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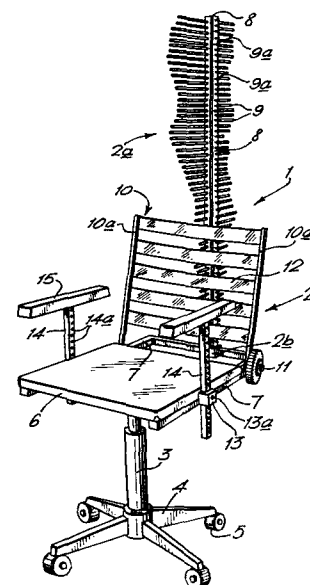
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54 Improvements in or relating to apparatus for use in designing orthopaedic chairs.

57 An apparatus for use in the design of orthopaedic chairs comprises a chair (2) and a contour measuring device (2a) mounted at the rear of the chair (2). The contour measuring device includes an elongate member (8) having a plurality of rods (9) slidably mounted therein, the rods (9) being mounted in parallel side-by-side relationship along the length of the elongate member (8) in a substantially common plane. In use, each rod (9) is slidable so as to enable the tip of one end of each rod (9) to engage the back of a patient sitting in the chair which tips thereby define a contour of the patient's back. A number of different contours along different vertical planes may be taken by adjusting the position of the elongate member (8) in the horizontal direction.



**"IMPROVEMENTS IN OR RELATING TO APPARATUS
FOR USE IN DESIGNING ORTHOPAEDIC CHAIRS"**

This invention relates to an apparatus for use in the design of orthopaedic chairs. In particular, it relates to a measuring apparatus which, inter alia, may be used in the determination of the contour of a patient's back so that the curvature and posture of the back may be determined quickly and easily.

Many people suffer from back injuries, congenital back problems and back strain, all of which result in pain to a patient particularly when the patient is seated for relatively long periods in an uncomfortable chair or a chair not providing the correct support for the patient. This has resulted in the production of so called orthopaedic chairs which attempt to provide the best possible support for the patient's back having regard to the patient's particular back problems.

In designing such a chair for a particular patient, a difficulty arises in determining the contour of the chair which is most suitable for the patient. Usually, the contour is determined by the patient repeatedly visiting a workshop in which the chair is being made so that the chair having the most appropriate contour may be fashioned. This need for returning to the workshop can prove difficult for patients who are old or who may have to travel long distances to the workshop. Furthermore, this delays the production of chairs in general thus leading to high costs and inconvenience for both the patient and the craftsman.

It is an object of the present invention to overcome these problems by providing an apparatus which may be used with the patient to enable the craftsman to quickly and easily determine the appropriate measurements and requirements of the patient in one visit and then to make an orthopaedic chair for that patient using those measurements and requirements. It also enables the apparatus according to the invention to be used by persons who are not skilled in the art of manufacture of the chairs but who can use the device to take the appropriate measurements and requirements, record them and then convey them to the craftsman.

The invention therefore 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 member having a plurality of rods slidably mounted relative thereto, the rods being arranged in parallel side-by-side relationship along the length of the member in a substantially common plane whereby, in use, each rod is slidable so as to enable the tip of one end of each rod to engage the back of a patient sitting on the chair which tips thereby define a contour of the patient's back.

It will be appreciated that the device according to the invention enables a craftsman to fashion a chair according to the exact requirements of the patient using contour information derived from the apparatus.

It will further be appreciated that the apparatus may be used in the design of chairs not primarily for orthopaedic use, for example chairs which are "personalised" to the shape and posture of the user's

body.

The invention will be understood in greater detail from the following description of a preferred embodiment thereof given by way of example only and with reference to the accompanying drawings in which:-

Fig. 1 is a perspective view of a first embodiment of an apparatus according to the invention;

Fig. 2 is a side elevation of the apparatus of Fig. 1 and a patient;

Fig. 3 is a rear elevation of the apparatus of Fig. 1 and a patient;

Fig. 4 is a plan view of the apparatus of Fig. 1;

Fig. 5 is a perspective view of a component of the apparatus of Fig. 1;

Fig. 6 is a perspective view of a component of an apparatus according to a second embodiment of the invention; and

Fig. 7 is a rear elevation of the apparatus according to the second embodiment and a patient.

Referring now to the drawings, and in particular to Figs. 1 to 5 there is shown an apparatus 1 according to the invention which comprises a chair, generally shown as 2, and a contour measuring device generally shown as 2a. The chair 2 has a seat 6 which is telescopically mounted on a support member 3 which is, further mounted on legs 4 having castors 5. A conventional seat height-adjustment means having a lock-nut 4a is provided for retaining the seat at a desired height relative to the ground, the telescopic components of the support member 3 being calibrated so that the height of the seat may be recorded. Attached to the seat 6 is a generally U-shaped frame 7 having a substantially square cross-section.

The contour measuring device 2a comprises an upright elongate member 8 mounted at the rear of the

chair and having a plurality of holes therein along its length into each one of which holes is slidably mounted a respective rod 9. Each of the rods 9 is calibrated and may be set relative to a datum mark
5 (not shown) on the member 8. The rods 9 are mounted in parallel side-by-side relationship and lie in a substantially common vertical plane so as to be slidable longitudinally either towards or away from the rear of the chair 2. A plurality of screws 9a is
10 also provided (one for each rod 9) on the member 8 which screws 9a releasably lock each rod 9 in the member 8 at any selected position. The member 8 of the contour measuring device 2a is fixed fast to a base 2b which base 2b is slidably mounted on the frame
15 7.

The chair 2 also has a pair of parallel back members 10a pivotally mounted on the U-shaped frame 7 at opposite sides of the rear of the frame, the rake of the member 10a being adjustable by means of a
20 conventional lock-nut 11. The lock-nut 11 is calibrated so that the rake of the members 10a may be recorded relative to a datum point. Joining the members 10a is a webbing 12 which, together with the members 10a, forms the back 10 of the chair. The
25 webbing 12 assumes the contour of the back of a patient 13 sitting on the chair 2.

The seat 6 of the chair 2 is adjustable for tilt by a conventional tilting means (not shown) located beneath the seat 6, the tilting means being calibrated
30 so that the angle of tilt of the seat 6 may be recorded. Attached to each leg of the U-shaped frame 7 is a respective lug 13 each having a slidable member 14 therein. Each slidable member 14 carries an arm rest 15 at its upper end. The height of each arm rest
35 15 may be adjusted relative to the seat 6 by passing a

bolt (not shown) through a hole 13a in each lug 13 which bolt engages with one of a plurality of calibration holes 14a in the member 14. The angle of tilt of the arm rest 15 may also be adjusted by means (now shown) which is calibrated as regards the angle of tilt.

In use, the screws 9a are loosened so as to permit all of the rods 9 to slide longitudinally relative to the upright member 8. The patient 13 is now asked to sit comfortably and upright in the chair 2. The seat 6 is adjusted to a comfortable height by means of the knob 4a; the tilt of the seat is adjusted; the rake of the back 10 is adjusted by means of the lock-nut 11; and the height of each arm rest 15 is set on instructions from the patient 13. With reference to the calibration scales associated with these components, their relative positions may be recorded. The patient's back rests against the webbing 12 which assumes the contour of the patient's back. During these operations, the rods 9 are in a sufficiently rearward position in the member 8 not to engage with the patient's back.

When the patient 13 is comfortable, the member 8 is pushed along the rear of the U-shaped frame 7 so as to be on the extreme left of the frame 7 as viewed in Fig. 3. The rods 9 are pushed in the member 8 in a forward direction towards the patient's back until the forward tip of each rod 9 rests lightly on the patient's back or the webbing 12 as the case may be. A vertical contour of the patient's back at that location is thus taken, the calibration on each rod 9 is recorded, and the position of the member 8 relative to the frame 7 is also recorded. Each of the rods 9 is now pulled rearwardly and the member 8 is slid to the right as viewed in Fig. 3 to a second calibrated

position and again the rods 9 are pushed towards the patient's back or webbing 12 as the case may be until the tip of each rod 9 rests lightly on the patient's back. The position of each rod 9 is recorded. This
5 procedure is repeated until the member 8 is on the extreme right of the frame 7 as viewed in Fig. 3. In Fig. 3, there is shown in dotted outline two possible positions of the member 8.

All of the readings having being recorded by the
10 operator, the patient 13 may then leave and the measurements given to a craftsman who translates the measurements into a chair which is shaped and contoured in a manner particular to the patient 13.

It will be appreciated that if only a single
15 contour of the patient's back is required and it is desired to transfer the contour obtained onto a sheet, the screws 9a may be used to lock each rod 9 in position so that when the patient 13 leaves the device 1, the sheet may be placed along the contour thus
20 generated and the contour may be then drawn onto the sheet for subsequent use by the craftsman.

Referring now to Figs. 6 and 7 of the drawings, the upright member 8 has vertically slidably mounted thereon a horizontal second elongate member 80 which
25 is similar to the member 8 except that its base 22b is located centrally thereof. The upright member 8 has a U-section to permit the base 22b of the horizontal member 80 to slide vertically therein. The sliding action of the base 22b in the U-section should require
30 a positive push. In other words, in the absence of a force being applied to the member 80, the latter should remain in a fixed position on the member 8. When the horizontal member 80 is in use for the purpose of taking horizontal contours of the patient's
35 back, the rods 9 of the upright member 8 should be pulled

rearwardly to permit the member 80 to slide freely on the member 8. It will also be appreciated that the base 2b of the member 8 should be located centrally on the frame 7 when the member 80 is in use. It will
5 also be appreciated that the slidable rods 9 of the horizontal member 80 function in a similar manner to the rods 9 of the member 8, except that in this case they are mounted in parallel side-by-side relationship along the length of the member 80 in a substantially
10 common horizontal plane. If desired, screws may be provided to releasably lock each rod 9 in the member 80.

It will further be appreciated that an unskilled person in the art of fashioning orthopaedic or
15 "personalised" chairs may be trained to use the apparatus described above. Having obtained appropriate measurements for each of the calibrated movable components of the apparatus, the measurements may be passed to the craftsman who then makes the
20 chair for the patient or user.

CLAIMS:

1. An apparatus for use in the design of orthopaedic chairs, the apparatus being characterised by a chair (2) and a contour measuring device (2a) positioned at the rear of the chair, the contour measuring device including a first elongate member (8) having a plurality of rods (9) slidably mounted relative thereto, the rods (9) being arranged in parallel side-by-side relationship along the length of the member (8) in a substantially common plane whereby, in use, each rod (9) is slidable so as to enable the tip of one end of each rod (9) to engage the back of a patient sitting on the chair (2) which tips thereby define a contour of the patient's back.
2. An apparatus as claimed in claim 1, wherein means (9a) is provided for releasably locking each rod (9) relative to the first member (8).
3. An apparatus as claimed in claim 1 or 2, wherein each rod (9) is calibrated relative to the first member (8).
4. An apparatus as claimed in claim 1, 2 or 3, wherein the rods (9) are arranged in a substantially vertical plane.
5. An apparatus as claimed in claim 4, wherein the first member (8) is slidably mounted on a mounting means (7) for substantially horizontal movement whereby any one of a plurality of different substantially vertical contours of the patient's back may be taken.

6. An apparatus as claimed in claim 5, wherein the mounting means (7) is calibrated relative to the first member (8).

5 7. An apparatus as claimed in claim 5 or 6, wherein the mounting means (7) is attached to the back of the chair.

8. An apparatus as claimed in any of claims 1 to 7, further including a second elongate member (80) transversely mounted on the first member (8) and
10 slidable in the longitudinal direction thereof, the second member (80) having a plurality of further rods (9) slidably mounted relative thereto, the further rods (9) being arranged in parallel side-by-side relationship along the length of the second member
15 (80) in a substantially common plane whereby, in use, each rod (9) is slidable so as to enable the tip of one end of each rod (9) to engage the back of a patient sitting on the chair (2) which tips thereby define a contour of the patient's back.

20 9. An apparatus as claimed in claim 8, wherein the second member (80) is calibrated relative to the first member (8).

10. An apparatus as claimed in claim 8 or 9, wherein the further rods (9) are calibrated relative
25 to the second member (80).

11. An apparatus as claimed in any one of claims 1 to 10, wherein the back (10) of the chair (2) comprises webbed material (12) which, in use, assumes the contours of the patient's back.

12. An apparatus as claimed in any one of claims 1 to 11, wherein means (11) is provided for adjusting the rake of the back (10) of the chair (2).

5 13. An apparatus as claimed in claim 12, wherein the back (10) of the chair (2) is calibrated relative to the chair.

14. An apparatus as claimed in any one of claims 1 to 13, wherein means is provided for adjusting the tilt of the seat (6) of the chair (2).

10 15. An apparatus as claimed in claim 14, wherein the seat (6) of the chair (2) is calibrated relative to the chair.

15 16. A device as claimed in any one of claims 1 to 15, wherein the chair (2) further comprises a pair of arm rests (15).

17. A device as claimed in claim 16, wherein the height of each arm rest (15) is adjustable.

20 18. An apparatus as claimed in claim 17, wherein each arm rest (15) is calibrated relative to the chair as regards height.

19. An apparatus as claimed in any one of claims 16 to 18, wherein the tilt of each arm rest (15) is adjustable.

25 20. An apparatus as claimed in claim 19, wherein each arm rest (15) is calibrated relative to the chair as regards tilt.

21. A chair whenever produced in accordance with information or measurements obtained from using a device as claimed in any of claims 1 - 20.

FIG. 1.

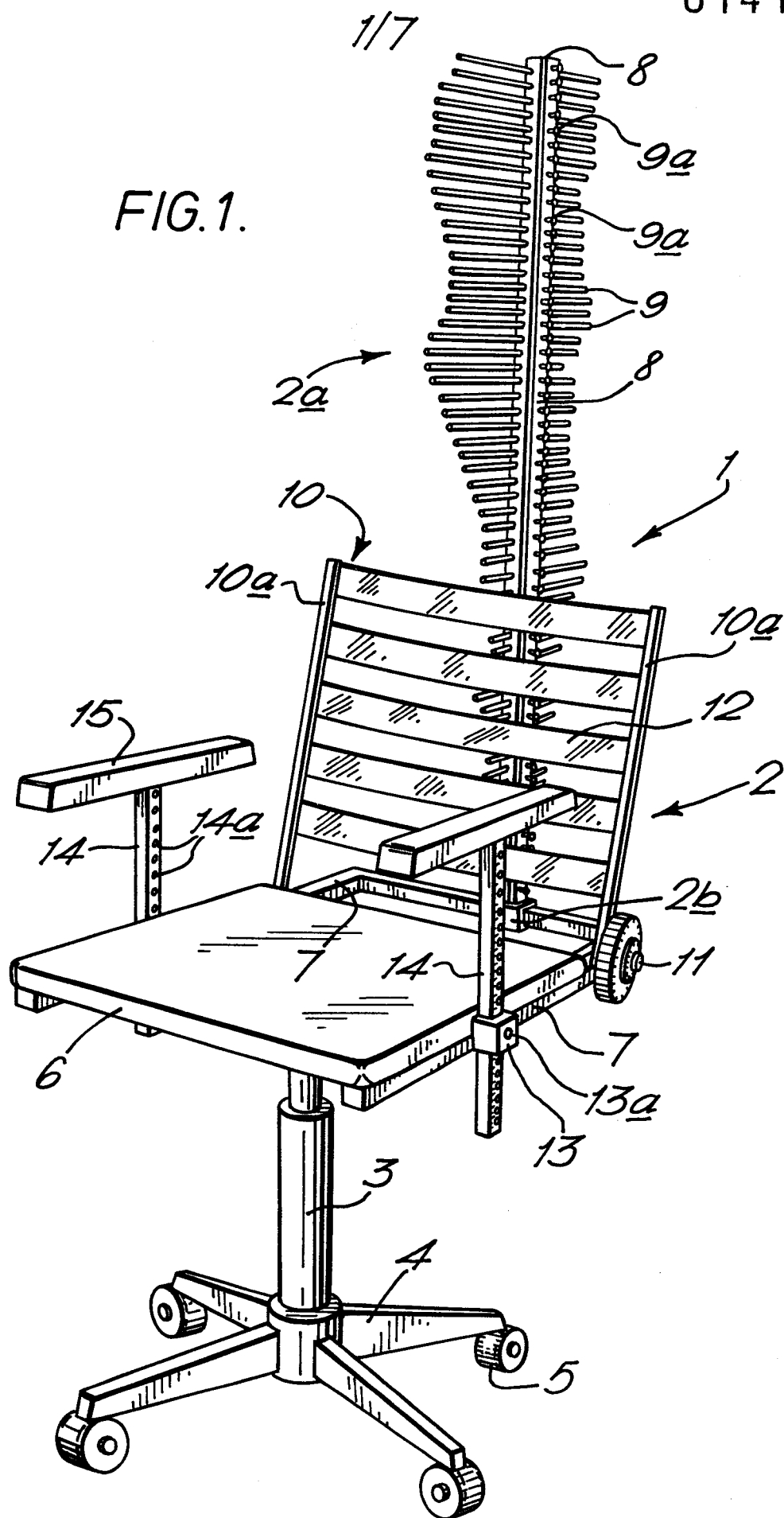
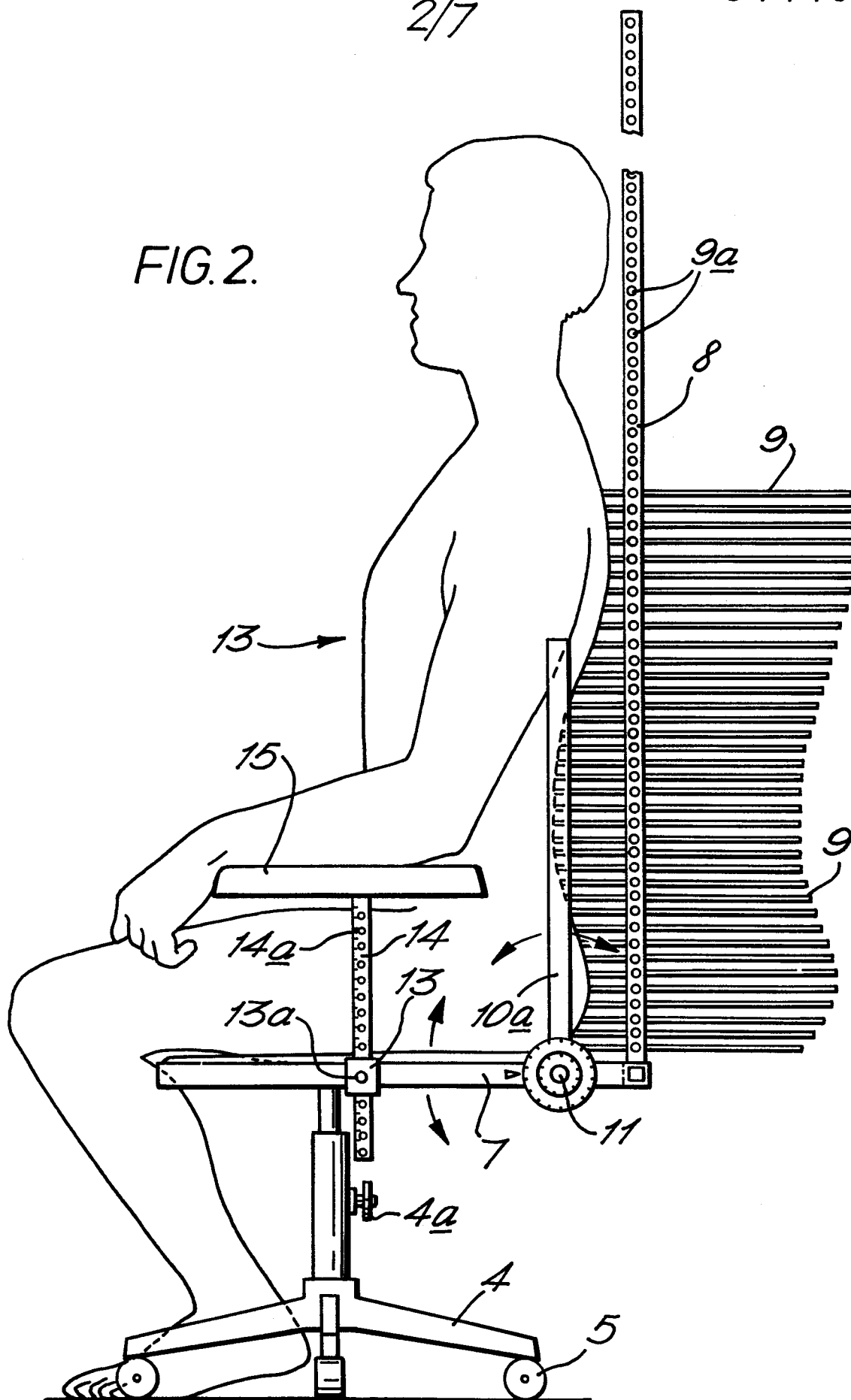
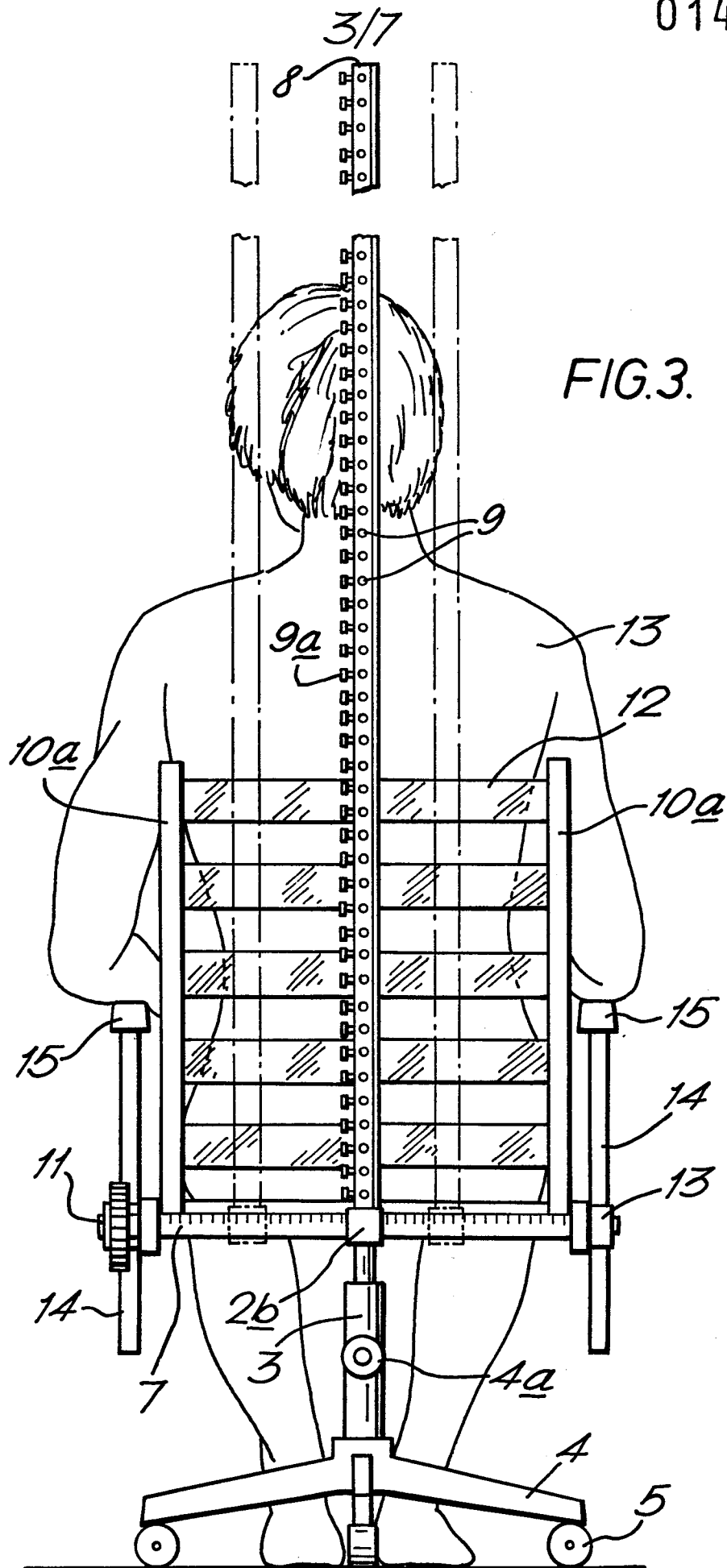


FIG. 2.





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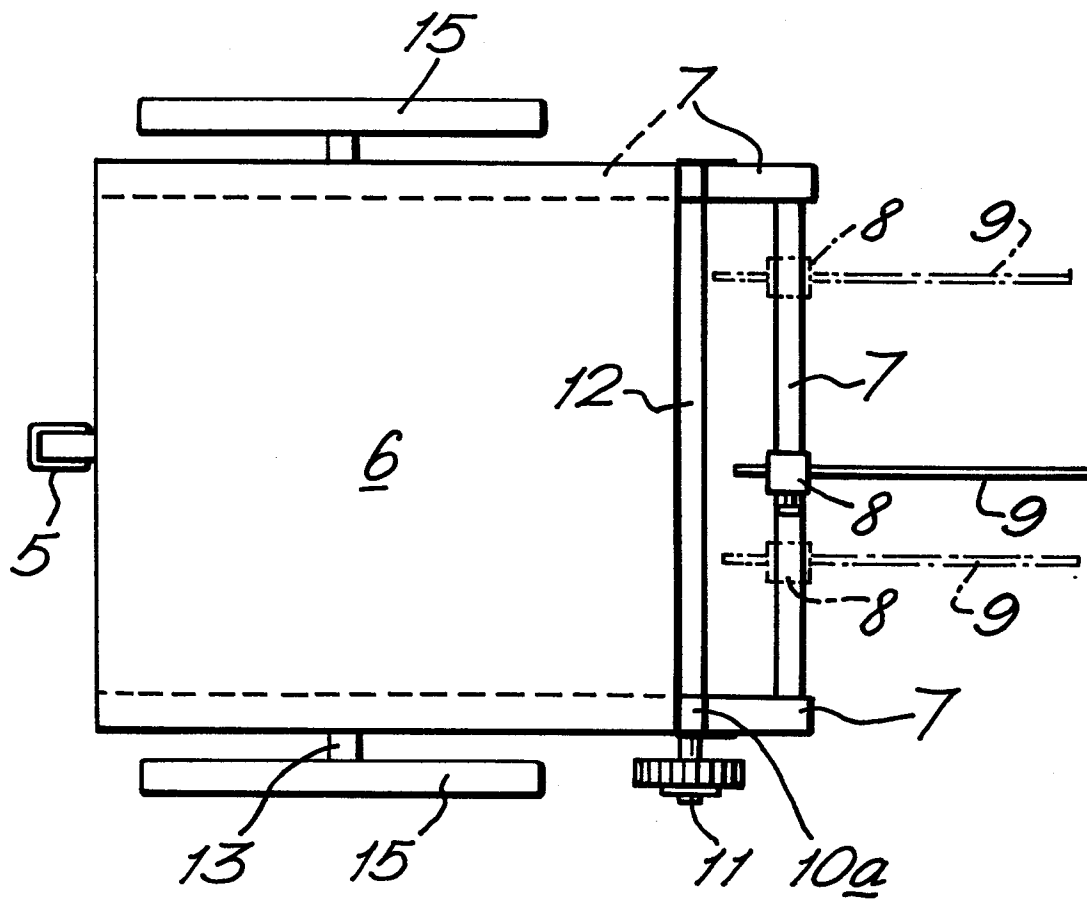
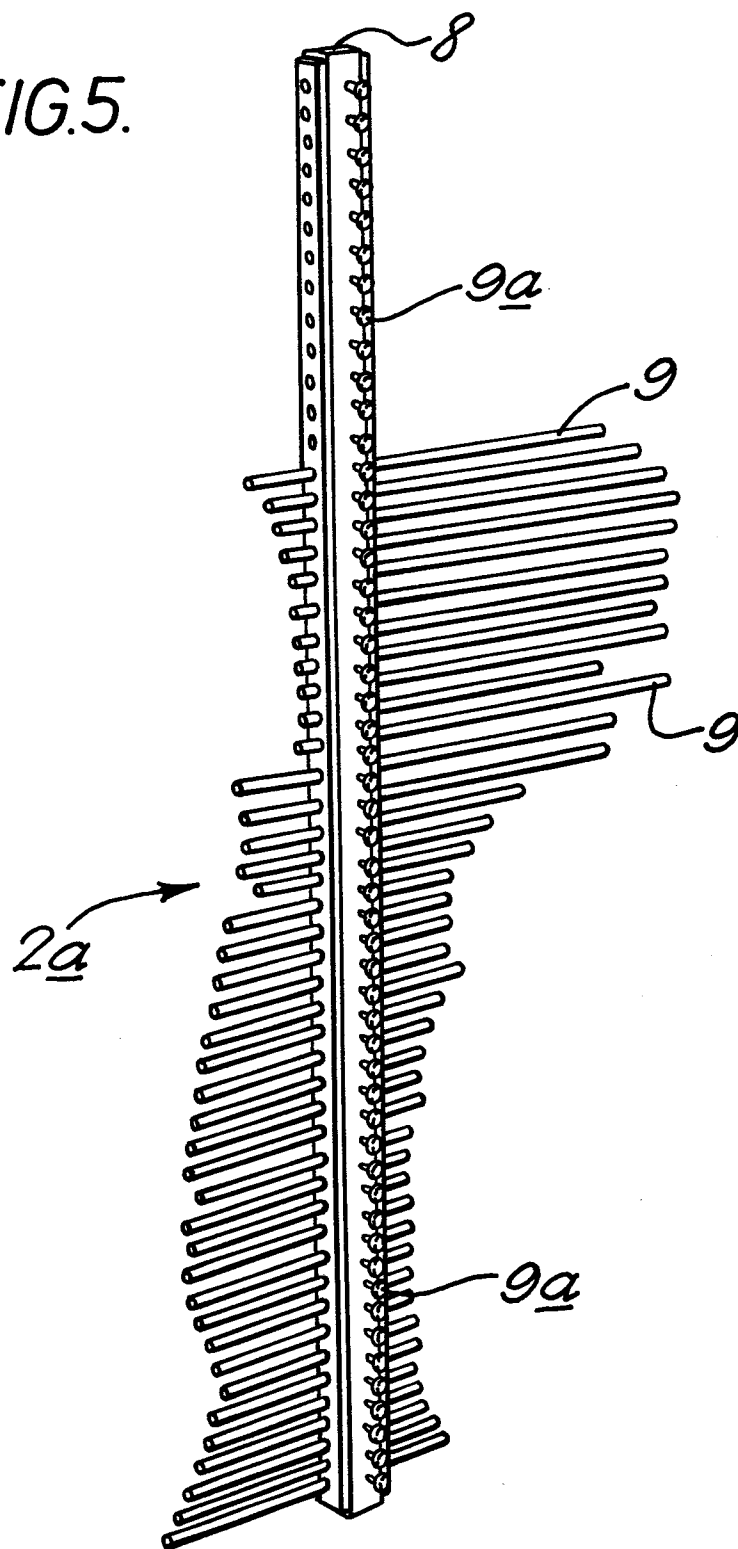
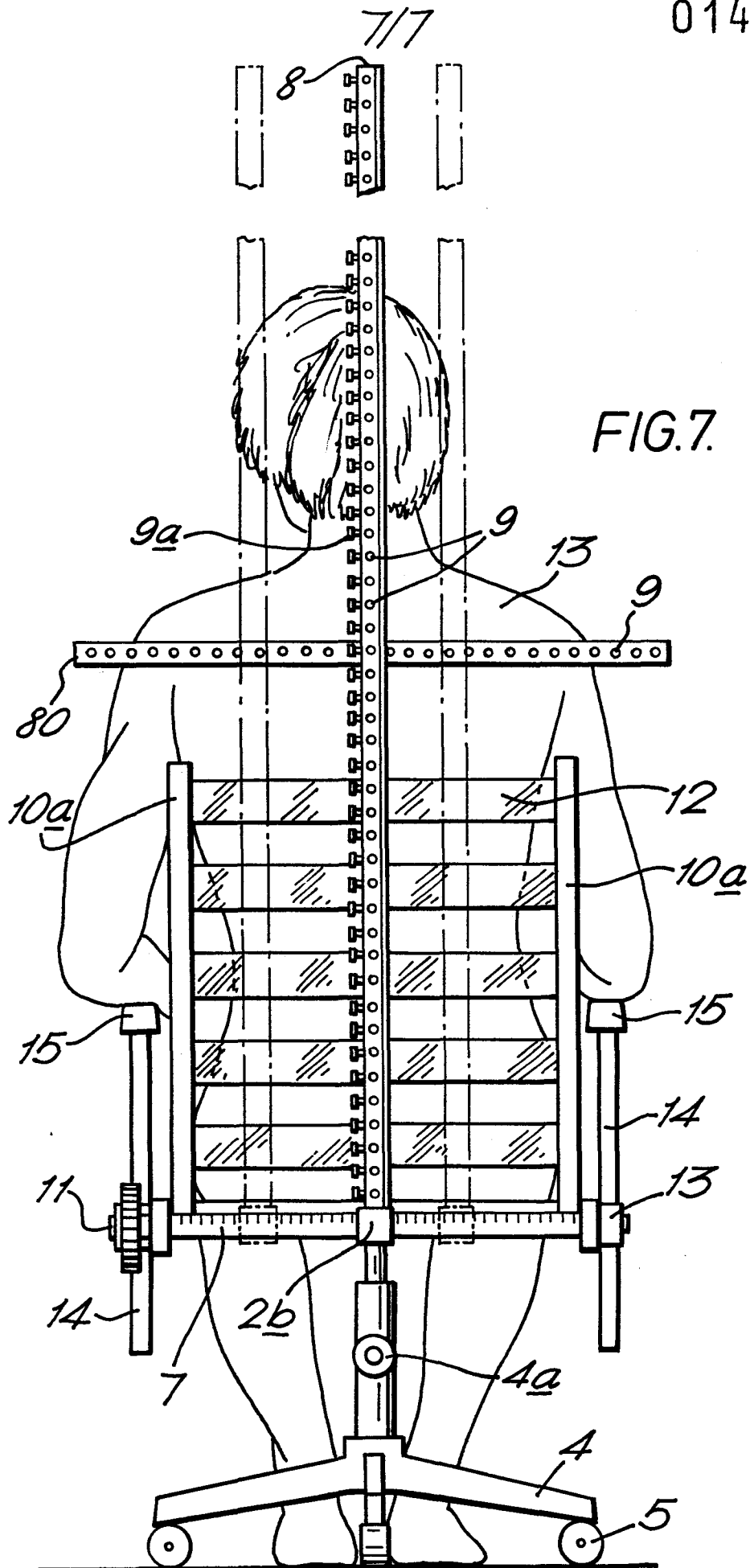


FIG. 4.

FIG. 5.









European Patent
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EUROPEAN SEARCH REPORT

0141652

Application number

EP 84 30 7548

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.4)
X	US-A-3 081 129 (RIDDER) * Column 2, line 38 - column 3, line 28; column 3, lines 58-71; column 4, lines 18-46; figures 1-6,8,11,14,17 *	1,2	A 47 C 31/12
A		3,4,8 10,12 13,14 21	
Y	DE-A-3 106 882 (REGEHR) * Page 3, last paragraph - page 4; figures 1,2 *	1	
A		2,4,14 ,16,17 ,19,21	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			A 47 C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 30-01-1985	Examiner VANDEVONDELE J.P.H.
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p>			