June 4, 1963 F. DRABERT 3,092,417

ORTHOPAEDIC SEATING DEVICE

Filed Oct. 12, 1959

3 Sheets-Sheet 1

Fig. 1

Fig. 2

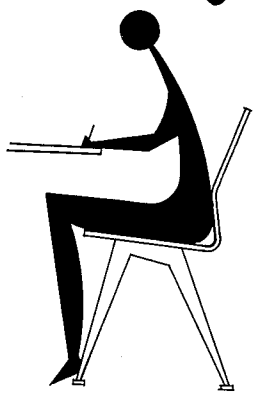


Fig. 3

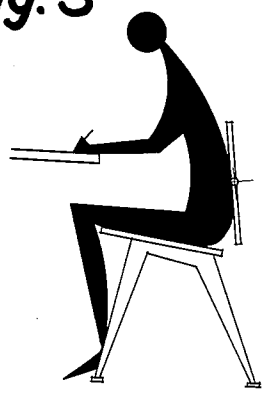


Fig. 4

Fig. 5

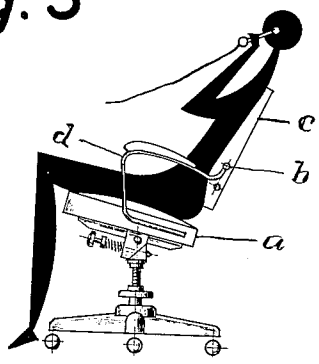
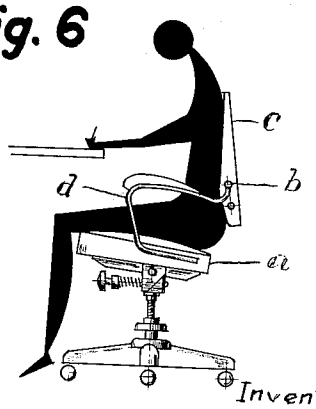


Fig. 6



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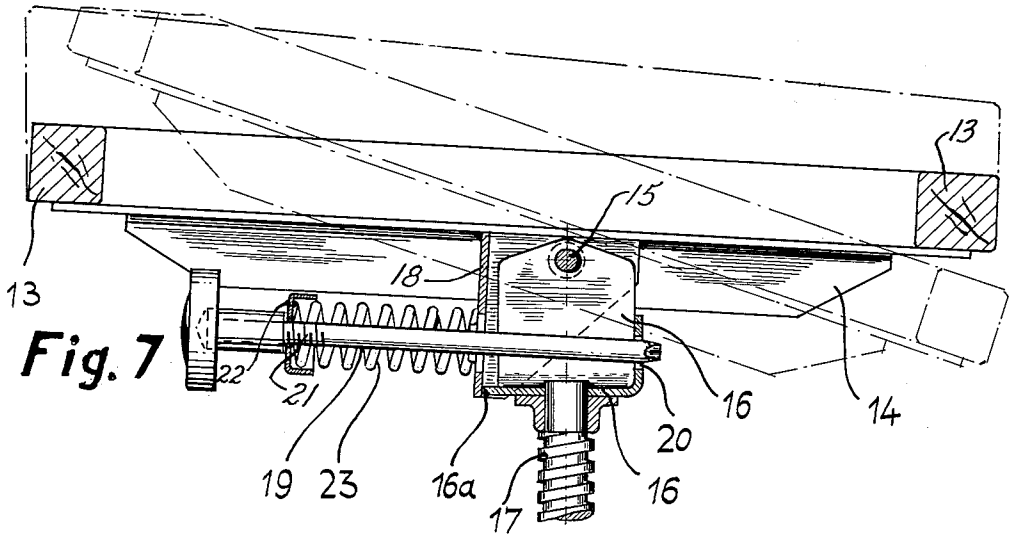
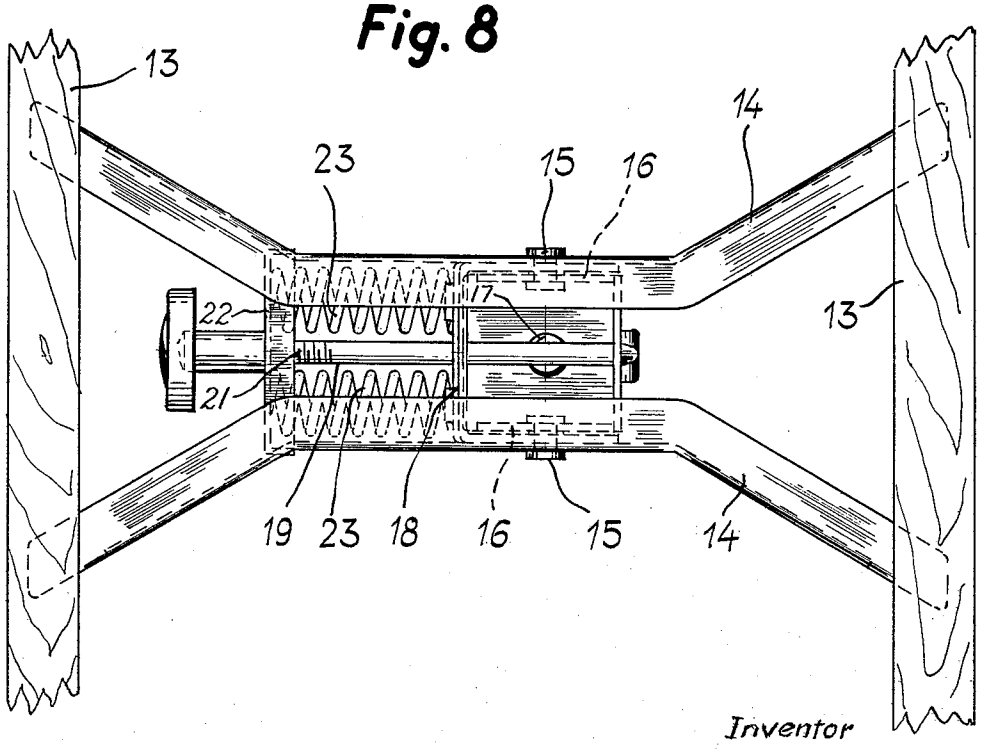


Fig. 7

Fig. 8



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ORTHOPAEDIC SEATING DEVICE

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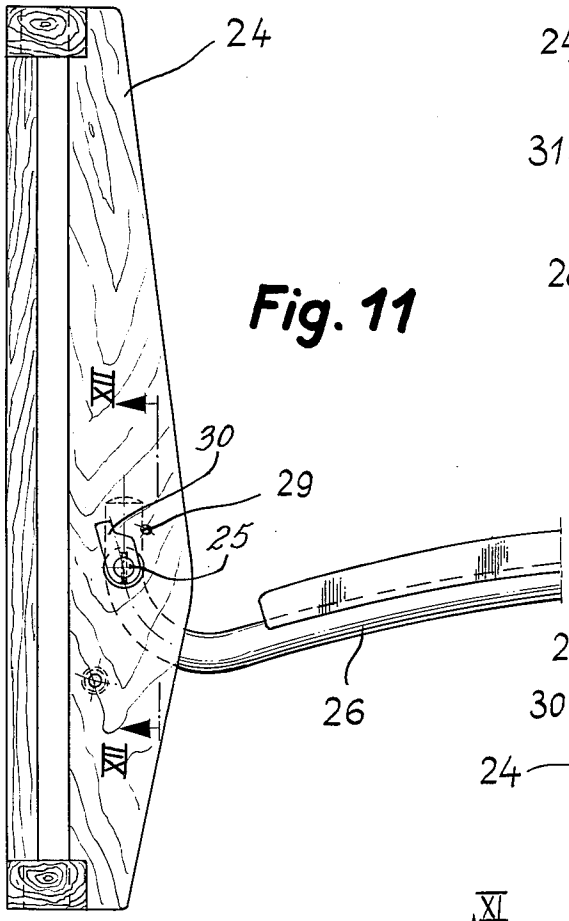
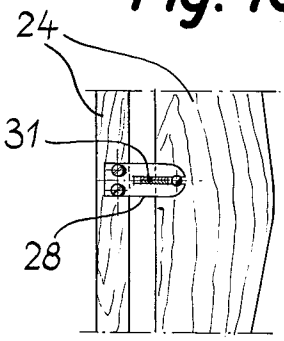


Fig. 11

Fig. 10



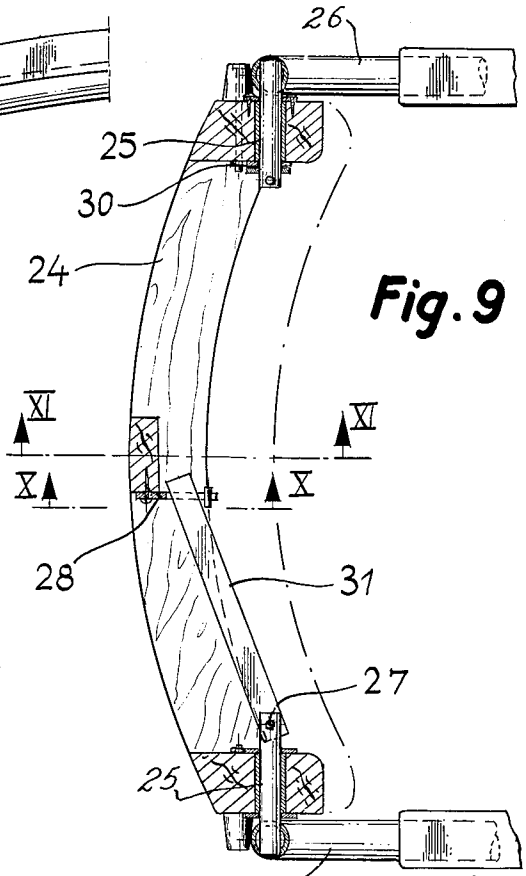


Fig. 9

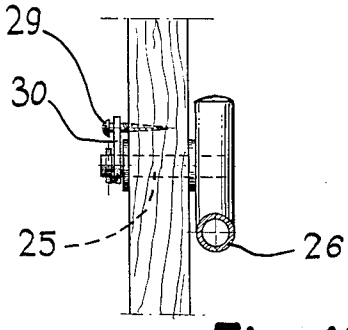


Fig. 12

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ORTHOPAEDIC SEATING DEVICE

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4 Claims. (Cl. 297—291)

The invention is concerned with the problem of producing an orthopaedic seating device which provides a perfect back-support for its user as well in the writing position as in the reading position. Up to the present, no solution of this problem has been proposed which meets all the requirements.

The nearest approach to a solution of the problem is the form of back-support of chairs in the so-called Akerblom line, being a back support which supports the incurve or "lordose" of the loin region close above the pelvis.

It is true that chairs with such a form of back-support are advantageous for one particular body attitude. However they offer no satisfactory body support in very different body attitudes since, in the extreme cases, they can be designated "writing-position" or "reading-position." FIGURES 1 and 2 of the accompanying drawings show schematically a chair having a fixed Akerblom back-support on which a person is seated first in the reading position and secondly in the writing position. The chair shown in FIGURES 1 and 2 is clearly good from a technical point of view in the reading position of FIGURE 1. In the writing position shown in FIGURE 2 however, support is provided at only one point of the back so that in this case after a time the pressure becomes painful.

In chairs commonly constructed with a back-support, it has been proposed to provide a back support which is straight from top to bottom and is mounted on a swivel bearing whose axis is located approximately midway along the length of the back-support. Such a chair is shown in FIGURES 3 and 4. The pivoting of the back-support certainly eliminates the support at a single point of the back as mentioned above. Nevertheless this provides no satisfactory support for the back either in the writing position or in the reading position. It fails in both positions to support the incurve of the back above the curve of the loins since, owing to the high position of the swivels of the back support, the back is supported too far above the surface of the seat.

The present invention is based on the realisation that the aged-old problem of correct seat construction is solved when the following features are present:

(*a*) The back support must be of convex form (Akerblom line) in other respects however it should fit the curve of the back (concave);

(*b*) The back-support must be pivotable;

(*c*) The swivel axis of the back-support which reaches down to the curved part of the loin must lie above the convex protrusion of the back-support.

When furthermore the seat also is pivoted about a horizontal axis, the best result is obtained.

The back-support described should serve not only for supporting the back but equally as an orthopaedic exercising device. The anatomically formed back-support, reaching down as it does into the curved region of the loin should effect exercising of the back muscles for overcoming lordosis, and for the time being straightening the spine in the loin region when the user changes from the sitting to the reading position. The device therefore provides not only a support for the back, but also therapy through movement.

When the user of the new orthopaedic seating device leans against the back-support he presses unconsciously

on the upper longer arm of the lever constituted by the back-support and thereby presses the lower shorter arm of the lever against the curve of his loin region.

The user is therefore capable himself of varying this pressure against the spinal vertebrae, that is to say to regulate it weaker or stronger.

If the seat is likewise pivotally mounted, and this pivotal axis is parallel to the pivotal axis of the back-support, the back-support and seat can to a large extent be adjusted with respect to one another. In this way, it is possible to occupy different sitting attitudes. This is important, since according to medical and physiological research into the best form of seating furniture a change of sitting attitude is desirable, and by prolonged use of a good seat, tired muscles can gradually be relieved. In the seating device according to the present invention, the seat and back-support can be automatically co-ordinated in use. The seat is not fixed, but at the same time is not floating, that is to say it is not movable laterally as in the case of many known forms of chair. The seat is pivoted oscillating on a chassis support so that it can turn about a horizontal axis forwards and backwards. Accordingly the back-support which likewise oscillates about a horizontal axis adjusts itself to the user in response to a very slight pressure from the body and follows each movement.

In the drawings, FIGURES 5 and 6 show by way of example one embodiment in accordance with the invention in two different positions, namely the reading position in FIGURE 5 and the writing position in FIGURE 6.

According to FIGURE 5 the seat *a* is inclined a comparatively long way back. In this example the pivotal axis *b* of the back-support *c* is fixed to the seat *a*, namely by the arm-supports *d*. The greater the backward inclination of the seat *a*, the further is the axis *b* of the back-support moved backwards. This leads to a perfect adaptation of the back-support and seat for the reading position of the body.

In FIGURE 6 the user of the seating device is in the writing position. It will be seen that the back-support *c* follows the forwardly inclined position of the body, so that in the writing position also good support for the back is provided. In this case the seat requires a large surface which again results from the ability of the seat to pivot.

FIGURE 7 of the drawing shows an elevation, part in section, of a chair seat having below it, part cut away, an arrangement for adjusting the inclination of the seat, the inclined position of the seat being shown in broken lines;

FIGURE 8 is a plan view of the arrangement of FIGURE 7;

FIGURE 9 is a horizontal section through the back-support and its mounting;

FIGURE 10 is a section on the line X—X of FIGURE 9;

FIGURE 11 is a section on the line XI—XI of FIGURE 9 and

FIGURE 12 is a section on the line XII—XII of FIGURE 11.

Below the frame **13** of the chair seat, two bent angle-iron members **14** are fastened. These are connected by means of pivot pins **15** to a bracket **16** which rests on a screw-threaded spindle **17**, the latter forming the support-column for the chair. To the angle-iron members **14**, a plate **18** is rigidly connected which, in the normal position of the seat, engages an edge **16***a* of the bracket and thereby limits the forward inclination of the seat.

A spindle **19**, **20**, which is rotatable but not displaceable, is fitted in the bracket. A part **21** of the spindle **20** is screw-threaded and adjustably supports a spring

plate 22. Against this spring plate, two springs 23 press, the opposite ends of which rest on the plate 18. The springs 23 limit the inclination of the chair seat in the backward direction (that is the clockwise direction in the drawing). This backward inclination is represented in FIGURE 7 by the broken lines.

The back-support 24 shown in FIGURES 9 to 12 is rotatably supported on the bolts 25 which are fastened to arms 26 formed by steel tubes which extend at a slight downward inclination in the rearward direction and terminate at their rearward ends in pivots for the back-support. These steel tubes thus constitute cantilever arms. It will be evident that the horizontal pivotal axis of the back-support, which is adjacent the loin region of the user of the chair, lies in a horizontal plane which intersects the arms 26 at a position forward of the back-support. The normal position of the back-support 24 can be controlled by a leaf-type torsion spring 31 of which one end 27 is fastened to one of the bolts 25 and the other end rests in a forked metal plate 28 which is fixed to the back-support 24. The pivotal movement of the back-support is limited by a pin 29. Against this pin a finger 30 can rest, the finger being fastened to the non-rotatable bolt 25.

I claim:

1. An orthopaedic seating device comprising in combination a seat, means for supporting the seat above the floor, means mounting said seat for pivotal movement about a stationary axis in a backward direction in response to a backward movement by the user and in a forward direction in response to a forward movement by the user, a back-support arranged to extend down into the loin region of the user and having a protrusion for fitting and supporting this region of the user, pivots supporting said back-support on a horizontal pivotal axis for backward tilting movement in response to the user leaning backwards and for forward tilting movement in response to the user leaning forwards, arm support means rigidly attached on the one hand to the seat and on the other hand to the pivots, said arm support means lying closely adjacent to the horizontal plane which contains said horizontal pivotal axis, a torsion spring and means rigidly connecting said spring at one end to said back-support and at its opposite end to said arm support means.

2. An orthopaedic seating device according to claim 1 wherein said arm support means comprise a pair of cantilever arms, said arms being disposed on opposite sides of said seat and each comprising a first upwardly-directed portion, means rigidly securing said first portion to the seat, and a second rearwardly-directed portion integral with said first portion and supporting one of said back-support pivots.

3. An orthopaedic seating device according to claim 2 wherein each said rearwardly-directed arm portion includes an upwardly-curved terminal portion, said pivot being located in said terminal portion.

4. An orthopaedic seating device according to claim 3 wherein said arms are tubular, and including a pair of arm-supporting pads and means securing each pad to one of said arms.

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