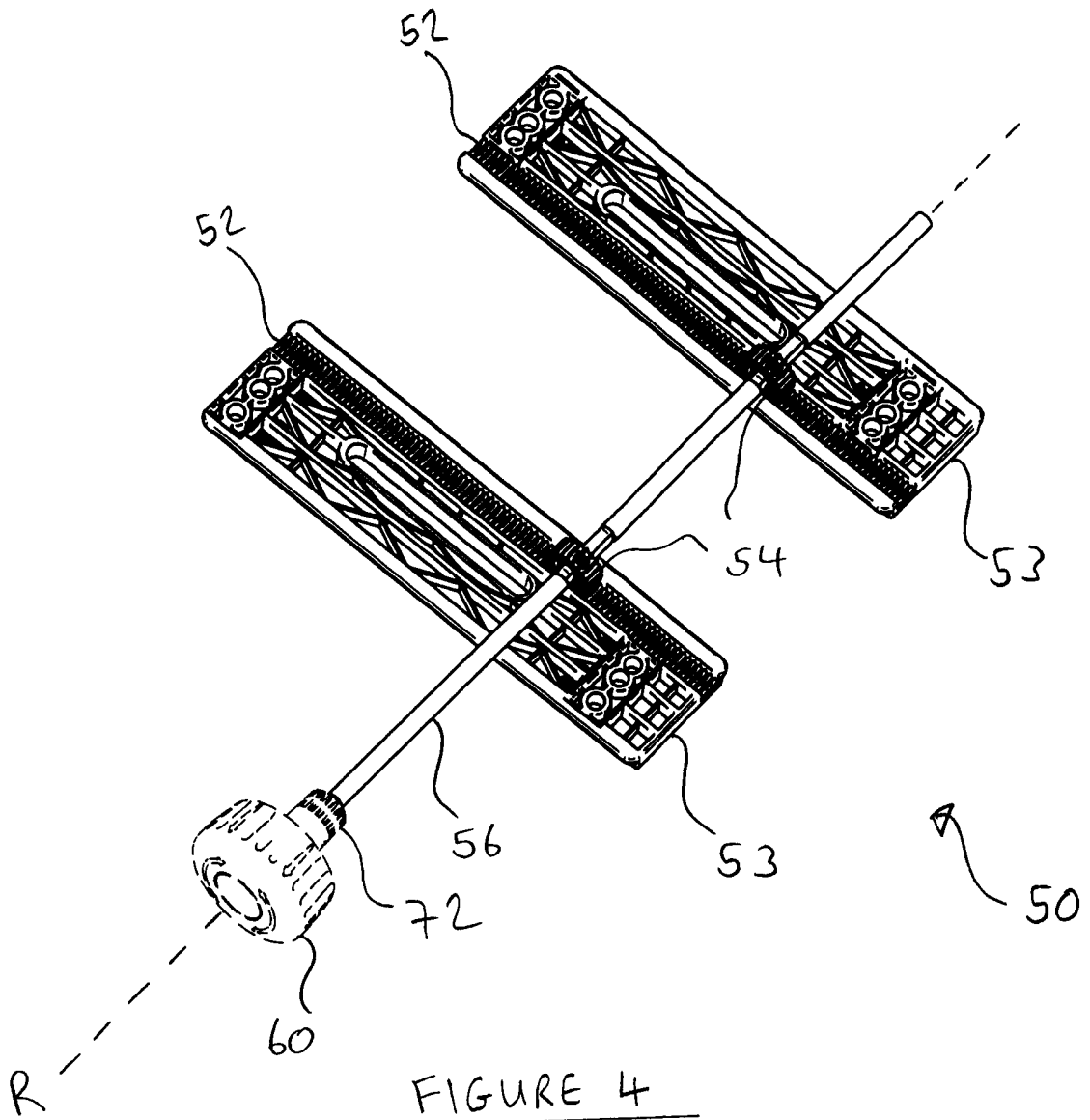


FIGURE 4

5/7

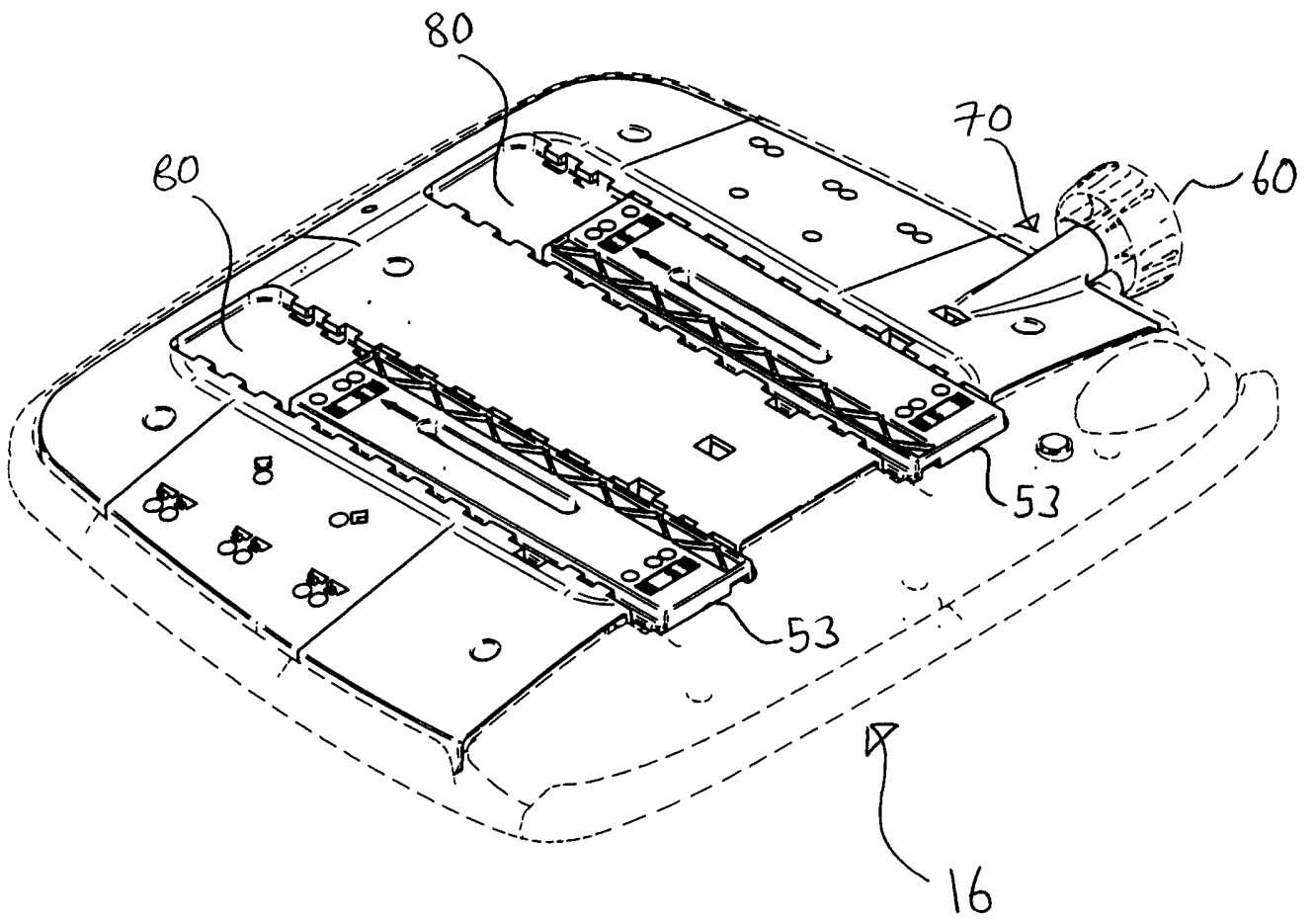


FIGURE 5

6/7

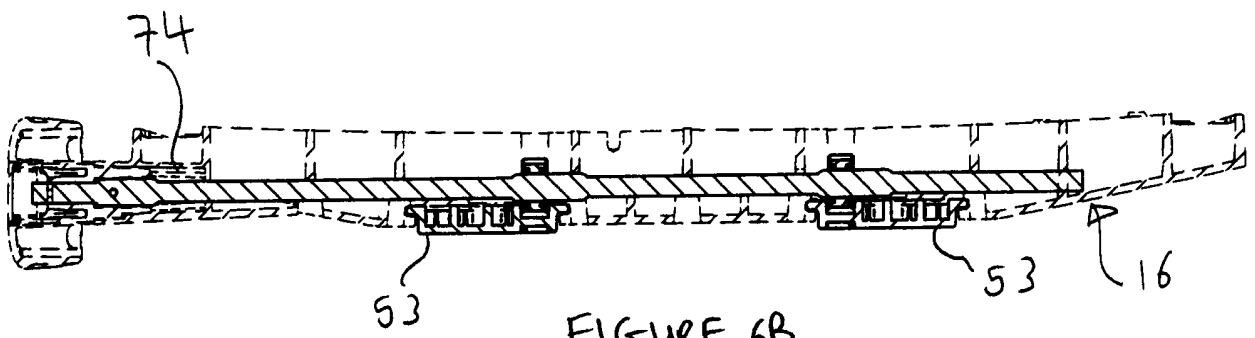


FIGURE 6B

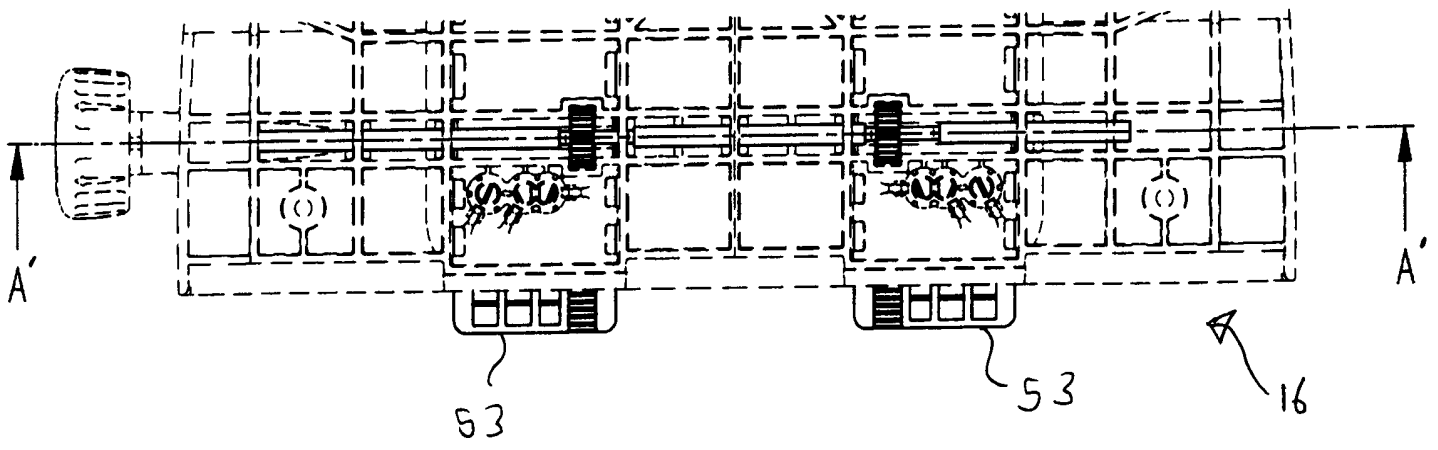


FIGURE 6A

7/7

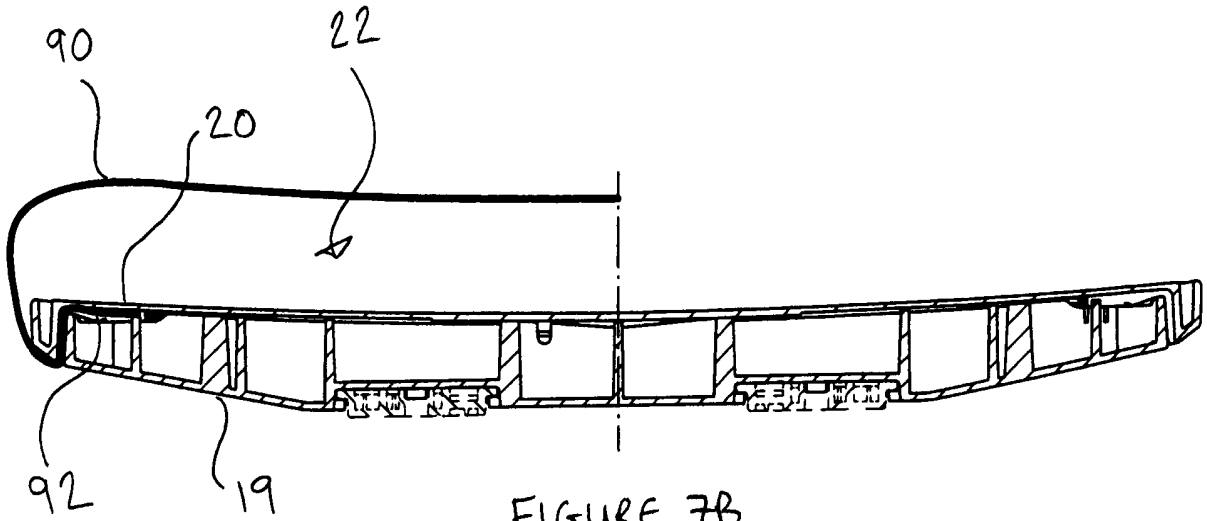


FIGURE 7B

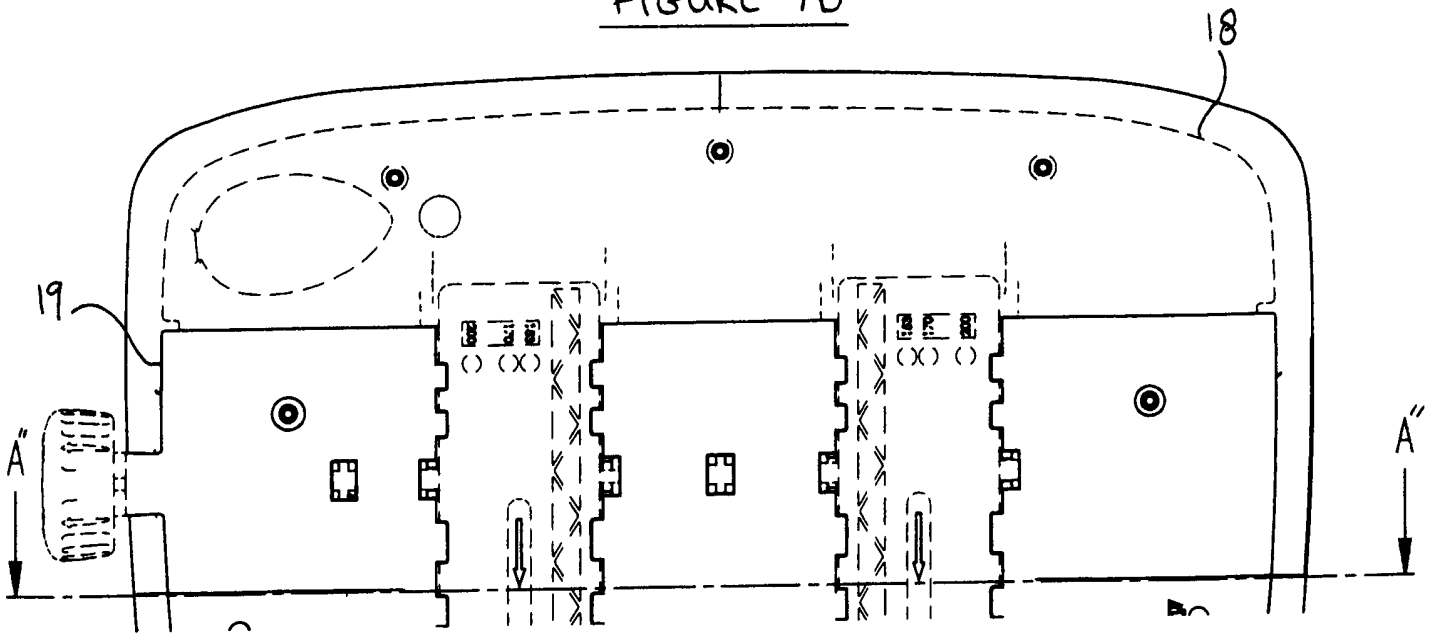


FIGURE 7A



5                    TITLE: CHAIR AND PADDED SEAT THEREFOR

10                    DESCRIPTION

15            The present invention relates generally to chairs, in particular but not exclusively chairs for use in an office environment, and to padded seats therefor.

          It is known in the art to provide an office chair having a seat with a padded front portion of gradually  
20 decreasing thickness forming a radius (commonly referred to as a "waterfall" because of its cross-sectional profile) for reducing pressure concentrations on an underside of a user's legs when sat in the chair. Although such a waterfall may provide effective relief from pressure  
25 concentrations, the visual impact of the waterfall profile is sometimes undesirable, particularly in modern designs.

          A mechanical solution to the problem of pressure concentrations has been proposed in the art. The chair

comprises a multi-element seat having a rigid front part and a rigid rear part, with the front part being pivotally connected to the rear part by means of a plurality of resilient ribs forming a hinge, whereby in use the front  
5 part pivots relative to the rear part in response to pressure applied by a user's legs. Although such an arrangement provides some reduction in pressure, a pressure concentration might still be likely to occur at the region where the front and rear parts are hinged together.  
10 Furthermore, the hinged arrangement is believed to be significantly more expensive to manufacture than a standard waterfall.

It is also known to provide office chairs with moveable supporting parts. For example, it is well known  
15 to provide a chair having a backrest which is moveable relative to a seat of the chair to accommodate users of different heights. Such moveable supporting parts are usually slidable relative to a body of the chair and are locked in position using a rotatable clamping mechanism.  
20 However, such arrangements generally require two-handed operation and may not be operable when seated in the chair.

US 5405189 discloses a height adjustment mechanism for varying the height of a backrest on an office chair, the mechanism comprising a rack and pinion arrangement  
25 configured to be operated by a hand-wheel. To prevent unwanted movement of the backrest, the hand-wheel is configured to rotate the pinion only when a force above a predetermined threshold is applied.

It is additionally known to cover a padded seat of a chair with an upholstery cover and to secure the upholstery cover to an underside of the seat using staples or the like.

5 The present applicant has identified the need for an improved chair and seats therefor which overcome, or at least alleviate, problems connected with the prior art.

In accordance with a first aspect of the present invention, there is provided a padded seat for a chair,  
10 comprising: a member including a first part for attachment to a body of a chair, and a second part extending from the first part and moveable relative thereto for relieving pressure on a user's legs when a user is sat in the seat, wherein the first and second parts are one piece with a  
15 resilient integral bending region formed therebetween.

In this way, a seat for a chair is provided which may have a substantially flat profile when not in use, and a gradually curved profile for reducing pressure on a user's legs when in use. Since the curved profile is obtained by  
20 flexure of the member itself, only a relatively thin layer of padding is required to provide an acceptable level of comfort. In use, the bending region may be configured to provide a profile which is similar to that of a conventional waterfall. Furthermore, since there is no  
25 need for separate components to form a hinge, the seat of the present invention requires minimal assembly and is thus relatively cheap to manufacture.

The chair may be a freestanding chair, e.g. an office

chair or the like. The chair may be mounted on castors.

The first part may be configured to be attached to a body of a chair (either direct to the chair or via an intermediate part, e.g. a slidable base portion) using 5 fixing means (e.g. bolts). In one embodiment, the first part is configured to be attached to a body of a chair at an attachment location spaced from the bending region.

The member may extend substantially from a front edge of the seat to a rear edge of the seat. In this way, the 10 entire structural part of the seat and the pressure-relieving part can be provided as a single component.

One or both of the first and second parts may be substantially rigid. The first and second parts may each include a peripheral flange for increased structural 15 rigidity, but terminating at the bending region.

The member may comprise plastics material. For example, the member may comprise a co-polymer such as PP (Polypropylene).

For the purposes of the present specification, the 20 bending region is defined as a region which flexes downwardly when downward pressure is applied to the second part (i.e. flexes to a position below its relaxed position). The bending region may span a length of between substantially 25mm to substantially 75mm between 25 the first and second parts. For example, the bending region may have a span length of between substantially 40mm and substantially 60mm. In addition to the span length of the bending region, careful choice of material,

thickness, and lateral extent or width of the bending region, spacing between the attachment location and the bending region, the bending region may be configured to provide a gradual bend of up to 60°.

5 In accordance with a second aspect of the present invention, there is provided a chair comprising: a body; support means mounted on the body for supporting a part of a user's body when a user is seated on the chair, the support means being moveable relative to the body for  
10 adjusting a configuration of the chair; a mechanism for moving the support means relative to the body, the mechanism including a rotatable drive shaft; a handle for rotating the drive shaft; and locking means which is moveable between a first configuration in which movement  
15 of the support means relative to the body is prevented and a second configuration in which movement of the support means relate to the body is permitted.

The chair may be a freestanding chair, e.g. an office chair or the like. The chair may be mounted on castors.

20 The locking means may be configured to engage the mechanism when in the first configuration. For example, when engaging the mechanism, the locking means may be configured to prevent rotation of the drive shaft relative to the body. In one embodiment, the locking means  
25 prevents drive shaft rotation by engaging the handle. For example, the locking means may comprise a pair of engageable profiles provided on the mechanism and the handle respectively for preventing relative rotation

therebetween. The handle may be moveable linearly along its axis of rotation between a first position in which the engageable profiles are engaged and a second position in which the engageable profiles are disengaged. In this way, a handle is advantageously provided which can provide either a driving action or a locking action depending on how it is operated. The handle may move linearly relative to the drive shaft. In another embodiment, the handle and drive shaft move linearly together between the first and second positions.

The locking means may be biased in the first configuration. For example, in the case of a handle which is moveable between the first and second positions, the handle may be biased in the first position.

The support means may be configured to move linearly relative to the body, with the mechanism being configured to convert rotation of the drive shaft into linear movement.

In one embodiment, the mechanism comprises a rack and pinion arrangement. In this way, rotational movement of the handle may be converted to linear movement of the support means with a high degree of control. The rack may be mounted to the body and the pinion may be rotatably mounted to the seat.

The support means may comprise a seat. The handle may be located on the seat.

The support means may comprise a backrest. The mechanism may further comprise a bias (e.g. counterweight)

for maintaining the backrest in any raised position relative to the body.

The support member and the body may have slidably engageable parts for guiding movement of the support member relative to the body. The slidably engageable parts may comprise a channel and one or more sliders for sliding engaging the channel. The sliders and/or the channel may comprise low-friction plastics material, e.g. self-lubricating nylon. In the case that the support means comprises a seat, the position of the seat may be adjusted whilst a user is seated in the chair.

In accordance with a third aspect of the present invention, there is a method of upholstering a padded support member for a chair, comprising: providing a cover (e.g. fabric cover) for covering a padded support member, the cover having a perimeter and constricting means for reducing the perimeter and resisting subsequent enlargement of the perimeter once fitted around the support member; fitting the cover around the support member; using the constricting means to reduce the perimeter of the cover, and prevent subsequent enlargement of the perimeter to maintain tension in the cover; and clamping the cover to the support member using clamping means.

In this way, a method of upholstering a padded support member is provided which is both quick and easy to perform. Furthermore, by using separate constricting means and clamping means, the constricting means may be

readily concealed from view in or behind the clamping means.

The chair may be a freestanding chair, e.g. an office chair or the like. The chair may be mounted on castors.

5 The constricting means may be used to pull the cover taut.

The constricting means may comprise a resilient member. The resilient member may extend around the perimeter of the cover. In this way, the cover is  
10 automatically placed in tension once it has been fitted around the support member. In another embodiment, the constricting means comprises drawstring means. The drawstring means may extend around the perimeter of the cover. Free ends of the drawstring means may be drawn to  
15 pull the cover taut around the support member. The free ends of the drawstring may then be secured by tying a knot therein or by clamping each free end using clip means (e.g. a toggle).

The clamping means may comprise a member configured  
20 to be attached to a corresponding member of the support means. One or both of the member and the corresponding member may be substantially rigid. One or both of the member and the corresponding member may be substantially plate-like.

25 In accordance with a fourth aspect of the present invention, there is provided a chair comprising: a padded support member; a cover for covering the padded support member, the cover having a perimeter; and means for



clamping the cover to the support member; wherein the cover comprises a resilient member or drawstring means for reducing the perimeter and resisting subsequent enlargement of the perimeter once fitted around the support member.

The chair may be a freestanding chair, e.g. an office chair or the like. The chair may be mounted on castors.

The resilient member or drawstring means may extend around the perimeter of the cover.

10 The clamping means may comprise a member configured to be attached to a corresponding member of the support means. One or both of the member and the corresponding member may be substantially rigid. One or both of the member and the corresponding member may be substantially  
15 plate-like.

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

Figure 1 is an exploded schematic partial view of a  
20 seat embodying the present invention;

Figure 2 is a schematic perspective view of a part of the seat of Figure 1;

Figure 3A is a schematic underside view of the part of the seat shown in Figure 2

25 Figure 3B is a schematic cross-sectional view of the part of the seat shown in Figure 2 along section A-A;

Figure 4 is a schematic perspective view of further parts of the seat of Figure 1;

Figure 5 is a schematic perspective view of the underside of the seat of Figure 1;

Figure 6A is a partial schematic plan view of parts of the seat of Figure 1;

5 Figure 6B is a schematic cross-sectional view of the parts of the seat shown in Figure 6A along section A'-A';

Figure 7A is a schematic underside view of parts of the seat of Figure 1; and

Figure 7B is a schematic cross-sectional view of the 10 parts of the seat shown in Figure 7A along section A''-A''.

For clarity, different aspects of the present invention will now be described under different headings.

#### Passive Waterfall

Figure 1 shows parts of a free-standing office chair 15 10 comprising a body 12 and a seat 14 mounted on the body 12. The seat 14 comprises padded support means 16 and front and rear base parts 18 and 19 respectively. Support means 16 includes a member 20 and a layer of padding 22 for covering the member 20.

20 As shown in more detail in Figures 2-3B, member 20 comprising rigid first part 24 and a rigid second part 25 extending from the first part 24 and moveable relative thereto for relieving pressure on a user's legs when a user is sat in the seat 10. The first and second parts 24, 25 25 are formed in a single piece with a resilient bending region 26 formed therebetween.

The first and second parts 24, 25 each include a respective peripheral flange 34, 35 for increased

structural rigidity. The bending region 26 has a span of length "L" extending between flanges 34, 35. The member 20 is formed from ABS, with the thickness "T" of the bending region 26 being 3mm. Length "L" is optimally chosen to be 5 50mm.

The member 20 extends substantially from a front edge of the seat to a rear edge of the seat, and from one lateral side of the seat to an opposed lateral side (i.e. the member 20 defines an outer peripheral profile of the 10 seat) and is configured to receive the layer of padding 22.

The first part 24 is configured to be bolted to rear base portion 19 using front and rear sets of bores 28,29. The front set of bores 28 are separated from a first bending point 26A (the bend datum) of the bending region 26 by 15 distance "D" which is 34mm in length. The length "L" of the bending region 26 is substantially the same as that of the second part 25.

In use, a user sitting on the chair applies pressure through their legs to the second part 25 and causes the 20 second part 25 and bending region 26 to move downwardly relative to the first part 24 to form a waterfall-like profile for reducing pressure on the user's legs. Once the pressure is removed from the first part 24, the resilient bending region 26 causes the member 20 to return to its 25 original substantially flat position.

#### Adjustable support

The office chair 10 further comprises a mechanism 50 for moving the seat 14 relative to the body 12. As shown

most clearly in Figures 4-6B, mechanism 50 comprises a pair of racks 52 each mounted on a slider 53 for attaching to a body of the chair, and a pair of pinions 54 each rotatably mounted to a rotatable drive shaft 56 housed in the rear 5 base portion 19 of the seat 14. A handle 60 configured to be rotated by a user's hand is provided for rotating the drive shaft 56 and is mounted externally to the side of rear base portion 19. Locking means 70 is provided for positively locking the handle 60, and consequentially 10 locking the drive shaft 56 and the support means 16 in a selected position relative to the body. The locking means 70 comprises a pair of engageable profiles 72, 74 provided on the mechanism 50 and the handle 60 respectively for preventing relative rotation therebetween. The handle 60 15 is moveable along its axis of rotation "R" relative to the drive shaft 56 between a first position in which the engageable profiles 72, 74 are engaged (i.e. the locked configuration) and a second position in which the engageable profiles 72, 74 are disengaged. A spring (not 20 shown) is used to bias handle 60 in the first position.

The rear base portion 19 comprises a pair of channels 80 each for slidably receiving a slider 53. The sliders 53 comprise a plurality of channel-engaging ridges or castellations for minimising friction caused by contact 25 between the sliders 53 and the channels 80. To further reduce friction, the sliders 53 and the channels 80 are each formed from self-lubricating nylon.

When in the second position, a user may rotate handle

60 to cause linear movement of the seat 14 relative to the body 12. In this way, the seat 14 is moveable relative to the body of the chair, thereby allowing the chair to be moved relative to a backrest (not shown) even when the user 5 is sat in the seat.

#### Upholstery Management

As illustrated in Figures 7A-7B, support means 16 is upholstered using a fabric cover 90 having a periphery 92 with a drawstring (not shown) extending around the 10 perimeter 92 for reducing the periphery once the fabric cover 90 has been placed around the support means 16. Once fitted around the support means 16, the fabric cover 90 is pulled taut using the drawstring and the tension in the fabric cover is maintained by coupling free ends of the 15 drawstring together at a point where the drawstring emerges from the fabric cover (e.g. using a sliding toggle or the like). Front base portion 18 of the seat 14 is then attached to the member 20 to clamp a front portion of the periphery 92 of the upholstery cover 90 in place, followed 20 by the step of attaching the member 20 to rear base portion 19 of the seat 14 to clamp a rear portion of the periphery 92 of the upholstery cover 90 in place.

CLAIMS

1. A padded seat for a chair, comprising:  
a member including a first part for attachment to a body of a chair, and a second part extending from the  
5 first part and moveable relative thereto for relieving pressure on a user's legs when a user is sat in the seat, wherein the first and second parts are one piece with a resilient integral bending region formed therebetween.
2. A seat according to claim 1, wherein the first part  
10 is configured to be attached to a body of a chair at an attachment location spaced from the bending region.
3. A seat according to claim 1 or claim 2, wherein the member extends substantially from a front edge of the seat to a rear edge of the seat.
- 15 4. A seat according to any of the preceding claims, wherein one or both of the first and second parts are substantially rigid.
5. A seat according to claim 4, wherein one or both of the first and second parts includes a peripheral flange.
- 20 6. A seat according to any of the preceding claims, wherein the bending region spans a length of between substantially 25mm to substantially 75mm between the first and second parts.
7. A seat according to claim 6, wherein the bending  
25 region has a span length of between substantially 40mm and substantially 60mm.

Application No: GB0525524.5

Examiner: Mr Nick Smith

Claims searched: 1-7

Date of search: 15 March 2006

**Patents Act 1977: Search Report under Section 17**

**Documents considered to be relevant:**

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-7	US 4660887 A1 (FLEMING) See Figs. 9 & 14 and col. 8, lines 23-32
X	1-7	US 4418958 A1 (WATKIN) See Fig. 1, col. 4, lines 1-7 and col. 5, lines 42-52
X	1-7	EP 0172340 A1 (HUELS) 26.02.86 (See Figs. 1 & 11 and WPI Abstract Accession No. 1986-056299/09)

**Categories:**

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

**Field of Search:**

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>X</sup> :

A4L

Worldwide search of patent documents classified in the following areas of the IPC

A47C

The following online and other databases have been used in the preparation of this search report

Online: EPODOC, WPI