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EP 0 792 604 A1

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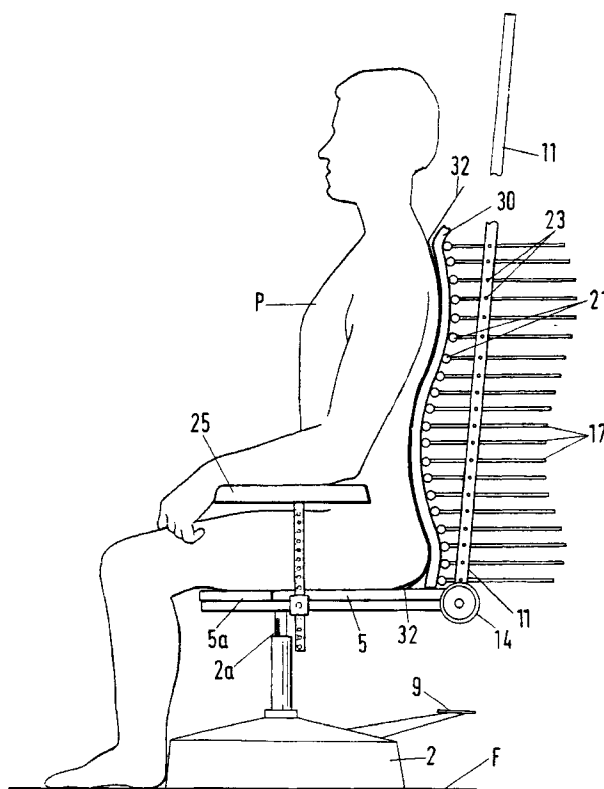
EUROPEAN PATENT APPLICATION

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Clondalkin, Dublin24 (IE)**(54) Apparatus and method for use in the design of orthopaedic chairs**

(57) The apparatus comprises a chair (1) and a contour measuring device (7) which includes a generally up-right member (11) having a plurality of rods (17) slideably mounted relative thereto. The rods (17) are arranged in parallel side by side relationship along the length of the member (11) in a common plane. Each rod (17) has a transversely disposed tube (21) at its tip for engaging

the back of a person (P) sitting in the chair (1). The method includes placing a layer of foam (30) and chair covering material (32) between the tubes (21) and the person's back, adjusting the rods (17) so that the tubes (21) engage the person's back and recording contour information which is used to accurately fashion an orthopaedic chair to the contour of the back of the person (P).

**FIG. 2****EP 0 792 604 A1**

Description

The present invention relates to an apparatus and method for use in the design of orthopaedic chairs. More particularly, the invention relates to an improved measuring apparatus and to an improved method of measuring the contour of a person's back so that the curvature and posture of the back may be determined efficiently.

The most relevant prior art is disclosed in Irish Patent Application No. 2570/83 (and corresponding South African Patent No. 84/8556) which discloses an apparatus for use in the design of orthopaedic chairs. The apparatus comprises a chair and a contour measuring device positioned at the rear of the chair. The contour measuring device includes a vertical elongate member having a plurality of rods slideably mounted relative thereto. The rods are in vertical parallel side by side relationship along the length of the member in a substantially common plane. In use, each rod is slideable so as to enable the tip of one end of each rod to engage the back of a person sitting on a chair. The tips define a profile of the person's spine. A horizontal member with a plurality of slideable rods is vertically slideably mounted to the vertical member for measuring the horizontal contour of the person's back.

The contour measuring device enables a craftsman to fashion a chair according to the exact requirements of the person using contour information derived from the apparatus.

The known arrangement however suffers from a number of disadvantages particularly in relation to fitting the person to the chair. In the existing arrangement, a craftsman or a person specifically trained in the use of the measuring device obtains the contour information. This information is measured directly from the person's spine and provides raw data from which a craftsman can fashion the chair. In fashioning the chair, the craftsman considers the use of the chair, the material to be used to cover the chair and the contouring material to be used for the contoured area according to its proposed use. For example, a chair to be used in an office environment will be designed having a back positioned in a more upright posture with a relatively dense layer of contouring material and an appropriate covering material. A chair for household or personalised use may comprise a less dense layer of contouring material and a relatively less utilitarian covering material. In each case, the person or consumer must consult with the craftsman before the chair is finally upholstered to ensure that the contour information derived from the contour measuring device correctly anticipates the use of the chair and the materials used thereon. This second consultation involves more time on the part of the person or consumer thereby detracting from the purchase appeal of the article and adding significantly to the time involved in crafting the chair. Additionally, a certain level of skill is involved in adjusting the chair measurements to correct any defects before the chair is finally upholstered.

It is an object of the present invention to provide a modified apparatus for use in the design of orthopaedic chairs and a method for designing orthopaedic chairs which overcome the problems associated with the prior art.

Accordingly, the present invention provides an apparatus for use in the design of orthopaedic chairs, the apparatus comprising a chair and a contour measuring device positioned at the rear of the chair, the contour measuring device including a first elongate generally upright member having a plurality of rods movably mounted relative thereto, the rods being arranged in parallel side by side relationship along the length of the member in a substantially common plane, characterised in that each rod has at its tip a generally transversely disposed elongate element for engaging the back of a person sitting in the chair, each rod being movable relative to the upright member so as to move the element to rest across the back of a person sitting in the chair, with at least one layer of material for the proposed chair being capable of being disposed between the elongate elements and the person's back to more effectively recreate the chair that is to be fashioned from the measurements taken.

This arrangement allows the person to experience the shape of a finished and upholstered chair, produces accurate contour measurements and obviates the requirement for a second fitting or consultation before the chair is finally upholstered.

The contour measuring device is pivotally mounted on the chair so as to be adjustable with respect to a substantially horizontal seat to facilitate the construction of chairs for different uses, the chair having means for retaining the contour measuring device in the desired angular relationship.

Advantageously, the elongate elements of the contour measuring device are shaped or curved to approximate the transverse contour of the person's back.

Each generally transverse element includes a hinged portion at each free end, said hinged portion being adapted to abut the back of a person sitting in the chair to accurately represent the transverse contour of the person's back.

A recording means is provided for recording contour measurements from which a profile of the person's back is constructed.

Conveniently, the recording means comprises a piece of plastically deformable material which is locatable adjacent the contour measuring device.

Preferably, a thin strip of plastically deformable material is locatable between the person's back and the contour measuring device to record accurately the contour of the person's back. Optionally, a thin sheet of plastically deformable material is locatable between the at least one layer of material and the contour measuring device.

The recording means optionally comprises transducers disposed within the upright member adjacent

each rod to feed measurement information to a data processing apparatus or cutting machine.

The present invention further provides a method for the design of orthopaedic chairs, the method including:

seating a person in a chair including the contour measuring device, as defined above, positioned at the rear of the chair;

disposing at least one layer of material between the contour measuring device and the person's back;

movably adjusting rods of the contour measuring device to engage the back of the person sitting in the chair thereby defining the contour of the person's back; and

recording the contour information provided by the contour measuring device so that a chair is fashioned accurately to the contour of the person's back.

The invention will now be described more particularly with reference to the accompanying drawings which show by way of example only, one embodiment of improved apparatus for use in the method of designing an orthopaedic chair. In the drawings:

Figure 1 is a perspective view of the apparatus; and

Figure 2 is a side elevation of the apparatus in use.

Referring to the drawings and initially to Figure 1, the apparatus comprises a chair 1 mounted on a height-adjustable base 2. The chair 1 comprises a seat 5 and a contour measuring device 7 pivotally mounted to the rear of the seat 5. The level of the seat 5 from the ground is varied by operating a pedal 9 of the height-adjusting base 2. The elevation of the seat 5 with respect to a floor surface F can be measured by reading graduations marked on the ram 2a of the height-adjustable base 2.

The contour measuring device 7 comprises a generally upright member 11 attached to a pivotal transverse element 12 disposed to the rear of the seat 5. The angle of the upright member 11 with respect to the vertical can be altered by turning a knob 14 of a locking mechanism located at one end of the transverse element 12. The upright member 11 is provided with a plurality of lockable sliding rods 17 which penetrate holes 19 evenly spaced along the length of the member 11. At one end of each rod 17, there is a transversely mounted tube 21 for locating against the back of a person sitting on the seat. Each rod 17 is lockable to the upright member 11 by a locking screw 23 to prevent the tubes 21 moving with respect to one another should the person shift following final adjustment of the rods. The tubes 21 are curved to approximate the contour of a person's back. The tubes 21 are optionally provided with hinged portions (not shown) at their free ends. For example, a

tube 21 having an overall length of 45cms and which is fixed centrally to a rod 17 includes hinged portions approximately 10cms long. The hinged portions are arranged to abut the person's back to accurately represent the transverse contour of person's back. The movement of the hinged portions requires a manually applied force to move them so that the contour information is retained after a person leaves the chair 1. A foam cover (also not shown) is optionally provided on each tube.

The chair 1 is further provided with a pair of adjustable arm rests 25, a tilt mechanism (not shown) attached to the underside of the seat 5 and includes an additional seat member 5a for extending the depth of the seat 5 from front to rear.

Referring now to Figure 2, which shows the apparatus in use, a person P is seated in the chair 1 and is directed as to the correct posture for the particular type of chair to be constructed. The seat 5 is elevated until the person's feet are located correctly with no excessive force transferring through the soles of the feet. When the correct posture has been established, a flat layer of foam material 30 and chair covering material 32 is placed against the person's back. The slideable rods 17 are released and the transverse tubes 21 are brought to bear against the person's back.

When the person has assumed a correct or comfortable posture, the rods 17 are locked to the upright member 11 by the screws 23. The contour measurements are then taken from the relative positions of the rods with respect to the upright member 11 or the measurements can be derived directly from the profile determined by the tubes 21.

The means by which the contour measurements are recorded can be any one of the following:

- (a) recording the length of rod exposed between the tube 21 at the person's back and the upright member 11 from indication on the rods 17;
- (b) cutting an intermediate profile according to the profile presented by the ends of the tubes 21;
- (c) forming a line profile utilising a plastically deformable strip of material placed against the junctions of the rods 17 and tubes 21; and
- (d) forming a profile utilizing a plastically deformable sheet of material disposed between to person's back and the tubes 21 of the contour measuring device 7.

In the first of the above arrangements, a transducer (not illustrated) can be provided within the upright member 11 adjacent each rod 17 to feed measurement information to a data processing apparatus and optionally to a cutting machine. The plastically deformable strip referred to in (c) above comprises a resilient material, such as a lead rod, covered by rubber or a plastics material,

as exemplified in a shortened version as FLEXICURVE (Trade Mark). The means for recording the contour measurements referred to in (b) above optionally include an arrangement in which VELCRO (Trade Mark) pieces are attached to the free ends of the tubes 21. A continuous length of mating VELCRO is fixed to a length of FLEXICURVE so that rigid cardboard can be placed along the FLEXICURVE and the contour measurements can be marked on the cardboard. A plastically deformable sheet may similarly comprise a rubberised lead sheet but preferably comprises a plastics material which is heated to form a flexible sheet which is deformed as required and subsequently solidifies on cooling.

Constructional details of the seat 5, the base 2, the tilt mechanism and the arrangement 12,14 for altering the angle of the upright member 11 with respect of the seat 5 may be modified without departing from the scope of the invention.

It will of course be understood that the invention is not limited to the specific details described herein, which are given by way of example only, and that various modifications and alterations are possible within the scope of the appended claims.

Claims

1. An apparatus for use in the design of orthopaedic chairs, the apparatus comprising a chair (1) and a contour measuring device (7) positioned at the rear of the chair (1), the contour measuring device (7) including a first elongate generally upright member (11) having a plurality of rods (17) movably mounted relative thereto, the rods (17) being arranged in parallel side by side relationship along the length of the member (11) in a substantially common plane, characterised in that each rod (17) has at its tip a generally transversely disposed elongate element (21) for engaging the back of a person (P) sitting in the chair (1), each rod (17) being movable relative to the upright member (11) so as to move the element (21) to rest across the back of a person (P) sitting in the chair (1), with at least one layer of material (30,32) for the proposed chair being capable of being disposed between the elongate elements (21) and the person's back to more effectively recreate the chair that is to be fashioned from the measurements taken.
2. An apparatus for use in the design of orthopaedic chairs according to claim 1, in which the contour measuring device (7) is pivotally mounted on the chair (1) so as to be adjustable with respect to a substantially horizontal seat (5) to facilitate the construction of chairs for different uses, the chair (1) having means (14) for retaining the contour measuring device (7) in the desired angular relationship.
3. An apparatus according to claim 1 or claim 2, in which the elongate elements (21) of the contour measuring device (7) are shaped or curved to approximate the transverse contour of the person's back.
4. An apparatus according to any one of claims 1 to 3, in which each generally transverse elongate element (21) includes a hinged portion at each free end, said hinged portion being adapted to abut the back of a person (P) sitting in the chair (1) to accurately represent the transverse contour of the person's back.
5. An apparatus according to any one of the preceding claims, which includes a recording means for recording contour measurements from which a profile of the person's back is constructed.
6. An apparatus according to claim 5, in which the recording means comprises a piece of plastically deformable material locatable adjacent the contour measuring device (7).
7. An apparatus according to claim 5 or claim 6, in which the recording means comprises a thin strip of plastically deformable material locatable between the person's back and the contour measuring device (7) to record accurately the contour of the person's back.
8. An apparatus according to claim 5 or claim 6, in which the recording means comprises a thin sheet of plastically deformable material locatable between the at least one layer of material (30,32) and the contour measuring device (7).
9. An apparatus according to claim 5, in which the recording means comprises transducers disposed within the upright member (11) adjacent each rod (17) to feed measurement information to a data processing apparatus or cutting machine.
10. A method for the design of orthopaedic chairs, the method including:
 - seating a person (P) in a chair (1) including the contour measuring device (7), as defined in any one of claims 1 to 9, positioned at the rear of the chair (1);
 - disposing at least one layer of material (30,32) between the contour measuring device (7) and the person's back;
 - movably adjusting rods (17) of the contour measuring device (7) to engage the back of the person (P) sitting in the chair (1) thereby defin-

ing the contour of the person's back; and

recording the contour information provided by
the contour measuring device (7) so that a chair
is fashioned accurately to the contour of the
person's back. 5

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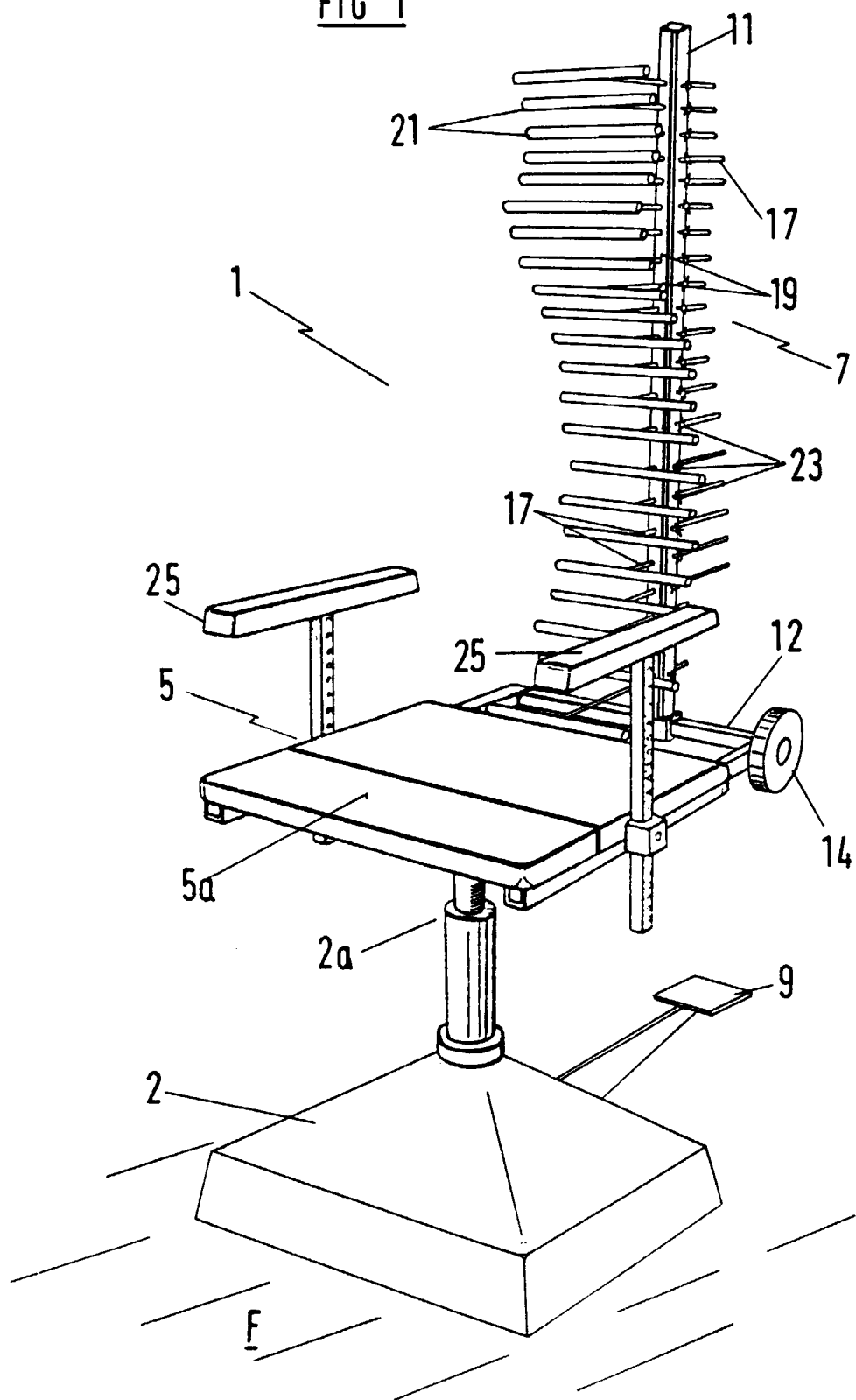
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FIG 1



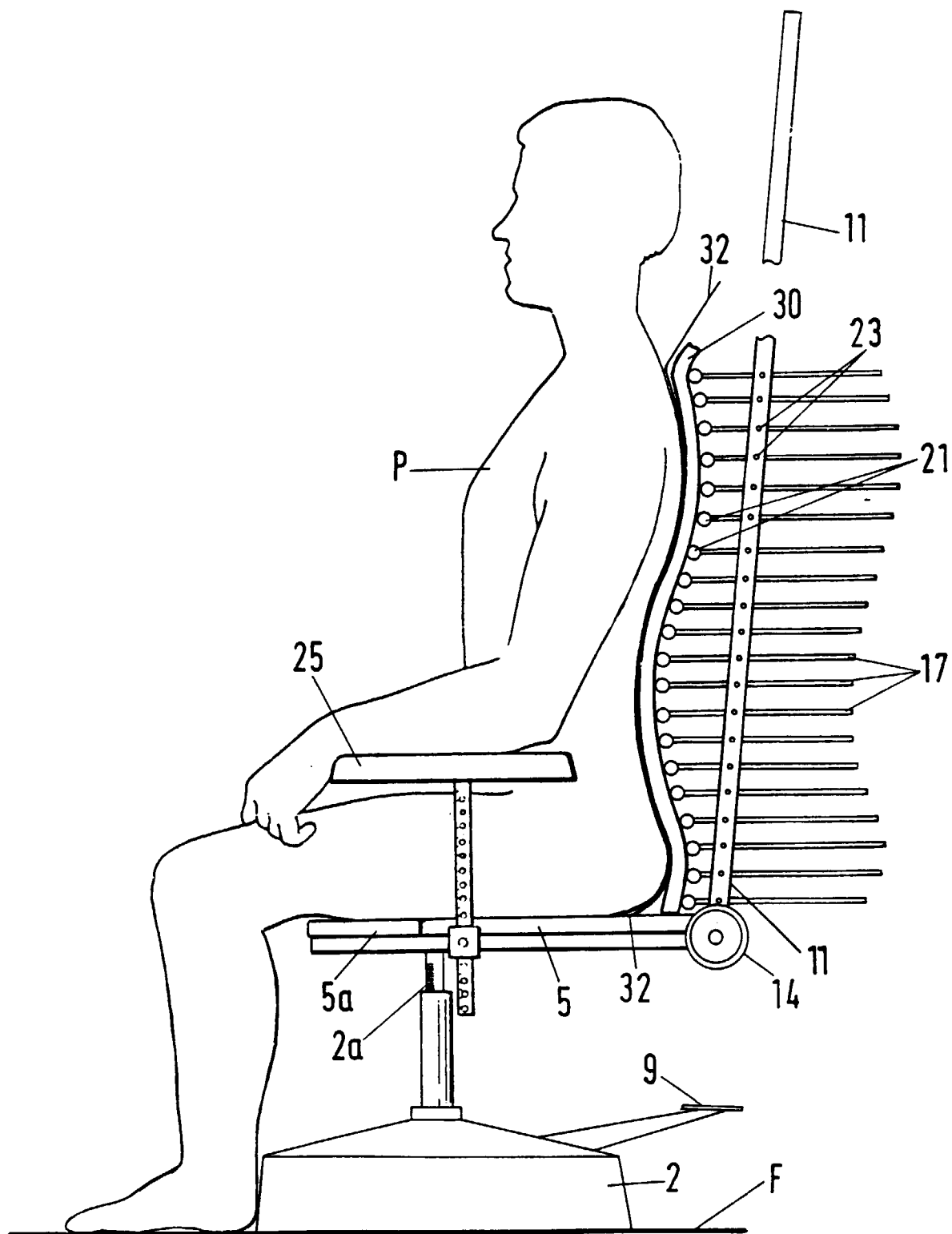


FIG 2



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EUROPEAN SEARCH REPORT

Application Number
EP 97 65 0008

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	GB 150 117 A (PRENTICE)	1,2,5-8, 10	A47C31/12
A	* the whole document *	3,4	

			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A47C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 4 June 1997	Examiner VandeVondele, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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