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

(11) **EP 1 287 783 B9**

(12) **CORRECTED EUROPEAN PATENT SPECIFICATION**
Note: Bibliography reflects the latest situation

(15) Correction information:
Corrected version no 1 (W1 B1)
Corrections, see page(s) 9,11-14

(48) Corrigendum issued on:
24.01.2007 Bulletin 2007/04

(45) Date of publication and mention of the grant of the patent:
11.10.2006 Bulletin 2006/41

(21) Application number: **02291942.7**

(22) Date of filing: **01.08.2002**

(51) Int Cl.:
A61B 5/12 *(2006.01)* ***A61G 15/00*** *(2006.01)*
A61B 1/227 *(2006.01)*

(54) Rotating patient chair with ear diagnosis and treatment unit

Drehpatientenstuhl mit einer Einheit zur Diagnose und Ohrbehandlung

Chaise rotative de patient avec système de diagnostic et de traitement de l'oreille

(84) Designated Contracting States:
DE ES FR GB IT

(30) Priority: **28.08.2001 KR 2001052021**
26.03.2002 KR 2002016272
26.04.2002 KR 2002022906

(43) Date of publication of application:
05.03.2003 Bulletin 2003/10

(73) Proprietor: **Ja-Ryoung Park**
Seoul 130-070 (KR)

(72) Inventor: **Ja-Ryoung Park**
Seoul 130-070 (KR)

(74) Representative: **Texier, Christian et al**
Cabinet Régimbeau
20, rue de Chazelles
75847 Paris cedex 17 (FR)

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- **PATENT ABSTRACTS OF JAPAN vol. 1998, no. 10, 31 August 1998 (1998-08-31) -& JP 10 113366 A (YUKIGAYA SEIMITSU KOGYO KK), 6 May 1998 (1998-05-06)**

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EP 1 287 783 B9

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a rotating patient chair mounted with an ear diagnosis and treatment unit, and more particularly, to a rotating patient chair mounted with an ear diagnosis and treatment unit including a variety of diagnosis and treatment tools to treat ears at an otorhinolaryngology department, for instance, suctioners, a treatment board, a microscope with a CCD (charge coupled device) camera, a monitor (image display on which a patient can observe a whole treatment process), a manipulating switch box and the like.

BACKGROUND OF THE INVENTION

[0002] A general treatment unit used at an otorhinolaryngology department has been disclosed at Korean Utility Model No. 247914. As shown in FIGS. 1 and 2, the general treatment unit 17 includes a suctioner 1, microscope with a CCD camera 3, patient monitor 5, practitioner monitor 7, stand 9, film view box 11, light source 13 and manipulating switch box 15. The treatment unit body 17 is fixedly arranged at a position, in a predetermined distance, away from both the practitioner chair 20 and a plurality of rotating patient chairs 22, so that the practitioner can medically treat patients respectively seated at rotating patient seats 22 by using the treatment tools distributed and mounted at predetermined positions of the unit body 17.

[0003] However, since the general unit body 17 thus constructed is fixedly arranged at a position in a predetermined distance away from the rotating patient chair 22, there have been problems in that the practitioner frequently has to move the treatment tools of the unit body 17 to the rotating patient chairs 22 for each treatment and much space of a diagnosis room is occupied by the treatment unit body 17.

[0004] Particularly, the microscope 3 and monitor 5 are installed on the unit body 17 regardless of the rotational direction of the rotating patient chair 22 or the position of both ears of the patient, anatomically positioned apart at 180 degrees of the human body. When treatment is performed on a patient seated on the designated rotating patient chair 22 without letting the patient move, while both of his or her left and right ears are checked through the patient monitor 5, there has been a problem of inconvenience in that it is necessary for the practitioner to move around to the patient's ears and make adjustments in the positioning of the microscope 3 after the patient's face or the rotational movement of the rotating patient chair 22 is stopped to align the sight of the patient sitting on the rotating patient chair 22 with the angle of the patient monitor 5.

[0005] If a practitioner treats a patient's ears through the microscope 3 while being seated on the practitioner's chair 20, there are methods of treating the ear by moving the patient to a plurality of rotating patient chairs 22 or by the patient remaining in one seat and rotating one designated rotating patient chair 22.

[0006] In one method, the patient is treated on both the right and left rotating patient chairs 22 so that the patient's sight can be conveniently aligned with the patient's monitor 5. There is an advantage in that the patient can observe all of the treatment processes of both ears on the patient monitor 5. However, there is a problem in that the patient must inconveniently move back and forth from chair to chair, causing the treatment process to take a longer time.

[0007] In another method, a patient is treated while being seated on one rotating patient chair 22 without the inconvenience of moving back and forth between the plurality of rotating patient chairs 22 for medical treatment. However, since the patient's sight and the patient monitor 5 become disaligned, the patient can only see the treatment process of one ear on the patient monitor 5.

[0008] Another medical device for otolaryngology is known from JP-A-10113366.

SUMMARY OF THE INVENTION

[0009] It is an object of the present invention to provide a rotating patient chair mounted with an integrated ear diagnosis and treatment unit (for instance, monitor, microscope, treatment board, suctioner, blood pressure tester, etc.) by which diagnosis and treatment can be performed on both ears without letting the practitioner or patient move around but by merely rotating the ear diagnosis and treatment unit, thereby minimizing inconvenience to the practitioner or patient, shortening the time of medical treatment and minimizing the space of a room occupied by the diagnosis and treatment unit.

[0010] It is another object of the present invention to provide a rotating patient chair mounted with an integrated ear diagnosis and treatment unit in which the monitor and microscope can simultaneously be rotated in a circle around the rotating patient chair in relation to both of the patient's ears, enabling the patient to observe all of the treatment process to his or her ears, including the thin, dark auditory canals and eardrums, on the monitor installed on the opposite side. This configuration also enables the practitioner to explain all of the treatment process shown on the monitor to the patient and his guardian, thereby improving reliability on the treatment processes and maximizing the effects of the treatment.

[0011] In order to accomplish the aforementioned objects of the present invention, there is provided a rotating patient chair mounted with an ear diagnosis and treatment unit according to claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Objects and aspects of the invention will become apparent from the following descriptions of preferred embodiments with reference to the accompanying

drawings in which:

FIG. 1 is a plan view for illustrating the otorhinolaryngological treatment unit of the prior art;

FIG. 2 is a front view for illustrating the otorhinolaryngological treatment unit of the prior art;

FIG. 3 is a lateral view for illustrating the rotating patient chair with an ear diagnosis and treatment unit in accordance with the first embodiment of the present invention;

FIGS. 4 through 7 illustrate a monitor and a microscope which are maintained at 180 degrees against the rotational supporting means in accordance with the second embodiment of the present invention for simultaneous rotation around the patient rotation chair; where FIG. 4 is a perspective view for illustrating the rotating patient chair with an ear diagnosis and treatment unit; FIG. 5 is a front view for illustrating the rotating patient chair with an ear diagnosis and treatment unit; FIGS. 6a and 6b are cross-sectional views of key parts of the rotating patient chair before and after the operation of the rotational supporting means; FIGS. 7a and 7b are plans for illustrating the states of the monitor and mircroscope that can simultaneously be rotated around a rotating patient chair while being maintained at 180 degrees from the center of the rotating patient chair; FIG. 7c illustrates the state of a rotating patient chair that can be rotated with the monitor and microscope while being maintained at 180 degrees from the center of the rotating patient chair;

FIG. 8 is a cross-sectional view for illustrating key parts of the rotating patient chair using a lock ball at the rotational supporting means in accordance with the third embodiment of the present invention;

FIGS. 9a through 10 illustrate a monitor and microscope installed at the rotational supporting means and respectively rotated around the rotating patient chair in accordance with the fourth embodiment of the present invention; where FIGS. 9a and 9b are cross-sectional views for illustrating respective states of the rotational supporting means before and after the operation; FIG. 10 is a plan for illustrating states of the monitor and microscope that can be respectively rotated around a rotating patient chair while being maintained at a predetermined angle of α degrees;

FIGS. 11 and 12 illustrate a monitor and microscope that are installed at the rotational supporting means and simultaneously rotated around the rotating patient chair in accordance with the fifth embodiment of the present invention; where FIG. 11 is a front view for illustrating the rotating patient chair with an ear diagnosis and treatment unit being mounted thereon; and FIG. 12 is a plan for illustrating the state of the monitor and microscope simultaneously rotated around the rotating patient chair while being maintained at 180 degrees.

DETAILED DESCRIPTION OF THE INVENTION

[0013] Hereinafter, the first embodiment of the present invention will be described with reference to FIG. 3.

[0014] In the first embodiment of the present invention, the rotating patient chair 30 includes a seat 31, back rest 32, foot pad 33, head rest 34, arm rest 35, and chair rotating drive part 36. A manipulating switch box 40 is mounted on the back of the chair rotating drive part 36, and a suctioner 44 is mounted on the lower end side of the back rest 32 by a first link mechanism 42a to horizontally control the position of the suctioner 44 in convenience. A board 46 is installed on the upper portion of the suctioner 44 with a plurality of accommodating holes 46a to display treatment products (medical products and treatment tools, etc.).

[0015] A microscope 48 having a CCD camera is installed on the upper rear end of the back rest 32 by a second link mechanism 42b to horizontally or vertically control the position of the microscope 48, and a monitor 50 is mounted on the front portion of the arm rest 35 by a third link mechanism 42c to horizontally control the position of the monitor 50.

[0016] The manipulating switch box 40 is connected to control the suctioner 44, microscope 48 and monitor 50. The microscope 48 and monitor 50 are connected to a light source using an optical cable.

[0017] The first link mechanism 42a has a plurality of split ends connected with a hinge pin (its reference numeral is not shown here) for horizontal folding. Both ends of the first link mechanism 42a are respectively fixed at the lower rear center of the back rest 32 and at the lateral side of the suctioner 44.

[0018] The second link mechanism 42b has a plurality of split ends connected with a hinge pin (its reference numeral is not shown here) for vertical folding. Both ends of the second link mechanism 42b are respectively fixed at the upper rear center of the back rest 32 and at the upper portion of the microscope 48 for horizontal rotation.

[0019] The third link mechanism 42c has a plurality of split ends connected with a hinge pin (its reference numeral is not shown here) for horizontal folding. One end of the third link mechanism 42c is fixed at the lower front portion of the arm rest 35, and the other end thereof is fixed at the lower center of the monitor 50 for horizontal rotation.

[0020] Hereinafter, the operations and effects of the first embodiment of the present invention thus constructed will be described below.

[0021] When a patient sits on the rotating patient chair 30 for treatment of his or her ear, the practitioner moves to a predetermined position to conveniently use the microscope 48, suctioner 44 and treatment board 46 mounted on the back rest 32 while sitting on the practitioner chair (not shown here). The patient can observe all of the treatment processes to both ears on the horizontally moving and rotating monitor 50 mounted on the arm rest 35 while sitting on the rotating patient chair 30.

[0022] In other words, the microscope 48, suctioner 44, treatment board 46 and monitor 50 are respectively mounted via the first, second and third link mechanism 42a, 42b, 42c for horizontal movement and rotation, so that the practitioner can manipulate the treatment unit and perform treatments without having to move around in the restricted space of a room, reducing the period of treatment time while adding convenience to the treatment process.

[0023] When the microscope 48 is positioned close to a patient's ear for treatment, the internal part of a patient's ear is photographed with the CCD camera and transmitted to the monitor 50 to enable the patient sitting on the rotating patient chair 30 and patient's guardians not only to carefully observe all of the practitioner's treatment processes but also listen to the practitioner's explanations, thereby improving reliability on the effects of treatment.

[0024] In addition, the microscope 48, suctioner 44, treatment board 46 and monitor 50 are mounted on the rotating patient chair 30 to reduce treatment time, minimize the space of a room occupied by the treatment units, prevent loss or damage of treatment tools and improve comfort and convenience to the patient and practitioner.

[0025] The second embodiment of the present invention will be described with reference to FIGS. 4 through 7c.

[0026] By way of reference, in the second embodiment of the present invention, identical designations and numerals will be used for indication of the same or equivalent parts as the first embodiment for simplicity of illustration and explanation, detailed descriptions of which will be omitted.

[0027] In the ear diagnosis and treatment unit with the rotating patient chair 30 having a seat 31, back rest 32, foot pad 33, head rest 34, arm rest 35 and chair rotating drive part 36 constructed in accordance with the second embodiment of the present invention, a plurality of suctioners 52 are attachably and detachably mounted at left and right ends of the upper portion of the back rest 32; a manipulating box 40 is mounted on the lateral side of the back rest 32; and a cylindrical blood pressure tester 54 is mounted on the upper portion of the arm rest 35 to measure the patient's blood pressure, whereby an arm band is wrapped around the patient's arm and is inflated with air, putting pressure on the arm and later deflated by slowly releasing the air.

[0028] The monitor 50 is mounted at a rotational supporting means 60 via a third link mechanism 42c while the microscope 48 is mounted at the rotational supporting means 60 via a second link mechanism 42b. The rotational supporting means 60 is mounted on the external periphery of a rotational axle 36a of the chair rotating drive part 36. Both the monitor 50 and microscope 48 are supported by the rotational supporting means 60 so that the monitor 50 is opposite from the microscope 48 at 180 degrees. The rotational supporting means 60 can simultaneously rotate or stop the monitor 50 and microscope 48 in a circle around the rotating patient chair 30.

[0029] The rotational supporting means 60 includes a rotational plate 72, a push lever 80, an elastic member 82, hollow connecting bars 90a, 90b, a first and second fixing bar 92a, 92b, and a first and second moving bar 98a, 98b.

[0030] The rotational plate 72 is supported via a bearing 70a at the outer circumferential surface of the rotational axle 36a for free rotation separate from the rotation of the rotational axle 36a and circumferentially formed on the upper surface thereof with a plurality of split grooves 72a each spaced in a predetermined gap thereamong.

[0031] The push lever 80 is hinged via a hinge axle 78 in an open hole 74a formed at one side of a case 74 of the chair rotating drive part 36 for horizontal see-saw movement to enable a locking part 80a at one end thereof to be selectively coupled to or separated from one of the plurality of split grooves 72a in the case 74 while the other end thereof is protruded outside of the case 74.

[0032] The elastic member 82 is mounted between one side of the case 74 and one end side of the push lever 80 to press one end of the push lever 80. The hollow connecting bars 90a, 90b is fixed at one end thereof on the outer circumferential surface of the rotational plate 72 to face each other at 180 degrees.

[0033] The first fixing bar 92a is bent in the shape of an "L" figure and inserted into the connecting bar 90a at one end thereof to horizontally slide without revolving in relation to the corresponding connecting bar 90a. The first moving bar 98a is mounted at an upper circumferential end of the first fixing bar 92a for vertical movement and to support the monitor 50 with the third link mechanism 42c at a predetermined height level. The second fixing bar 92b is bent in the shape of an "L" figure with one end thereof inserted into the connecting bar 90b to horizontally slide without revolving in relation to the corresponding connecting bar 90b and supports the treatment board 46 with the first link mechanism at a predetermined height level. The second moving bar 98b is mounted at an upper circumferential end of the second fixing bar 92b for vertical movement and supports the microscope 48 with the second link mechanism 42b at a predetermined height level.

[0034] The first link mechanism 42a has a plurality of split ends connected with a hinge pin (its reference numeral is not shown here) for horizontal folding, with one end thereof mounted around the outer circumferential surface of the fixing bar 92b for horizontal rotation and the other end thereof fixed at the lower central surface of the treatment board 46.

[0035] The second link mechanism 42b has a plurality of split ends connected with hinge pins (reference numerals not shown) for vertical folding, with one end thereof fixed at the upper circumferential surface of the moving bar 98b for horizontal rotation and the other end thereof fixed at the upper surface of the microscope 48 for horizontal rotation.

[0036] The third link mechanism 42c has a plurality of split ends connected with hinge pins (reference numerals not shown) for horizontal folding, with one end thereof fixed at the outer circumferential surface of the moving bar 98a for horizontal rotation and the other end fixed at the lower central surface of the monitor 50 for horizontal rotation.

[0037] The rotational plate 72 is formed in a ring shape and mounted via a bearing 70a inserted between the internal circumferential surface thereof and the outer circumferential surface of the rotational axle 36a. A second bearing 70b is inserted between the lower surface of the rotational plate 72 and the upper portion of a base plate 100 rotatably supporting the lower end of the rotational axle 36a.

[0038] The case 74 is mounted on the outer circumferential surface of the rotational axle 36a via a third bearing 70c not to be in contact with the upper surface of the rotational plate 72 at the lower surface thereof. An open hole 74a is formed at one lateral side of the case 74 for inserting the push lever 80 therein. Also, a horizontally positioned fixing piece 74b is integrated at the upper internal surface of the open hole 74a.

[0039] A plurality of hinge pieces 76 are vertically and integrally fixed at the lower central surface of the fixing piece 74b with a predetermined gap thereamong. Both ends of the hinge axle 78 are fixed at the lower end of the plurality of hinge pieces 76. The push lever 80 is inserted and supported to the hinge axle 78 for see-saw movement.

[0040] The push lever 80 has a locking part 80a vertically bent to co-relate with the split groove 72a, and the lengthwise center of the push lever 80 is hinged at the lower end of the hinge piece 76 with the hinge axle 78. A non-slippery member is attached to the rear end of the push lever 80 for improvement of attachment force.

[0041] The elastic member 82 is made of a compressible coil spring with one end thereof fixed to the lower surface of the fixing piece 74b and the other end fixed to the upper surface of the push lever 80.

[0042] The connecting bars 90a, 90b and fixing bars 92a, 92b are coupled so that while the fixing bars horizontally slide with the corresponding connecting bars, both must revolve together in a spline coupling method.

[0043] The height level of the moving bars 98a, 98b is controlled by a control knob which is screwed in through one lower circumferential surface of the moving bars for fixing at a predetermined height level of the fixing bars 92a, 92b.

[0044] Hereinafter, the operations and effects will be described in accordance with the second embodiment of the present invention thus constructed.

[0045] When the right ear of a patient sitting on the rotating patient chair 30 is treated, the rotational supporting means 60 is turned to control the position of the microscope 48 in correspondence with the right ear, and the position of the monitor 50 in correspondence with the left ear, as shown in FIGS. 4 and 5.

[0046] In other words, in order to get the monitor 50 and microscope 48 supported by the rotational supporting means 60 to face each other at 180 degrees in correspondence with the patient's ears sitting on the rotating patient chair 30, the practitioner steps on the push lever 80 protruded outside of the case 74. Then, the push lever 80 makes a see-saw movement around the hinge axle 78 hinged at the hinge piece 76 to enable the locking part 80a to move up. While the locking part 80a moves upwards, it gets separated from one of the split grooves 72a formed at a predetermined gap thereamong around the upper circumferential end of the rotational plate 72. Therefore, the rotational plate 72 can freely turn around the rotational axle 36a connected with the bearing 70a.

[0047] When the practitioner steps on the push lever 80, the rotational plate 72 rotates in a predetermined direction to set up the microscope 48 and monitor 50 connected to the rotational plate 72 in correspondence with the patient's ears sitting on the rotating patient chair'30. When the practitioner takes his foot off the push lever 80, the push lever 80 makes a see-saw movement arising from the elasticity of the elastic member 82 inserted between the lower portion of the fixing piece 74b of the case and the upper portion of the push lever 80 to enable the locking part 80a to move downwards for insertion into one of the split grooves 72a formed around the rotational plate 72 for fixation as shown in FIG. 6a.

[0048] Furthermore, the rotational plate 72 simultaneously rotates the connecting bars 90a, 90b fixed at both circumferential ends of the rotational plate 72. At the same time, the fixing bars 92a, 92b and moving bars 98a, 98b, respectively connected in sequence at one end of the connecting bars 90a, 90b rotate along with the monitor 50 and microscope 48 connected at the upper portions of the moving bars 98a, 98b.

[0049] In other words, as the monitor 50 is connected to the moving bar 98a by way of the third link mechanism 42c, and the microscope 48 is connected to the moving bar 98b by way of the second link mechanism 42b, and the treatment board 46 is connected to the fixing bar 92b by way of the first link mechanism 42a, the monitor 50 connected to the moving bar 98a, opposite from the microscope 48 at 180 degrees, simultaneously rotates around the rotating patient chair 30 as desired, as shown in FIG. 7a or 7b, when the practitioner turns the moving bar 98b connected closely to the microscope 48 as desired.

[0050] Likewise, the monitor 50 and microscope 48 arranged at 180 degrees, correspondingly and simultaneously rotate around the rotating patient chair 30. When the practitioner controls the position of the microscope 48 toward one of the patient's ears while the patient is sitting on the rotating patient chair 3, the monitor 50 is turned as desired and automatically moved to a position to be aligned with the patient's sight. Thus, the patient does not need to move around, and the practitioner can treat the patient's ears while the microscope 48 is moved to the left or right side of the rotating patient chair 30.

[0051] Also, while the patient is seated on the designated rotating patient chair 30, the practitioner can treat the patient's ears while remaining on the practitioner's designated chair (not shown) by rotating only the rotating patient chair 30, for instance, at 180 degrees while keeping the monitor 50 and microscope 48 at the same position, as shown in FIG. 7c.

[0052] In other words, the rotational axle 36a of the rotating patient chair 30 is connected to the rotational plate 72 by way of the bearing 70a and to the case 74 by way of another bearing 70c. As the rotational plate 72 is combined with the case 74 by way of the push lever 80, the rotational plate 72 and case 74 remain constant at a predetermined angle without being rotated along with the rotational axle 36a connected with the seat 31.

[0053] The third embodiment of the present invention will be described with reference to FIG. 8.

[0054] By way of reference, if the third embodiment of the present invention is identically constructed as the first and second embodiments, the same reference numerals will be used for designation of like or equivalent parts, detailed descriptions of which will be omitted.

[0055] The rotational supporting means 60 includes: a rotational plate 172 fixed on the outer circumferential surface of the rotational axle 36a for simultaneous rotation and formed at the outer circumferential surface thereof with a plurality of split grooves 170 at a predetermined gap thereamong; a rotating ring 176 oppositely arranged to the outer circumferential surface and the end portion of the upper surface at the rotational plate 172, and comprised of a plurality of recesses 174 formed in horizontal correspondence with a plurality of split grooves 170 at the internal circumferential surface thereof to rotate clockwise and counter-ciockwise; a bearing 178 inserted into one horizontal side between the rotational plate 172 and rotating ring 176 to freely support the rotation of the rotating ring 176; a lock ball 182 elastically supported in the opening of the recess 174 by way of an elastic member 184 inserted into the recess 174 to slide down on the split grooves 170 for simultaneous attachment or detachment; hollow connecting bars 90a, 90b with one horizontal end thereof oppositely fixed on the outer circumferential surface of the rotating ring 176; fixing bars 92a, 92b respectively bent in the shape of an "L" figure with one end thereof inserted into the connecting bars 90a, 90b to horizontally slide down without revolving in relation to the corresponding connecting bars 90a, 90b; and moving bars 98a, 98b respectively mounted at the upper circumferential ends of the fixing bars 92a, 92b for vertical movement.

[0056] Hereinafter, the operations and effects will be described in accordance with the third embodiment of the present invention thus constructed.

[0057] In the rotational supporting means 60, when the lock ball 182 is matched with one of the split grooves 170, the lock ball 182 is inserted into and tightly contact with one of the split grooves by the elastic member 184. If the rotational force of the rotating ring 176 is greater than the elasticity of the elastic member 184, the rotating ring 176 can be rotated to a desired direction. In contrast, if the rotational force of the rotating ring 176 is smaller than the elasticity of the elastic member 184, the rotating ring 176 may not be rotated but stopped.

[0058] The fourth embodiment of the present invention will be described with reference to FIGS. 9a and 10.

[0059] By way of reference, if the fourth embodiment of the present invention is identically constructed as the first through third embodiments described above, identical reference numerals will be used for designation of like or equivalent parts, detailed descriptions of which will be omitted.

[0060] The rotational supporting means 60 includes: rotational plates 172a, 172b fixed on the outer circumferential surface of the rotational axle 36a for simultaneous rotation each spaced in a predetermined gap thereamong and formed with a plurality of split grooves 170a, 170b at the outer circumferential surface thereof in a predetermined gap thereamong; rotating rings 176a, 176b oppositely arranged to the outer circumferential surface and the end portion of the upper surface at the rotational plate 172a, 172b, and comprised of a plurality of through holes 174a, 174b formed in horizontal correspondence with a plurality of split grooves 170a, 170b at the internal circumferential surface thereof to rotate clockwise and counter-clockwise; bearings 178a, 178b respectively inserted into one load concentrating side between the rotational plates 172a, 172b and rotating rings 176a, 176b to separately support the rotation of the rotating rings 176a, 176b; lock pins 182a, 182b respectively and movably supported by way of fixing brackets 180a, 180b at one outer circumferential surface of the rotating rings 176a, 176b to get one end thereof selectively attached to or detached from one of the plurality of split grooves 170a, 170b in the through holes 174a, 174b; elastic members 184a, 184b installed in the fixing brackets 180a, 180b to apply elasticity to enable the lock pins 182a, 182b to respectively move forward to the outer circumferential surface of the rotational plates 172a, 172b; push levers 188a, 188b respectively hinged at the lower end of the fixing brackets 180a, 180b for vertical see-saw movement by way of hinge axles 186a, 186b and formed with an upper end hitched to the rear end of the lock pins 182a, 182b, wherein the upper end moves the lock pins 182a, 182b backward when the practitioner steps on the push levers 188a, 188b; hollow connecting bars 90a, 90b with one end thereof being respectively fixed at one horizontal circumferential surface of the rotating rings 176a, 176b; a first fixing bar 92a bent in the shape of an "L" figure with one end thereof inserted into the connecting bar 90a to horizontally slide without revolving in relation to the corresponding connecting bar 90a; a first moving bar 98a mounted at the upper circumferential surface of the fixing bar 92a for vertical movement to support the monitor 50 with the third link mechanism 42c at a predetermined upper height level; a second fixing bar 92b bent in the shape of an "L" figure with one end thereof inserted

into the other connecting bar 90b for horizontal sliding without revolving in relation to the corresponding connecting bar 90b to support the treatment board 46 with the first link mechanism 42a at a predetermined height level; and a second moving bar 98b mounted at the upper circumferential surface of the fixing bar 92b for vertical movement to support the monitor 50 with the second link mechanism 42c at a predetermined upper height level.

[0061] The rotational plates 172a, 172b are integrated with the rotational axle 36a, for instance, by welding for simultaneous rotation.

[0062] The plurality of split grooves 170a, 170b of the rotational plates 172a, 172b are respectively formed, each having an identical angle around the rotational axle 36a.

[0063] The fixing brackets 180a, 180b are respectively bent in the shape of a "⊏" figure with the end thereof being fixed with a plurality of fastening bolts (reference numerals not shown), for instance, at one circumferential surface of the rotating rings 176a, 176b.

[0064] The ends of the lock pins 182a, 182b are formed in a round shape. Hitching jaws (reference numerals not shown) are respectively integrated in the lengthwise center of the circumferential surface of the lock pins 182a, 182b to place a restriction on the forward movement by being hitched at the respective through holes 174a, 174b of the rotating rings 176a, 176b. Besides, bent parts (reference numerals not shown) are respectively formed at the rear end of the lock pins 182a, 182b for convenient hitching at the upper end of the push levers 188a, 188b.

[0065] The elastic members 184a, 184b are made of compressible coil springs respectively inserted into the rear circumferential surface of the lock pins 182a, 182b. One end of the elastic members 184a, 184b is closely attached for hitching at the internal side of the fixing brackets 180a, 180b and the other end thereof is hitched at hitching jaws (reference numerals not shown) protruded at the lengthwise center of the lock pins 182a, 182b.

[0066] The push levers 188a, 188b are bent in the shape of an "L" figure to respectively form horizontal and vertical portions thereof. The center of the vertical portion is hinged by way of the hinge axle 186a, 186b at one side of the fixing brackets 180a, 180b, and a non-slippery member is attached on the surface of each horizontal portion to be used as a foot pad.

[0067] A bearing 70d is inserted between the rotational plates 172a, 172b.

[0068] Hereinafter, the operations and effects will be described in accordance with the fourth embodiment of the present invention.

[0069] In order to control the position of the monitor 50 and microscope 48 around the rotating patient chair 30, for instance, to make them face each other by manipulation of the rotational supporting means 60, the rotational plates 172a, 172b and rotating rings 176a, 176b respectively fixed at the lower circumferential surface of the rotational axle 36a of the chair rotating drive part 36 should be placed apart, far enough to allow free rotation as shown in FIG. 9b.

[0070] The separation operation as such will be described with reference to FIG. 9b. When the practitioner steps on either of the push levers 188a, 188b protruded at the lower external end of the chair rotating drive part 36, the push levers 188a, 188b engage in a see-saw movement around the hinge axle 186a, 186b to enable the upper end thereof to rotate clockwise. At this time, the lock pins 182a, 182b respectively hitched at the upper portions of the push levers 188a, 188b horizontally move backwards by operation of the push levers 188a, 188b for separation of the ends of the lock pins 182a, 182b from the plurality of split grooves 170a, 170b formed around the circumferential surface of the rotational plates 172a, 172b and, at the same time, inserted into the through holes 174a, 174b of the rotating rings 176a, 176b. Therefore, rotational plates 172a, 172b and rotating rings 176a, 176b are separated to prevent any interference when rotational plates 172a, 172b and rotating rings 176a, 176b are rotated at different angles.

[0071] At this time, the practitioner can rotate and position the connecting bar 90a, fixing bar 92a, moving bar 98a, third link mechanism 42c and monitor 50 connected with the upper rotating ring 176a in a corresponding movement around the rotating patient chair 30 as desired.

[0072] Moreover, if the practitioner takes his or her foot off the push levers 88a, 88b after the monitor 50 and microscope 48 are properly positioned at a predetermined angle (α degrees) as desired, the lock pins 82a, 82b respectively move forward to the horizontal direction by elasticity of the elastic member 84a for selective insertion into one of the split grooves 70a, 70b each spaced in a predetermined gap thereamong relative to the circumferential surface of the rotational plates 72a, 72b. Then, the rotational plates 72a, 72b and rotating rings 76a, 76b can simultaneously be rotated along with the rotating patient chair 30.

[0073] Likewise, the position of the monitor 50 and microscope 48 can be controlled by the locking operation of the lock pins 82a, 82b at a predetermined angle (α degrees) around the rotating patient chair 30 as shown in FIG. 10.

[0074] The fifth embodiment of the present invention will be described with reference to FIGS. 11 and 12.

[0075] By way of reference, if the fifth embodiment of the present invention is identically constructed as the first through fourth embodiments described above, identical reference numerals will be used for designation of like or equivalent parts, detailed descriptions of which will be omitted.

[0076] The rotational axle 36a of the chair rotating driving part 36 of the rotating patient chair 30 has a rotational supporting means 60 that completely rotates or stops around the rotating patient chair 30, and connects and supports the monitor 50 and microscope 48 to face each other along the same horizontal line.

[0077] In other words, the rotational supporting means

60 includes: a rotational plate 72 supported to the rotational axle 36a to allow free rotation around the rotating patient chair 30; a hollow connecting bar 90b horizontally fixed at the outer circumferential surface of the rotational plate 72; a fixing bar 92b bent in the shape of an "L" figure with one end thereof being inserted into the connecting bar 90b for horizontal sliding without revolving in relation to the corresponding connecting bar 90b to support the treatment board 46 with the first link mechanism 42a at a predetermined vertical height level; a moving bar 98b mounted at the upper circumferential surface of the fixing bar 92b for vertical movement to support the microscope 48 with the second link mechanism at a predetermined height level; and a supporting bar 110 mounted at the upper portion of the moving bar 98b and bent in the shape of a "¬" figure for horizontal rotation to support the monitor 50 with the third link mechanism at the horizontal end thereof.

[0078] The connecting bar 90b and the fixing bar 92b should be coupled in a spline coupling method, so that while the fixing bar 92b horizontally slides with the corresponding connecting bar 90a, both must revolve together.

[0079] The moving bar 98b is connected to control the vertical height level with a control knob 98c closely fixed in a thread-fitted manner at a predetermined height level of the outer circumferential surface of the fixing bar 92b.

[0080] The supporting bar 110 is inserted into and connected to the upper portion of the moving bar 98b with a control knob 98d to prevent vertical separation.

[0081] Hereinafter, the operations and effects will be described with reference to the fifth embodiment of the present invention thus constructed.

[0082] When a patient seated on the rotating patient chair 30 is treated, the rotational supporting means 60 is rotated as shown in FIGS. 11 and 12. The microscope 48 and monitor 50 simultaneously rotate around the rotating patient chair 30 synchronously with the rotation of the rotational supporting means 60 to be positioned in correspondence with both ears of the patient. For instance, when the position of the microscope 48 is controlled in correspondence with the patient's right ear, the monitor 50 is automatically positioned correspondingly.

[0083] In other words, as the rotational supporting means 60 includes the connecting bar 90b, fixing bar 92b, moving bar 98b, supporting bar 110 sequentially connected in a line, the treatment board 46 is installed at the fixing bar 92b with the first link mechanism 42a, the microscope 48 is installed at the moving bar 98b with the second link mechanism 42b, and the monitor 50 is installed at the supporting bar 110 with the third link mechanism, the treatment board 46, microscope 48 and monitor 50 all move synchronously when the rotational supporting means 60 is rotated.

[0084] Particularly, the supporting bar 110 can be turned to a predetermined angle around the moving bar 98b by releasing the control knob 98d, which fixes the lower vertical portion of the supporting bar 110 and the upper portion of the moving bar 98b. Also, the supporting bar 110 can be stopped at a predetermined height level when the control knob 98d is tightened. As a result of the aforementioned structure, the monitor 50 connected to the supporting bar 110 with the third link mechanism 42c and the microscope 48 connected to the moving bar 98b with the second link mechanism 42b can be positioned to face each other around the patient rotation chair 30.

[0085] Therefore, the supporting bar 110 illustrated in the fifth embodiment is more cost-effective and has a simpler structure than the second embodiment of the present invention where the microscope 48 and monitor 50 are respectively supported with the moving bars 98a, 98b.

[0086] As described above, the rotating patient chair mounted with an integrated ear diagnosis and treatment unit described in accordance with the first through fourth embodiments of the present invention is constructed with suctioners, treatment board, microscope having a camera, monitor, control box to control devices and treatment tools, so that the monitor and microscope can be positioned in correspondence with the patient's ears anatomically positioned at 180 degrees, to enable the patient to observe all of the treatment processes to his or her ear parts including the thin, dark auditory canals and eardrums, on the installed monitor and to enable the practitioner to explain all of the treatment processes shown on the monitor to the patient and his guardians, thereby improving reliability on the practitioner and the treatment processes and maximizing the treatment effects. Also, the diagnosis and treatment processes can be performed on the patient's ears by not letting the practitioner or patient move around but by merely rotating the ear diagnosis and treatment unit, thereby minimizing discomfort and inconvenience to the practitioner or patient, shortening the medical treatment time and minimizing the space of a treatment room occupied by the diagnosis and treatment unit.

[0087] The foregoing descriptions of specific embodiments of the present invention are presented for purposes of illustration and description. They are not intended to be exhaustive or to limit the invention to the precise forms disclosed. Obviously many modifications and variations are possible in view of the above teachings. The embodiments were chosen and described in order to best explain the principles of the invention and its practical applications, to thereby enable others skilled in the art to best utilize the invention and various embodiments with various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the following claims.

Claims

1. A rotating patient chair (30) mounted with an ear diagnosis and treatment unit, wherein the ear diagnosis and treatment unit includes at least one suctioner

(44 ; 52), a treatment board (46), a microscope (48) having a camera, a monitor (50), and the rotating patient chair (30) includes a seat (31), a back rest (32), an arm rest (35), a chair rotating drive part (36), the chair (30) comprising :

a first link mechanism (42a) connecting the treatment board (46) to the chair (30) and adapted for controlling the position of the treatment board (46) ;
a second link mechanism (42b) connecting the microscope (48) to the chair (30) and adapted for controlling the position of the microscope (48) ;
the first and second link mechanism (42a, 42b) being arranged such that a treatment can be performed on both ears of a patient sitting in the chair (30),
and a third link mechanism (42c) connecting the monitor (50) to the chair (30) and adapted for controlling the position of the monitor (50),
the third link mechanism (42c) being arranged such that a patient sitting in the chair (30) can observe the treatment process performed on both ears on the monitor (50).

2. A rotating patient chair (30) according to claim 1 comprising :

a manipulating switch box (40) mounted at one side of the chair rotating drive part (36) to control the power of the suctioner (44), the microscope (48) and the monitor (50);
the first link mechanism (42a) connecting the suctioner, on which the treatment board (46) is mounted, to the back rest (32) to control the horizontal position of the suctioner (44);
the a second link mechanism (42b) connecting the microscope (48) to the back rest (32) to control the horizontal and vertical position of the microscope (48) ; and
the third link mechanism (42c) connecting the monitor (50) to the arm rest (35) to control the horizontal position of the monitor (50).

3. A rotating patient chair (30) according to claim 1, wherein the ear diagnosis and treatment unit includes suctioners (52), the chair (30) comprising :

a rotational supporting means (60) that connects a rotational axle (36a) of the chair rotating drive part (36) to the first, second and third link mechanisms (42a, 42b, 42c) and rotates around the rotational axle (36a) of the rotating patient chair (30) to simultaneously or respectively control the position of the microscope (48) and the monitor (50) kept at a predetermined angle.

4. The chair (30) as defined in claim 3 further comprising a manipulating switch box mounted at one side of the back rest (32) to control the power of the microscope (48), monitor (50) and suctioners (52).

5. The chair (30) as defined in claim 3, wherein the suctioners (52) are respectively mounted on both upper ends of the back rest (32).

6. The chair (30) as defined in claim 5, wherein a blood pressure tester (54) is mounted at an upper side of the arm rest (35).

7. The chair (30) as defined in claim 3, wherein the rotational supporting means (60) comprises:

a rotational plate (72) concentrically supported via bearings (70a) at the outer circumferential surface of the rotational axle (36a) to horizontally rotate independently the rotation of the rotational axle (36a), and circumferentially formed with a plurality of split grooves (72a) each spaced in a predetermined gap thereamong at the upper central surface thereof;
a push lever (80) hinged via a hinge axle (78) in an open hole formed at one side of a case (74) of the chair rotating drive part (36) for horizontal see-saw movement to enable a locking part (80a) at a tip end thereof to be selectively attached to or detached from one of the plurality of split grooves (72a) in the case (74) while a rear end thereof is protruded outside of the case (74);
an elastic member (82) mounted between one side of the case (74) and an upper end of the push lever (80) to place an elastic force down toward the tip end of the push lever (80) ;
hollow connecting bars (90a, 90b) with one end thereof being respectively fixed at the outer circumferential surface of the rotational plate (72) to face each other in order to rotate with the rotational plate (72) ;
a first fixing bar (92a) bent in the shape of an L figure with one end thereof inserted into one of the connecting bar (90a) to horizontally slide down without revolving in relation to the corresponding connecting bar (90a);
a first moving bar (98a) mounted at an upper circumferential surface of the first fixing bar (92a) for vertical movement and to support the monitor (50) with the third link mechanism (42c) at a predetermined height level;
a second fixing bar (92b) bent in the shape of an L figure with one end thereof being inserted into the other connecting bar (90b) to horizontally slide down without revolving in relation to the corresponding connecting bar (90b), and to support the treatment board (46) with the first

link mechanism (42a) at a predetermined height level; and

a second moving bar (98b) mounted at an upper circumferential surface of the second fixing bar (92b) for vertical movement and to support the microscope (48) with the second link mechanism (42b) at a predetermined height level.

8. The chair (30) as defined in claim 3, wherein the rotational supporting means (60) comprises:

a rotational plate (172) fixed on the outer circumferential surface of the rotational axle (36a) for simultaneous rotation and formed at the outer circumferential surface thereof with a plurality of split grooves (170) at a predetermined gap thereamong;

a rotating ring (176) supported on the lower circumferential surface of the rotational axle (36a) to freely rotate and formed with a plurality of recesses (174) in horizontal correspondence with a plurality of split grooves (170) at the internal circumferential surface thereof;

a lock ball (182) elastically supported in the recess via an elastic member (184) for coupling to or detaching from one of the plurality of the split grooves (170) ;

hollow connecting bars (90a, 90b) with one end thereof respectively fixed at the outer circumferential surface of the rotational ring (176) to face each other in order to rotate with the rotational ring (176) ;

a first fixing bar (92a) with one end thereof inserted into one of the connecting bar (90a) to horizontally slide down without revolving in relation to the corresponding connecting bar (90a) ;

a second fixing bar (92b) with one end thereof being inserted into the other connecting bar (90b) to horizontally slide down without revolving in relation to the corresponding connecting bar (90b) and to support the treatment board (46) at the lengthwise center thereof via the first link mechanism (42a);

a first moving bar (98a) mounted at the upper circumferential surface of the first fixing bar (92a) for vertical movement to support the monitor (50) with the third link mechanism (42c) at a predetermined upper height level thereof ; and

a second moving bar (98b) mounted at the upper circumferential surface of the second fixing bar (92b) for vertical movement to support the microscope (48) with the second link mechanism (42b) at a predetermined upper height level thereof.

9. The chair (30) as defined in claim 3, wherein the rotational supporting means (60) comprises:

rotational plates (172a, 172b) fixed at a predetermined gap thereamong on the outer circumferential surface of the rotational axle (36a) for simultaneous rotation and formed at the outer circumferential surface thereof with a plurality of split grooves (170a, 170b) in a predetermined gap thereamong;

rotating rings (176a, 176b) supported on the lower circumferential surface of the rotational axle (36a) to freely rotate and formed with a plurality of through holes (174a, 174b) in horizontal correspondence with the plurality of split grooves (170a, 170b) at the circumferential surface thereof;

lock pins (182a, 182b) respectively supported by way of fixing brackets (180a, 180b) at one circumferential surface of the rotating rings (176a, 176b) to move forward and backward with one end thereof selectively attached to or detached from one of the plurality of split grooves (170a, 170b) in the through holes (174a, 174b) ;

elastic members (184a, 184b) installed in the fixing brackets (180a, 180b) to apply elasticity to enable the lock pins (182a. 182b) to respectively move forward to the outside of the rotational plates (172a, 172b);

push levers (188a, 188b) respectively hinged at the lower ends of the fixing brackets (180a, 180b) for vertical see-saw movement via hinge axles (186a, 186b) and to move backwards the lock pins (182a, 182b) with the upper portion thereof hitched to the rear end of the lock pins (182a, 182b) when receiving external force ;

hollow connecting bars (90a, 90b) with one end thereof respectively fixed at the outer circumferential surface of the rotating rings (176a, 176b) ;

a first fixing bar (92a) with one end thereof inserted into one of the connecting bar (90a) for horizontal sliding without revolving in relation to the corresponding connecting bar (90a) ;

a first moving bar (98a) mounted at the upper circumferential surface of the first fixing bar (92a) for vertical movement to support the monitor (50) with the third link mechanism (42c) at the predetermined upper height level;

a second fixing bar (92b) with one end thereof inserted into the other connecting bar (90b) for horizontal sliding without revolving in relation to the corresponding connecting bar (90b) to support the treatment board (46) with the first link mechanism (42a) at a predetermined height level thereof ; and

a second moving bar (98b) mounted at the upper circumferential surface of the second fixing bar (92b) for vertical movement to support the microscope (48) with the second link mechanism (42b) at the predetermined upper height level

thereof.

10. The chair (30) as defined in claim 9, wherein the plurality of split grooves (170a, 170b) of the respective rotational plates (172a, 172b) are dispersed with an identical angle around the rotational axle (36a).

11. The chair (30) as defined in any one of claims 7, 8 or 9, wherein the fixing bars (92a, 92b) are respectively bent in the shape of an L figure and the lower horizontal parts thereof are coupled to the connecting bars (90a, 90b) for concentrical formation.

12. The chair (30) as defined in any one of claims 7, 8 or 9 , wherein the height of the moving bars (98a, 98b) is controlled by a control knob (98c), the one lower circumferential end of which is penetrated in a thread-fitted manner for attachment to a predetermined height level of the outer circumferential surface of the fixing bars (92a, 92b).

13. The chair (30) as defined in claim 3, wherein the rotational supporting means (60) comprises:

a rotational plate (72) supported on the rotational axle (36a) for free rotation separate from the rotation of the rotating patient chair (30) ;
a hollow connecting bar (90b) with one end thereof horizontally fixed at an outer circumferential surface of the rotational plate (72) ;
a fixing bar (92b) bent in the shape of an L figure with one end thereof inserted into the connecting bar (90b) to horizontally slide down without revolving in relation to the corresponding connecting bar (90b), and to support the treatment board (46) with the first link mechanism (42a) at a predetermined vertical height level thereof;
a moving bar (98b) mounted at the upper circumferential surface of the fixing bar (92b) for vertical movement and for supporting the microscope (48) with the second link mechanism (42b) at a predetermined height level thereof; and
a supporting bar (110) mounted at the upper end of the moving bar (98b) and bent in the shape of a ¬ figure for rotation to support the monitor (50) with the third link mechanism (42c) at one horizontal end thereof.

14. The chair (30) as defined in claim 13, wherein the lower vertical end of the supporting bar (110) is inserted into the upper end of the moving bar (98b) and fixed by a control knob (98d) penetrated to one upper circumferential end of the moving bar (98b).

Patentansprüche

1. Drehbarer Patientenstuhl (30), der mit einer Einheit zur Ohrdiagnose und -behandlung versehen ist, wobei die Einheit zur Ohrdiagnose und -behandlung wenigstens eine Saugvorrichtung (44; 52), einen Behandlungstisch (46), ein Mikroskop (48) mit einer Kamera, einen Monitor (50) aufweist und der drehbare Patientenstuhl (30) einen Sitz (31), eine Rückenlehne (32), eine Armlehne (35), ein Antriebsteil (36) für die Stuhldrehung aufweist, wobei der Stuhl (30) umfaßt:

einen ersten Gelenkmechanismus (42a), der den Behandlungstisch (46) mit dem Stuhl (30) verbindet und ausgelegt ist zur Steuerung der Position des Behandlungstisches (46);
einen zweiten Gelenkmechanismus (42b), der das Mikroskop (48) mit dem Stuhl (30) verbindet und ausgelegt ist zur Steuerung der Position des Mikroskops (48);

wobei der erste und der zweite Gelenkmechanismus (42a, 42b) derart angeordnet sind, daß eine Behandlung an beiden Ohren eines in dem Stuhl (30) sitzenden Patienten vorgenommen werden kann,
und einen dritten Gelenkmechanismus (42c), der den Monitor (50) mit dem Stuhl (30) verbindet und ausgelegt ist zur Steuerung der Position des Monitors (50),
wobei der dritte Gelenkmechanismus (42c) derart angeordnet ist, daß ein in dem Stuhl (30) sitzender Patient den an beiden Ohren vorgenommenen Behandlungsvorgang auf dem Monitor (50) beobachten kann.

2. Drehbarer Patientenstuhl (30) nach Anspruch 1, umfassend: einen Bedienungsschaltkasten (40), der an einer Seite des Antriebsteils (36) für die Stuhldrehung montiert ist, um die Leistung der Saugvorrichtung (44), des Mikroskops (48) und de Monitors (50) zu steuern;
wobei der erste Gelenkmechanismus (42a) die Saugvorrichtung, auf welcher der Behandlungstisch (46) montiert ist, mit der Rückenlehne (32) verbindet, um die horizontale Position der Saugvorrichtung (44) zu steuern;
wobei der zweite Gelenkmechanismus (42b) das Mikroskop (48) mit der Rückenlehne (32) verbindet, um die horizontale und vertikale Position des Mikroskops (48) zu steuern und
der dritte Gelenkmechanismus (42c) den Monitor (50) mit der Armlehne (35) verbindet, um die horizontale Position des Monitors (50) zu steuern.

3. Drehbarer Patientenstuhl (30) nach Anspruch 1, wobei die Einheit zur Ohrdiagnose und -behandlung Saugvorrichtungen (52) aufweist und der Stuhl (30)

umfaßt:

eine drehende Trägereinheit (60), die eine Drehachse (36a) des Antriebsteils (36) für eine Stuhldrehung mit dem ersten, zweiten und dritten Gelenkmechanismus (42a, 42b, 42c) verbindet und sich um die Drehachse (36a) des drehbaren Patientenstuhls (30) dreht, um gleichzeitig oder jeweils die Position des Mikroskops (48) und des Monitors (50), die unter einem vorbestimmten Winkel gehalten sind, zu steuern.

4. Stuhl (30) nach Anspruch 3, des weiteren umfassend einen Bedienungsschaltkasten, der an einer Seite der Rückenlehne (32) montiert ist, um die Leistung des Mikroskops (48), des Monitors (50) und der Saugvorrichtungen (52) zu steuern.

5. Stuhl (30) nach Anspruch 3, bei welchem die Saugvorrichtungen (52) jeweils an beiden oberen Enden der Rückenlehne (32) montiert sind.

6. Stuhl (30) nach Anspruch 5, bei welchem ein Blutdruckmesser (54) an einer Oberseite der Armlehne (35) montiert ist.

7. Stuhl (30) nach Anspruch 3, bei welchem die drehende Trageinrichtung (60) umfaßt:

eine Drehplatte (72), die konzentrisch über Lager (70a) an der Außenumfangsoberfläche der Drehachse (36a) getragen ist, um horizontal unabhängig von der Drehung der Drehachse (36a) zu drehen und umfangsmäßig mit mehreren geteilten Nuten (72a) ausgebildet ist, von denen jede in einem vorbestimmten Abstand untereinander an ihrer oberen zentralen Oberfläche beabstandet ist;
einen Druckhebel (80), der über eine Drehachse (78) in einem offenen Loch angelenkt ist, das an einer Seite eines Gehäuses (74) des Antriebsteils (36) für eine Stuhldrehung ausgebildet ist für eine horizontale Wippbewegung, um es einem Verriegelungsteil (80a) an einem vorderen Ende von ihm zu ermöglichen, wahlweise in Verbindung zu stehen oder nicht in Verbindung zu stehen mit einer der mehreren geteilten Nuten (72a) in dem Gehäuse (74), während ein hinteres Ende von ihm nach außen, von dem Gehäuse (74) vorsteht;
ein federndes Teil (82), das zwischen einer Seite des Gehäuses (74) und einem oberen Ende des Druckhebels (80) montiert ist, um eine Federkraft nach unten, in Richtung des vorderen Endes des Druckhebels (80) auszuüben;
hohle Verbindungsstangen (90a, 90b), deren ein Ende jeweils befestigt ist an der äußeren Umfangsoberfläche der Drehplatte (72), um aufeinander zuzuweisen, um sich mit der Drehplatte (72) zu drehen;
eine erste Fixierstange (92a), die in Form eines Buchstabens L gebogen ist und deren ein Ende in eine der Verbindungsstangen (90a) eingeführt ist, um horizontal nach unten zu gleiten, ohne sich in Bezug auf die entsprechende Verbindungsstange (90a) zu drehen;
eine erste bewegliche Stange (98a), die an einer oberen Umfangsoberfläche der ersten Fixierstange (92a) montiert ist für eine vertikale Bewegung und zum Halten des Monitors (50) mit dem dritten Gelenkmechanismus (42c) auf einem vorbestimmten Höhenniveau;
eine zweite Fixierstange (92b), die in Form eines Buchstabens L gebogen ist und deren ein Ende in die anderen Verbindungsstangen (90b) eingeführt ist, um horizontal nach unten zu gleiten, ohne sich in Bezug auf die entsprechende Verbindungsstange (90b) zu drehen und
um den Behandlungstisch (46) mit dem ersten Gelenkmechanismus (42a) auf einem vorbestimmten Höhenniveau zu halten; und
eine zweite bewegliche Stange (98b), die an einer oberen Umfangsoberfläche der zweiten Fixierstange (92b) montiert ist für eine vertikale Bewegung und zum Halten des Mikroskops (48) mit dem zweiten Gelenkmechanismus (42b) auf einem vorbestimmten Höhenniveau.

8. Stuhl (30) nach Anspruch 3, bei welchem die drehende Trägereinrichtung (60) umfaßt:

eine Drehplatte (172), die an der äußeren Umfangsoberfläche der Drehachse (36a) befestigt ist für eine gleichzeitige Drehung und an deren äußeren Umfangsoberfläche mehrere geteilte Nuten (170) unter einem vorbestimmten Abstand untereinander vorgesehen sind;
einen Drehring (176), der auf der unteren Umfangsoberfläche der Drehachse (36a) getragen ist, um frei zu drehen und der mit mehreren Ausnehmungen (174) in horizontaler Übereinstimmung mit mehreren geteilten Nuten (170) an seiner inneren Umfangsoberfläche ausgebildet ist;
eine Verriegelungskugel (182), die federnd in der Ausnehmung über ein federndes Element (184) gehalten ist, um eine Kopplung mit einer der mehreren geteilten Nuten (170) zu schaffen oder davon gelöst zu werden;
hohle Verbindungsstangen (90a, 90b), deren ein Ende jeweils an der äußeren Umfangsoberfläche des Drehrings (176) befestigt ist, um aufeinander zuzuweisen, um sich mit dem Drehring (176) zu drehen;
eine erste Fixierstange (92a), deren ein Ende in eine der Verbindungsstangen (90a) eingeführt ist, um horizontal nach unten zu gleiten, ohne

sich in Bezug auf die entsprechende Verbindungsstange (90a) zu drehen;
eine zweite Fixierstange (92b), deren ein Ende in die andere Verbindungsstange (90b) eingeführt ist, um horizontal nach unten zu gleiten, ohne sich in Bezug auf die entsprechende Verbindungsstange (90b) zu drehen und um den Behandlungstisch (46) bei seinem Zentrum in Längsrichtung über den ersten Gelenkmechanismus (42a) zu halten;
eine erste bewegliche Stange (98a), die an der oberen Umfangsoberfläche der ersten Fixierstange (92a) montiert ist für eine vertikale Bewegung zum Halten des Monitors (50) über den dritten Gelenkmechanismus (42c) auf seinem vorbestimmten oberen Höhenniveau; und
eine zweite bewegliche Stange (98b), die an der oberen Umfangsoberfläche der zweiten Fixierstange (92b) montiert ist für eine vertikale Bewegung, um das Mikroskop (48) mit dem zweiten Gelenkmechanismus (42b) auf seinem vorbestimmten oberen Höhenniveau zu halten.

9. Stuhl (30) nach Anspruch 3, bei welchem die drehende Trageinrichtung (60) umfaßt:

Drehplatten (172a, 172b), die unter einem vorbestimmten Abstand untereinander an der äußeren Umfangsoberfläche der Drehachse (36a) befestigt sind für eine gleichzeitige Drehung und an deren äußeren Umfangsoberfläche mehrere geteilte Nuten (170a, 170b) in einem vorbestimmten Abstand untereinander ausgebildet sind;
Drehringe (176a, 176b), die auf der unteren Umfangsoberfläche der Drehachse (36a) getragen sind, um frei zu drehen und mit mehreren Durchgangslöchern (174a, 174b) ausgebildet sind in horizontaler Übereinstimmung mit den mehreren geteilten Nuten (170a, 170b) bei ihrer Umfangsoberfläche;
Verriegelungsstifte (182a, 182b), die jeweils mittels Befestigungshaltern (180a, 180b) an einer Umfangsoberfläche der Drehringe (176a, 176b) gehalten sind, um sich mit einem ihrer Enden vorwärts und rückwärts zu bewegen und dabei wahlweise in Eingriff zu stehen oder gelöst zu sein von einer der mehreren geteilten Nuten (170a, 170b) in den Durchgangslöchern (174a, 174b);
federnde Teile (184a, 184b), die in den Befestigungshaltern (180a, 180b) installiert sind, um eine Federwirkung auszuüben und es den Verriegelungsstiften (182a, 182b) zu ermöglichen, sich jeweils vorwärts, nach außerhalb der Drehplatten (172a, 172b) zu bewegen;
Druckhebel (188a, 188b), die jeweils an den unteren Enden der Befestigungshalter (180a, 180b) angelenkt sind für eine vertikale Wippbewegung über Gelenkachsen (186a, 186b) und um die Verriegelungsstifte (182a, 182b) rückwärts zu bewegen, wobei ihr oberer Abschnitt bei Aufnahme der externen Kraft angekuppelt ist an dem hinteren Ende der Verriegelungsstifte (182a, 182b);
hohle Verbindungsstangen (90a, 90b), deren ein Ende jeweils an der äußeren Umfangsoberfläche der Drehringe (176a, 176b) befestigt ist;
eine erste Fixierstange (92a), deren ein Ende in eine der Verbindungsstangen (90a) eingeführt ist für eine horizontale Verschiebung ohne Drehung in Bezug auf die entsprechende Verbindungsstange (90a);
eine erste bewegliche Stange (98a), die an der oberen Umfangsoberfläche der ersten Fixierstange (92a) montiert ist für eine vertikale Bewegung, um den Monitor (50) mit dem dritten Gelenkmechanismus (42c) auf dem vorbestimmten oberen Höhenniveau zu halten;
eine zweite Fixierstange (92b), deren ein Ende in die andere Verbindungsstange (90b) eingeführt ist für eine horizontale Verschiebung ohne Drehung in Bezug auf die entsprechende Verbindungsstange (90b), um den Behandlungstisch (46) mit dem ersten Gelenkmechanismus (42a) auf seinem vorbestimmten Höhenniveau zu halten; und
eine zweite bewegliche Stange (98b), die an der oberen Umfangsoberfläche der zweiten Fixierstange (92b) montiert ist für eine vertikale Bewegung, um das Mikroskop (48) mit dem zweiten Gelenkmechanismus (42b) auf seinem vorbestimmten oberen Höhenniveau zu halten.

10. Stuhl (30) nach Anspruch 9, bei welchem die mehreren geteilten Nuten (170a, 170b) der jeweiligen Drehplatten (172a, 172b) unter einem identischen Winkel um die Drehachse (36a) verteilt sind.

11. Stuhl (30) nach einem der Ansprüche 7, 8 oder 9, bei welchem die Fixierstangen (92a, 92b) jeweils in Form eines Buchstabens L gebogen sind und deren unteren horizontalen Teile mit den Verbindungsstangen (90a, 90b) für eine konzentrische Ausbildung gekoppelt sind.

12. Stuhl (30) nach einem der Ansprüche 7, 8 oder 9, wobei die Höhe der beweglichen Stangen (98a, 98b) gesteuert wird über einen Einstellknopf (98c), dessen ein unteres Umfangsende auf über Gewindepassung vorgesehene Weise eindringt zum Zwecke der Befestigung auf einem vorbestimmten Höhenniveau der äußeren Umfangsoberfläche der Fixierstangen (92a, 92b).

13. Stuhl (30) nach Anspruch 3, bei welchem die dre-

hende Trägereinrichtung (60) umfaßt:

eine Drehplatte (72), die auf der Drehachse (36a) getragen ist für eine freie Drehung, getrennt von der Drehung des drehbaren Patientenstuhls (30);
eine hohle Verbindungsstange (90b), deren ein Ende horizontal an einer äußeren Umfangsoberfläche der Drehplatte (72) befestigt ist;
eine Fixierstange (92b), die in Form eines Buchstabens L gebogen ist, wobei deren ein Ende in die Verbindungsstange (90b) eingeführt ist, um horizontal nach unten zu gleiten ohne sich in Bezug auf die entsprechende Verbindungsstange (90b) zu drehen und den Behandlungstisch (46) mit dem ersten Gelenkmechanismus (42a) auf seinem vorbestimmten vertikalen Höhenniveau zu halten;
eine bewegliche Stange (98b), die an der oberen Umfangsoberfläche der Fixierstange (92b) montiert ist für eine vertikale Bewegung und zum Tragen des Mikroskops (48) mit dem zweiten Gelenkmechanismus (42b) auf dessen vorbestimmten Höhenniveau; und
eine Haltestange (110), die an dem oberen Ende der beweglichen Stange (98b) montiert ist und in Form einer Figur ¬ gebogen ist für eine Drehung, um den Monitor (50) mit dem dritten Gelenkmechanismus (42c) bei dessen horizontalem Ende zu halten.

14. Stuhl (30) nach Anspruch 13, bei welchem das untere vertikale Ende der Haltestange (110) in dem oberen Ende der beweglichen Stange (98b) eingeführt ist und fixiert ist über einen Einstellknopf (98d), der eindringt in ein oberes Umfangsende der beweglichen Stange (98b).

Revendications

1. Fauteuil pivotant (30) pour patient, monté en étant doté d'une unité de diagnostic et de traitement des oreilles, où l'unité de diagnostic et de traitement des oreilles comprend au moins un aspirateur (44 ; 52), un plateau de traitement (46), un microscope (48) ayant une caméra, un moniteur (50), et le fauteuil pivotant (30) pour patient comprend au moins un siège (31), un dossier (32), un accoudoir (35), une partie d'entraînement pivotante (36) du fauteuil, le fauteuil (30) comprenant :

- un premier mécanisme articulé (42a) reliant le plateau de traitement (46) au fauteuil (30) et adapté pour régler la position du plateau de traitement (46) ;
- un deuxième mécanisme articulé (42b) reliant le microscope (48) au fauteuil (30) et adapté pour régler la position du microscope (48) ;
- les premier et deuxième mécanismes articulés (42a, 42b) étant agencés de manière telle, qu'un traitement puisse être effectué aux deux oreilles d'un patient assis dans le fauteuil (30), et
- un troisième mécanisme articulé (42c) reliant le moniteur (50) au fauteuil (30) et adapté pour régler la position du moniteur (50),

le troisième mécanisme articulé (42c) étant agencé de manière telle, qu'un patient assis dans le fauteuil (30) puisse observer, sur le moniteur (50), le processus de traitement effectué aux deux oreilles.

2. Fauteuil pivotant (30) pour patient selon la revendication 1, comprenant :

- un boîtier de commutation (40) monté sur un côté de la partie d'entraînement pivotante (36) du fauteuil, pour régler la puissance de l'aspirateur (44), du microscope (48) et du moniteur (50) ;

le premier mécanisme articulé (42a) reliant l'aspirateur, sur lequel est monté le plateau de traitement (46), au dossier (32), pour régler la position horizontale de l'aspirateur (44) ;
le deuxième mécanisme articulé (42b) reliant le microscope (48) au dossier (32), pour régler la position horizontale et verticale du microscope (48) ; et
le troisième mécanisme articulé (42c) reliant le moniteur (50) à l'accoudoir (35), pour régler la position horizontale du moniteur (50).

3. Fauteuil pivotant (30) pour patient selon la revendication 1, dans lequel l'unité de diagnostic et de traitement des oreilles comprend des aspirateurs (52), le fauteuil (30) comprenant :

- des moyens supports de rotation (60) qui relient un axe de rotation (36a) de la partie d'entraînement pivotante (36) du fauteuil, aux premier, deuxième et troisième mécanismes articulés (42a, 42b, 42c) et tournent autour de l'axe de rotation (36a) du fauteuil pivotant (30) pour patient, pour régler simultanément ou respectivement la position du microscope (48) et du moniteur (50) maintenus à un angle prédéterminé.

4. Fauteuil (30) selon la revendication 3, comprenant en outre un boîtier de commutation monté sur un côté du dossier (32), pour régler la puissance du microscope (48), du moniteur (50) et des aspirateurs (52).

5. Fauteuil (30) selon la revendication 3, dans lequel les aspirateurs (52) sont montés, respectivement, sur les deux extrémités supérieures du dossier (32).

6. Fauteuil (30) selon la revendication 5, dans lequel un manchon de contrôle de la pression sanguine (54) est monté sur un côté supérieur de l'accoudoir (35).

7. Fauteuil (30) selon la revendication 3, dans lequel les moyens supports de rotation (60) comprennent :

- un plateau rotatif (72) supporté concentriquement par des surfaces d'appui (70a), au niveau de la surface circonférentielle extérieure de l'axe de rotation (36a), pour tourner horizontalement, indépendamment de la rotation de l'axe de rotation (36a), et formé circonférentiellement en comportant une pluralité de rainures fendues (72a), chaque rainure fendue étant espacée des autres rainures fendues, suivant un intervalle prédéterminé, sur la surface centrale supérieure dudit plateau rotatif ;
- un levier de poussée (80) articulé par un axe d'articulation (78), dans un trou ouvert formé sur un côté d'un bâti (74) de la partie d'entraînement pivotante (36) du fauteuil, pour un mouvement horizontal de bascule, afin de permettre à une partie de verrouillage (80a), placée au niveau d'une extrémité du levier de poussée, d'être sélectivement fixée sur l'une des rainures fendues formant la pluralité de rainures fendues (72a) du bâti (74), ou bien détachée de ladite rainure fendue, tandis qu'une extrémité arrière du levier de poussée dépasse à l'extérieur du bâti (74) ;
- un élément élastique (82) monté entre un côté du bâti (74) et une extrémité supérieure du levier de poussée (80), pour appliquer une force élastique vers le bas, en direction de l'extrémité du levier de poussée (80) ;
- des barres de liaison creuses (90a, 90b) dont l'une de leurs extrémités est respectivement fixée au niveau de la surface circonférentielle extérieure du plateau rotatif (72), les extrémités étant en face l'une de l'autre, afin de tourner avec le plateau rotatif (72) ;
- une première barre de fixation (92a) coudée ayant la forme de la lettre L, première barre de fixation dont une extrémité est introduite dans l'une des barres de liaison (90a) pour coulisser horizontalement vers le bas, sans tourner par rapport à la barre de liaison correspondante (90a) ;
- une première barre mobile (98a) montée au niveau d'une surface circonférentielle extérieure de la première barre de fixation (92a), prévue pour un mouvement vertical et pour supporter le moniteur (50) avec le troisième mécanisme articulé (42c), à un niveau de hauteur prédéterminé ;
- une deuxième barre de fixation (92b) coudée ayant la forme de la lettre L, une extrémité de la deuxième barre de fixation étant introduite dans l'autre barre de liaison (90b), pour coulisser horizontalement vers le bas, sans tourner par rapport à la barre de liaison correspondante (90b), et pour supporter le plateau de traitement (46) avec le premier mécanisme articulé (42a), à un niveau de hauteur prédéterminé ; et
- une deuxième barre mobile (98b) montée au niveau d'une surface circonférentielle supérieure de la deuxième barre de fixation (92b), prévue pour un mouvement vertical et pour supporter le microscope (48) avec le deuxième mécanisme articulé (42b), à un niveau de hauteur prédéterminé.

8. Fauteuil (30) selon la revendication 3, dans lequel les moyens supports de rotation (60) comprennent :

- un plateau rotatif (172) fixé sur la surface circonférentielle extérieure de l'axe de rotation (36a), pour une rotation simultanée, et formé au niveau de la surface circonférentielle extérieure dudit axe de rotation, en comportant une pluralité de rainures fendues (170), suivant un intervalle prédéterminé les unes par rapport aux autres ;
- une bague tournante (176) supportée sur la surface circonférentielle inférieure de l'axe de rotation (36a), pour tourner librement, et formée en comportant une pluralité de cavités (174) en correspondance horizontale avec une pluralité de rainures fendues (170), au niveau de la surface circonférentielle intérieure dudit axe de rotation;
- une bille de verrouillage (182) supportée élastiquement dans la cavité, par un élément élastique (184), pour coupler à l'une des rainures fendues formant la pluralité de rainures fendues (170) ou bien pour se détacher de ladite rainure fendue ;
- des barres de liaison creuses (90a, 90b) dont une extrémité est fixée respectivement au niveau de la surface circonférentielle extérieure de la bague tournante (176), pour être en face l'une de l'autre, afin de tourner avec la bague tournante (176) ;
- une première barre de fixation (92a) dont une extrémité est introduite dans l'une des barres de liaison (90a), pour coulisser horizontalement vers le bas, sans tourner par rapport à la barre de liaison correspondante (90a) ;
- une deuxième barre de fixation (92b) dont une extrémité est introduite dans l'autre barre de liaison (90b), pour coulisser horizontalement vers le bas, sans tourner par rapport à la barre de liaison correspondante (90b) et pour, grâce au premier mécanisme articulé (42a), supporter le plateau de traitement (46) au niveau du centre de ladite deuxième barre de fixation, dans le

sens longitudinal ;
- une première barre mobile (98a) montée au niveau de la surface circonférentielle supérieure de la première barre de fixation (92a), prévue pour un mouvement vertical et pour supporter le moniteur (50) avec le troisième mécanisme articulé (42c), à un niveau de hauteur supérieur prédéterminé de ladite première barre de fixation ; et
- une deuxième barre mobile (98b) montée au niveau de la surface circonférentielle supérieure de la deuxième barre de fixation (92b), prévue pour un mouvement vertical et pour supporter le microscope (48) avec le deuxième mécanisme articulé (42b), à un niveau de hauteur supérieur prédéterminé de ladite deuxième barre de fixation.

9. Fauteuil (30) selon la revendication 3, dans lequel les moyens supports de rotation (60) comprennent :

- des plateaux rotatifs (172a, 172b) fixés au niveau d'un intervalle prédéterminé, l'un par rapport à l'autre, sur la surface circonférentielle extérieure de l'axe de rotation (36a), pour une rotation simultanée, et formés au niveau de la surface circonférentielle extérieure dudit axe de rotation, en comportant une pluralité de rainures fendues (170a, 170b), suivant un intervalle prédéterminé les unes par rapport aux autres ;
- des bagues tournantes (176a, 176b) supportées sur la surface circonférentielle inférieure de l'axe de rotation (36a), pour tourner librement, et formées en comportant une pluralité de trous traversants (174a, 174b), en correspondance horizontale avec la pluralité de rainures fendues (170a, 170b) au niveau de la surface circonférentielle dudit axe de rotation ;
- des goupilles de verrouillage (182a, 182b) supportées respectivement au moyen de supports de fixation (180a, 180b), au niveau d'une surface circonférentielle des bagues tournantes (176a, 176b), pour se déplacer vers l'avant et vers l'arrière, une extrémité desdites goupilles de verrouillage étant sélectivement fixée sur l'une des rainures fendues formant la pluralité de rainures fendues (170a, 170b), ou bien détachée de celle-ci, dans les trous traversants (174a, 174b) ;
- des éléments élastiques (184a, 184b) installés dans les supports de fixation (180a, 180b), pour appliquer une élasticité, pour permettre aux goupilles de verrouillage (182a, 182b) d'avancer respectivement à l'extérieur des plateaux rotatifs (172a, 172b) ;
- des leviers de poussée (188a, 188b) respectivement articulés au niveau des extrémités inférieures des supports de fixation (180a, 180b), pour un mouvement vertical de bascule, via des axes d'articulation (186a, 186b), et pour reculer les goupilles de verrouillage (182a, 182b), leur partie supérieure étant fixée sur l'extrémité arrière des goupilles de verrouillage (182a, 182b), au moment de la réception de la force extérieure ;
- des barres de liaison creuses (90a, 90b), une de leurs extrémités étant respectivement fixée au niveau de la surface circonférentielle extérieure des bagues tournantes (176a, 176b) ;
- une première barre de fixation (92a) dont une extrémité est introduite dans l'une des barres de liaison (90a) pour coulisser horizontalement, sans tourner par rapport à la barre de liaison correspondante (90a) ;
- une première barre mobile (98a) montée au niveau de la surface circonférentielle supérieure de la première barre de fixation (92a), prévue pour un mouvement vertical et pour supporter le moniteur (50) avec le troisième mécanisme articulé (42c), au niveau de hauteur supérieur prédéterminé ;
- une deuxième barre de fixation (92b) dont une extrémité est introduite dans l'autre barre de liaison (90b) pour coulisser horizontalement, sans tourner par rapport à la barre de liaison correspondante (90b), pour supporter le plateau de traitement (46) avec le premier mécanisme articulé (42a), à un niveau de hauteur prédéterminé de ladite deuxième barre de fixation; et
- une deuxième barre mobile (98b) montée au niveau de la surface circonférentielle supérieure de la deuxième barre de fixation (92b), prévue pour un mouvement vertical et pour supporter le microscope (48) avec le deuxième mécanisme articulé (42b), au niveau de hauteur supérieur prédéterminé de ladite deuxième barre de fixation.

10. Fauteuil (30) selon la revendication 9, dans lequel les rainures fendues formant la pluralité de rainures fendues (170a, 170b) des plateaux rotatifs respectifs (172a, 172b) sont dispersées, suivant un angle identique, autour de l'axe de rotation (36a).

11. Fauteuil (30) selon l'une quelconque des revendications 7, 8 ou 9, dans lequel les barres de fixation (92a, 92b) sont respectivement coudées en ayant la forme de la lettre L, et les parties horizontales inférieures de ces barres de fixation sont couplées aux barres de liaison (90a, 90b), pour une formation concentrique.

12. Fauteuil (30) selon l'une quelconque des revendications 7, 8 ou 9, dans lequel la hauteur des barres mobiles (98a, 98b) est réglée par un bouton de réglage (98c) dont l'extrémité circonférentielle inférieu-

re pénètre dans un ajustage fileté, pour y être fixée à un niveau de hauteur prédéterminé de la surface circonférentielle extérieure des barres de fixation (92a, 92b).

13. Fauteuil (30) selon la revendication 3, dans lequel les moyens supports de rotation (60) comprennent :

- un plateau rotatif (72) supporté sur l'axe de rotation (36a) pour une rotation libre, distincte de la rotation du fauteuil pivotant (30) pour patient ;
- une barre de liaison creuse (90b) dont une extrémité est fixée horizontalement au niveau d'une surface circonférentielle extérieure du plateau rotatif (72) ;
- une barre de fixation (92b) coudée ayant la forme de la lettre L, dont une extrémité est introduite dans la barre de liaison (90b) pour coulisser horizontalement, vers le bas, sans tourner par rapport à la barre de liaison correspondante (90b), et pour supporter le plateau de traitement (46) avec le premier mécanisme articulé (42a), à un niveau de hauteur verticale prédéterminé de ladite barre de fixation ;
- une barre mobile (98b) montée au niveau de la surface circonférentielle supérieure de la barre de fixation (92b), prévue pour un mouvement vertical et pour supporter le microscope (48) avec le deuxième mécanisme articulé (42b), à un niveau de hauteur prédéterminé de ladite barre de fixation ; et
- une barre support (110) montée au niveau de l'extrémité supérieure de la barre mobile (98b) et coudée en ayant la forme d'un caractère ¬, pour tourner et supporter le moniteur (50) avec le troisième mécanisme articulé (42c), au niveau d'une extrémité horizontale de ladite barre support.

14. Fauteuil (30) selon la revendication 13, dans lequel l'extrémité verticale inférieure de la barre support (110) est introduite dans l'extrémité supérieure de la barre mobile (98b) et fixée par un bouton de réglage (98d) pénétrant dans une extrémité circonférentielle supérieure de la barre mobile (98b).

FIG.1

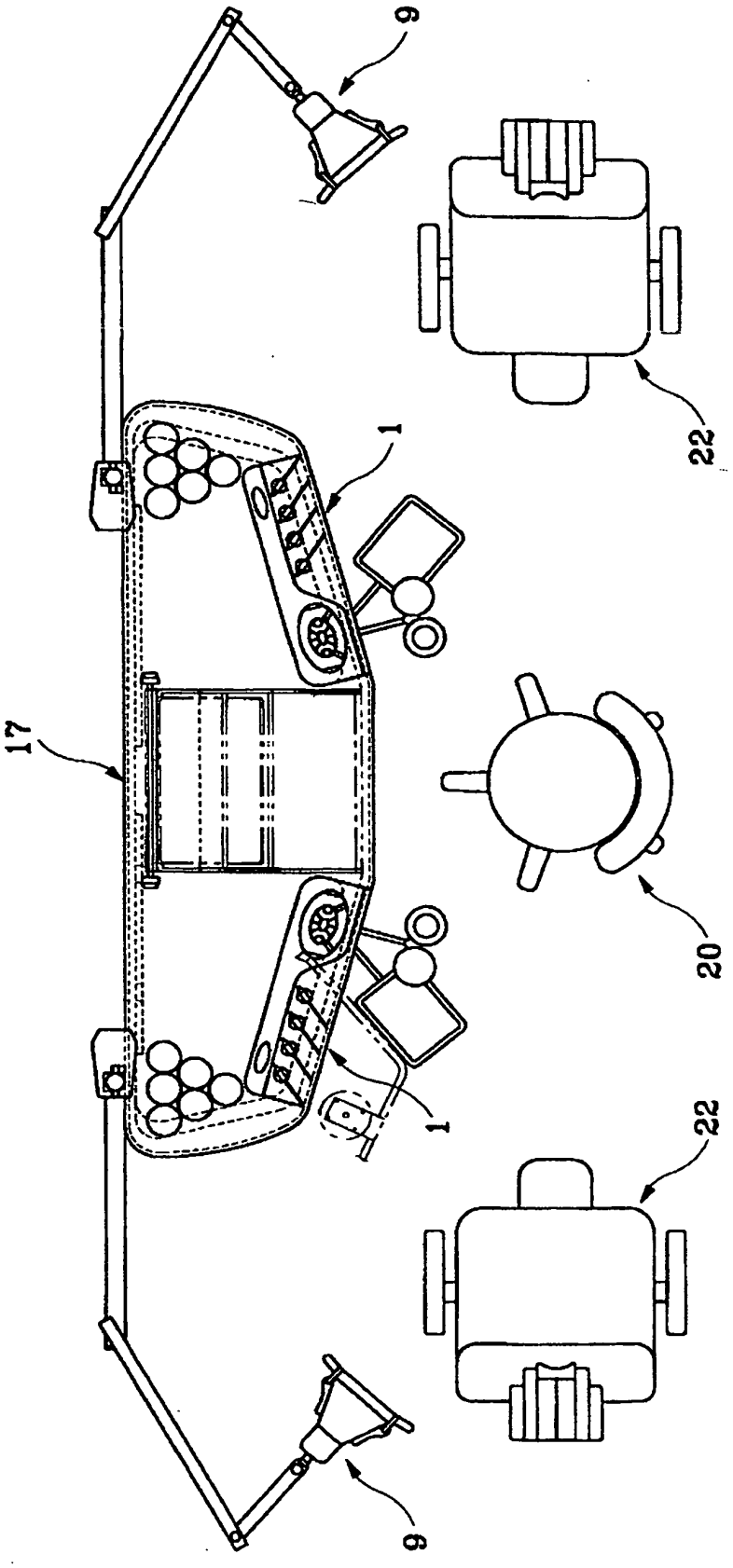


FIG.2

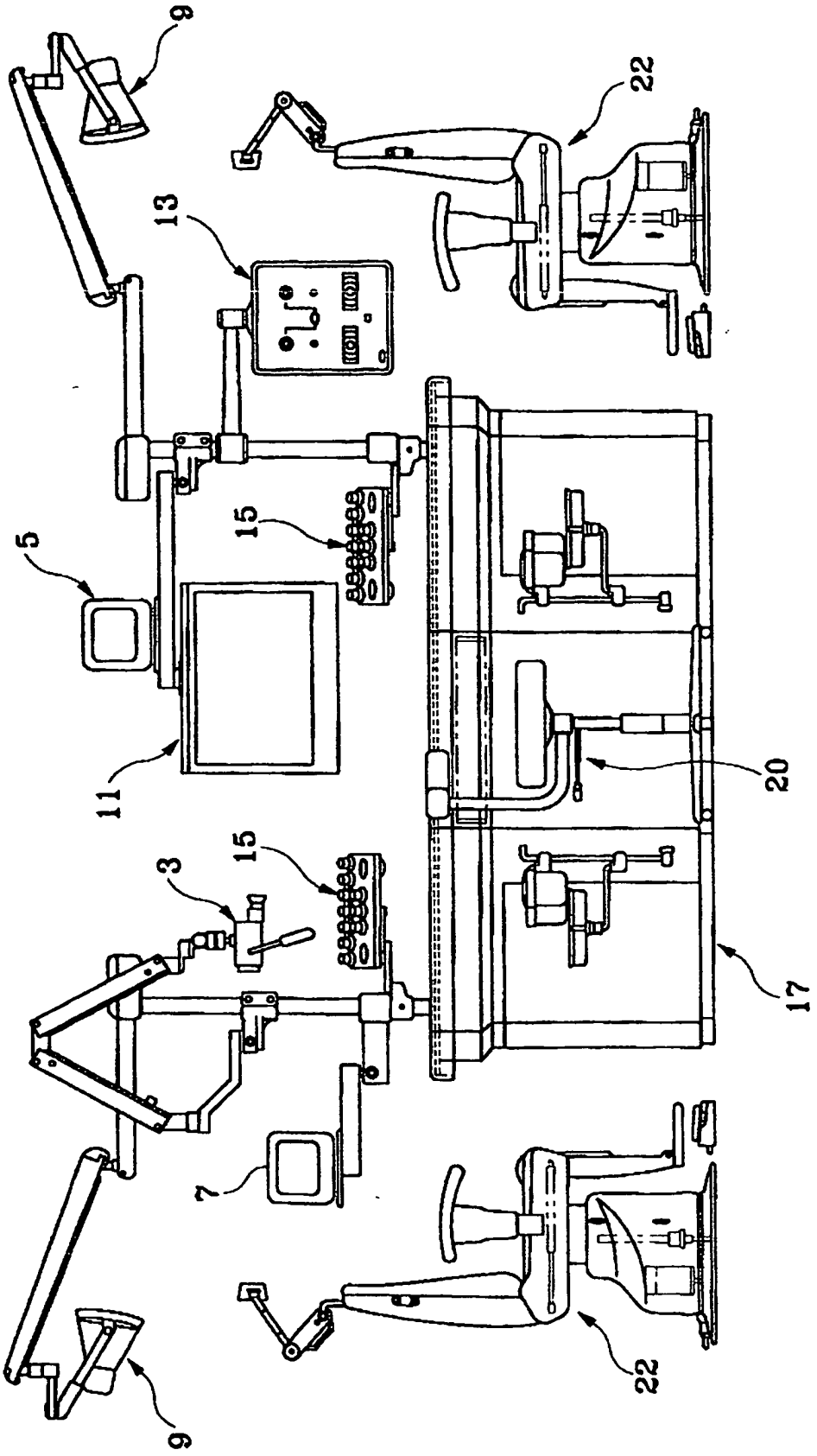


FIG.3

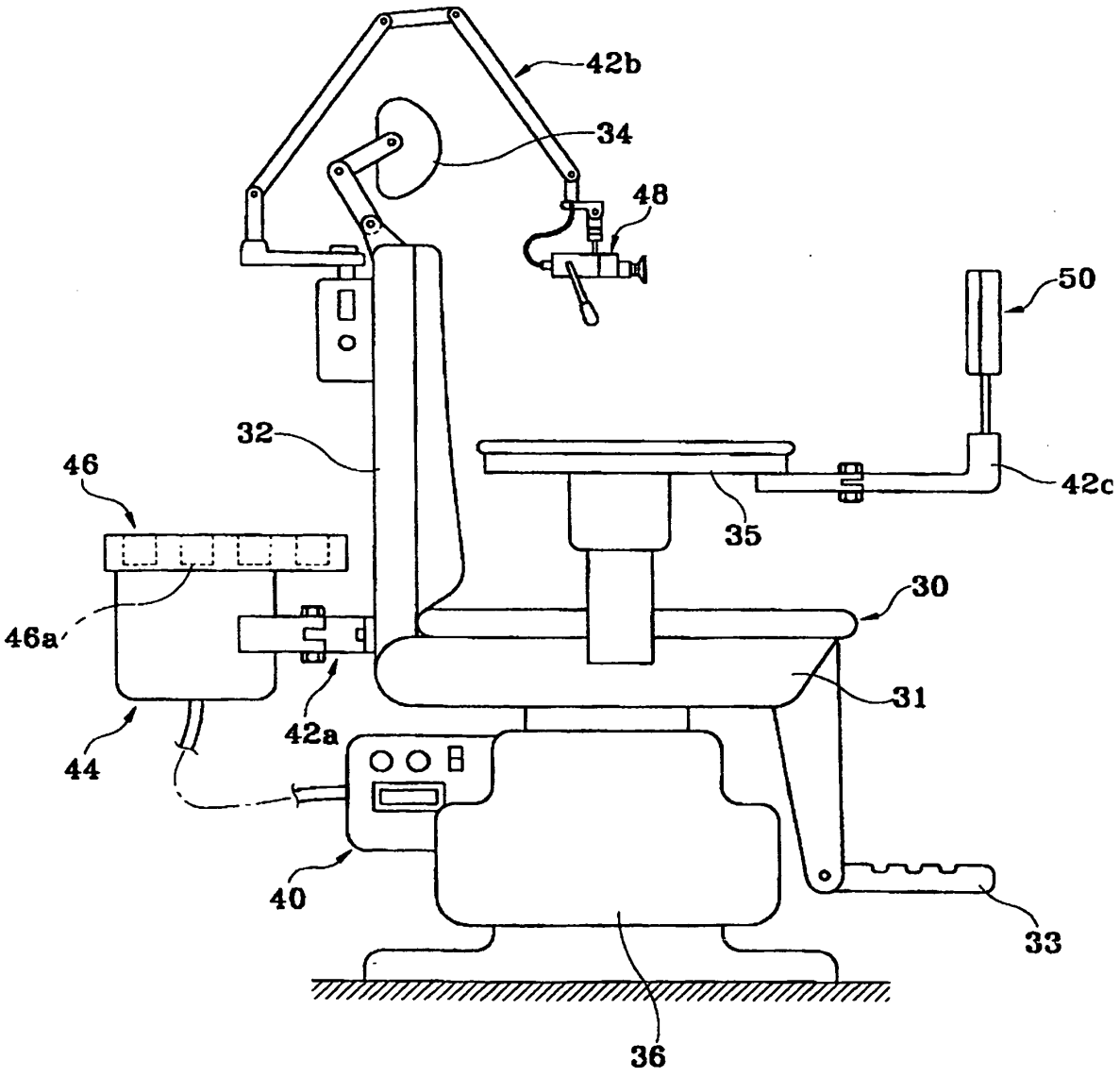


FIG.4

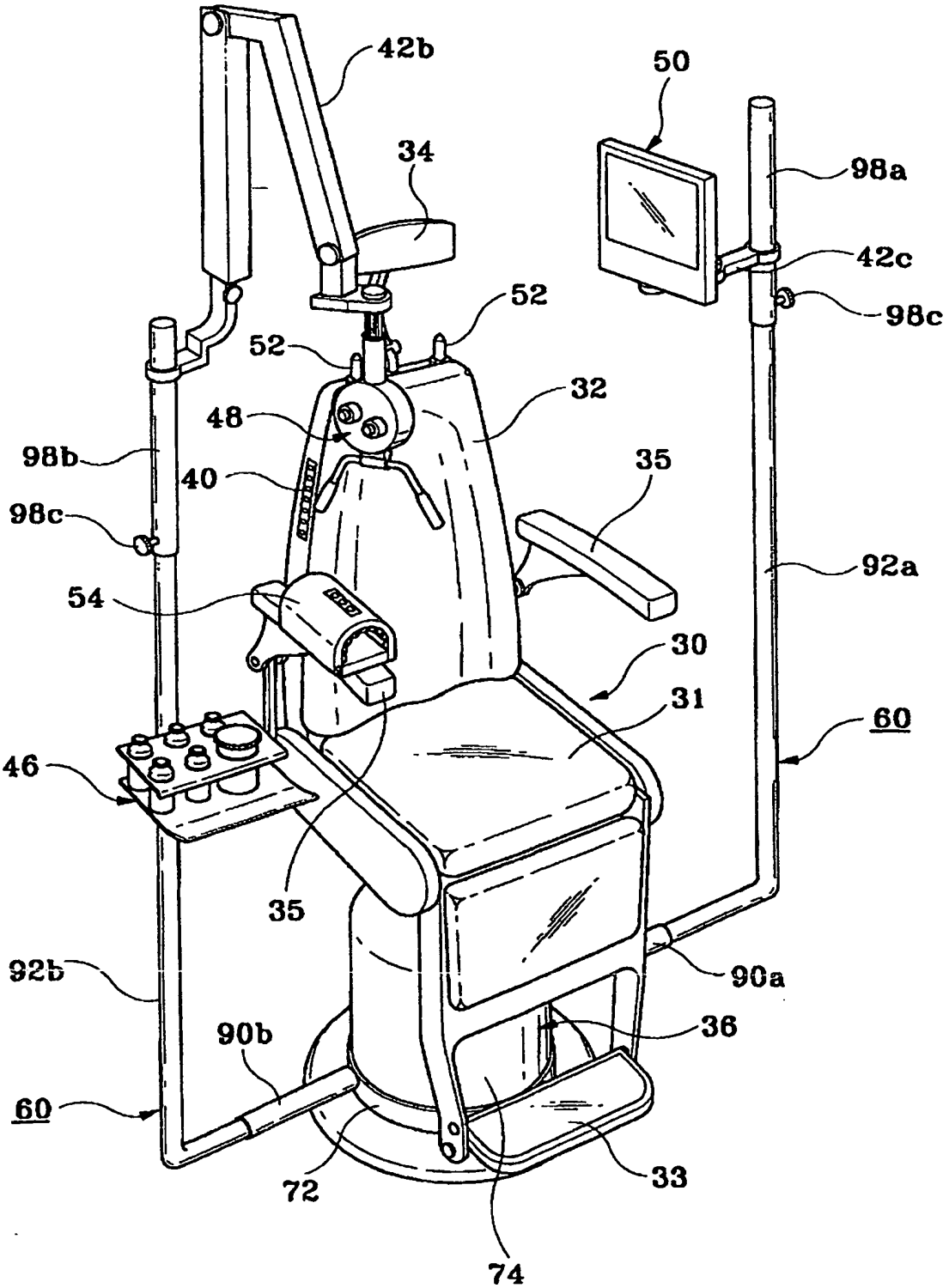

42b
50
34
98a
42c
52
98c
52
32
48
98b
40
35
98c
92a
54
30
31
60
46
35
92b
90a
90b
36
60
72
33
74

FIG.5

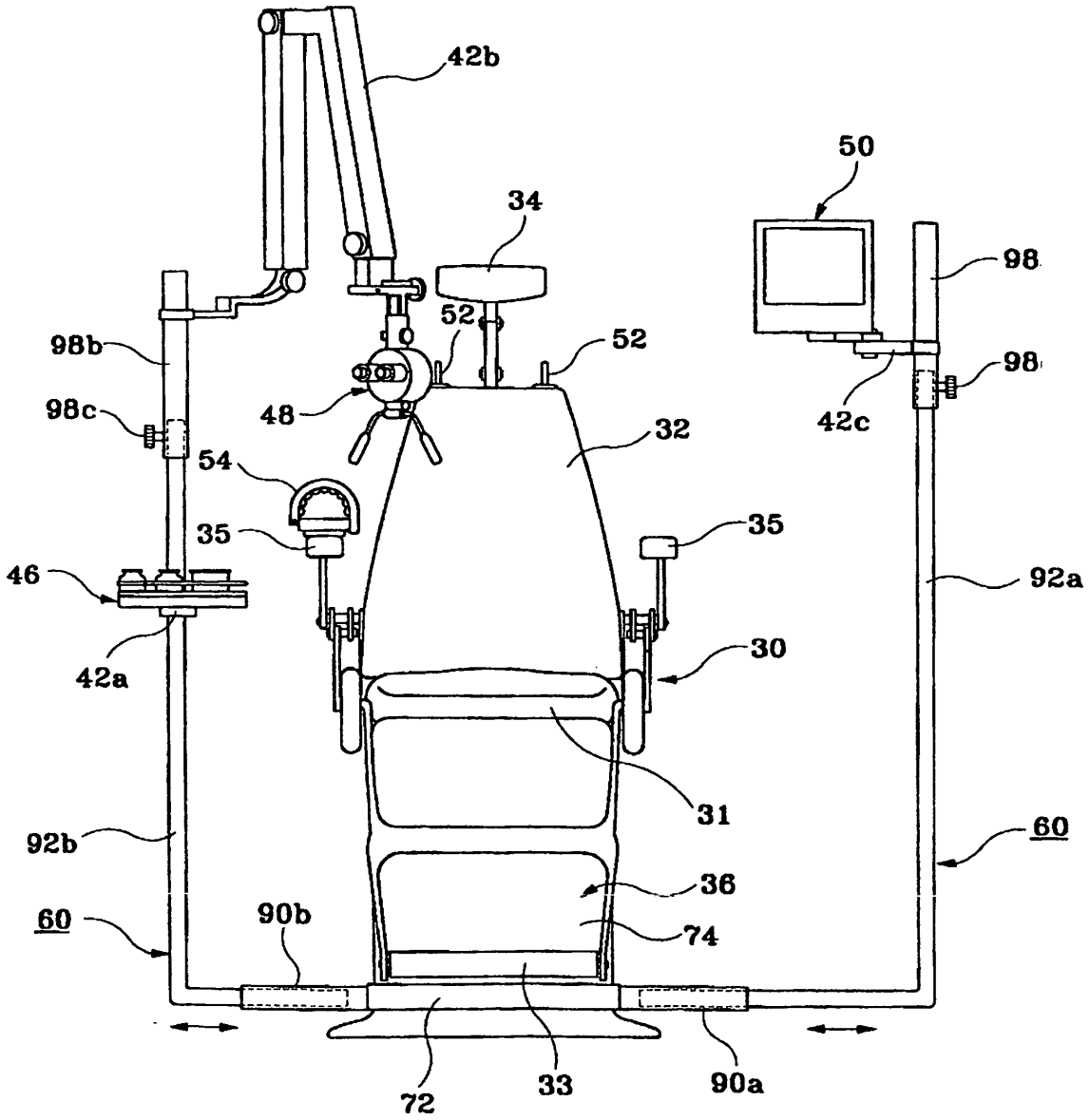

42b
50
34
98
52
52
98b
98
48
42c
98c
32
54
35
35
46
92a
42a
30
31
92b
60
36
60
90b
74
72
33
90a

FIG.6a

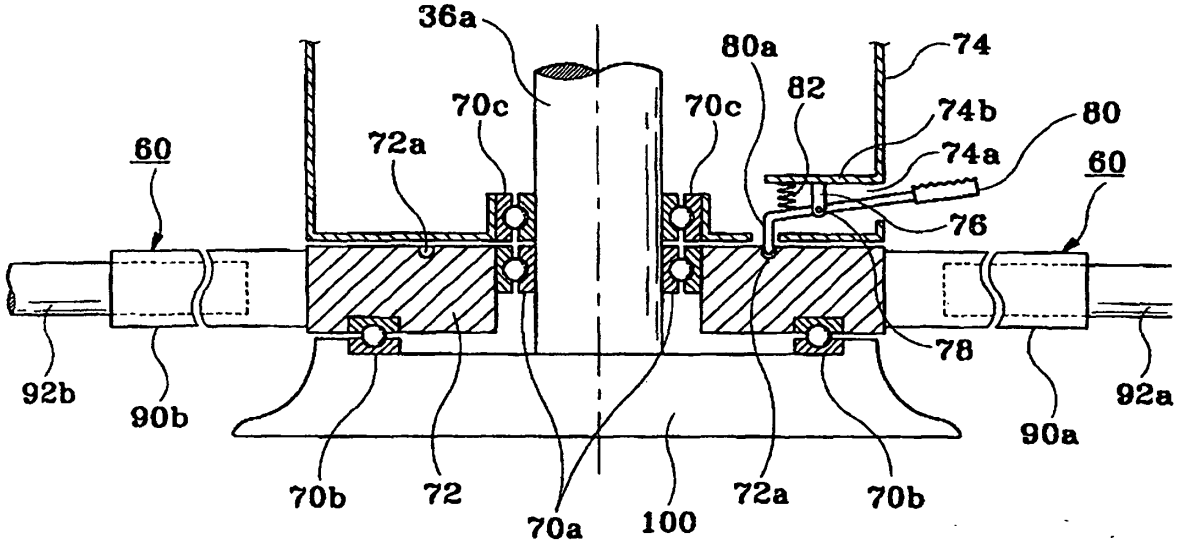
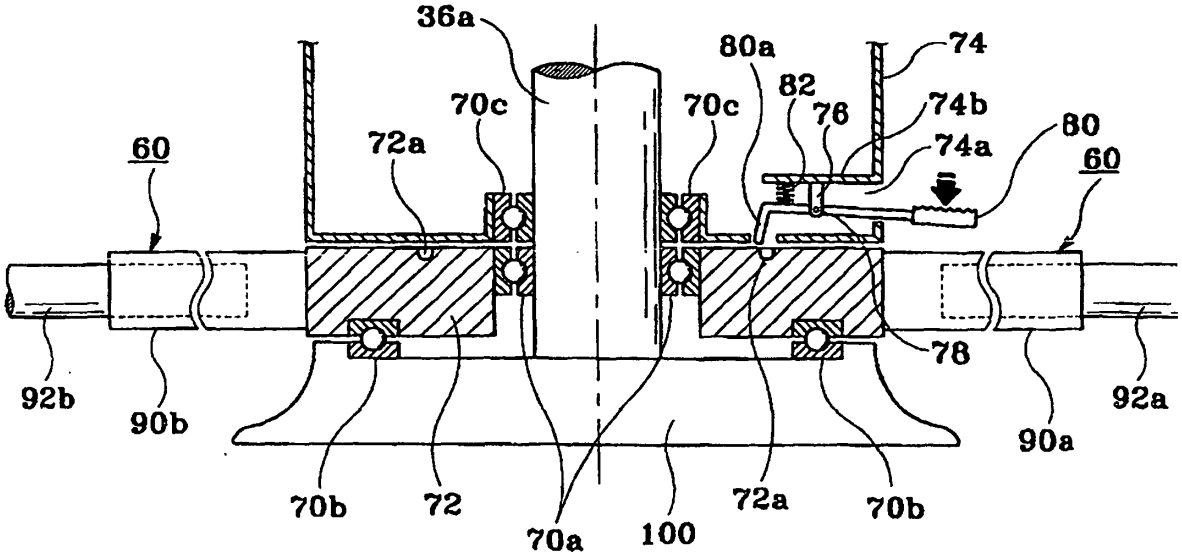

36a
80a
74
70c
82
70c
74b
80
60
72a
74a
60
76
78
92b
90b
90a
92a
70b
72
70a
100
72a
70b

FIG.6b


36a
80a
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70c
76
74b
80
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72a
74a
60
78
92b
90b
90a
92a
70b
72
70a
100
72a
70b

FIG.7a

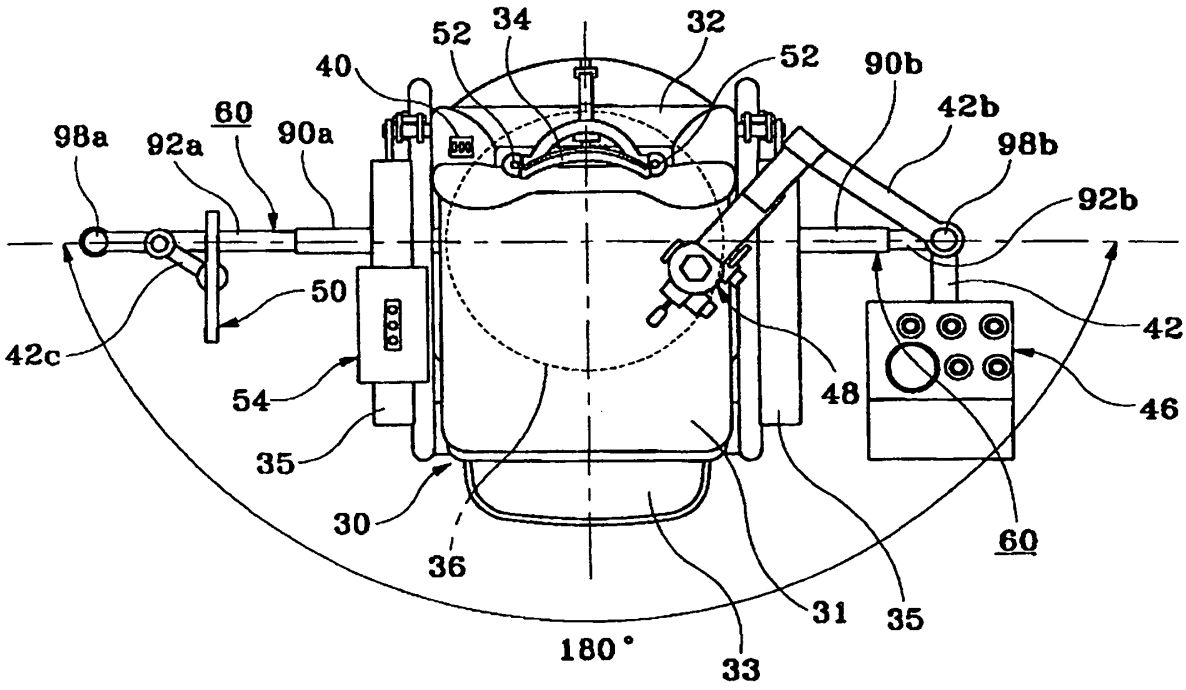

52
34
32
40
52
90b
42b
98a
92a
60
90a
98b
92b
50
42
42c
54
48
46
35
30
60
36
31
35
180°
33

FIG.7b

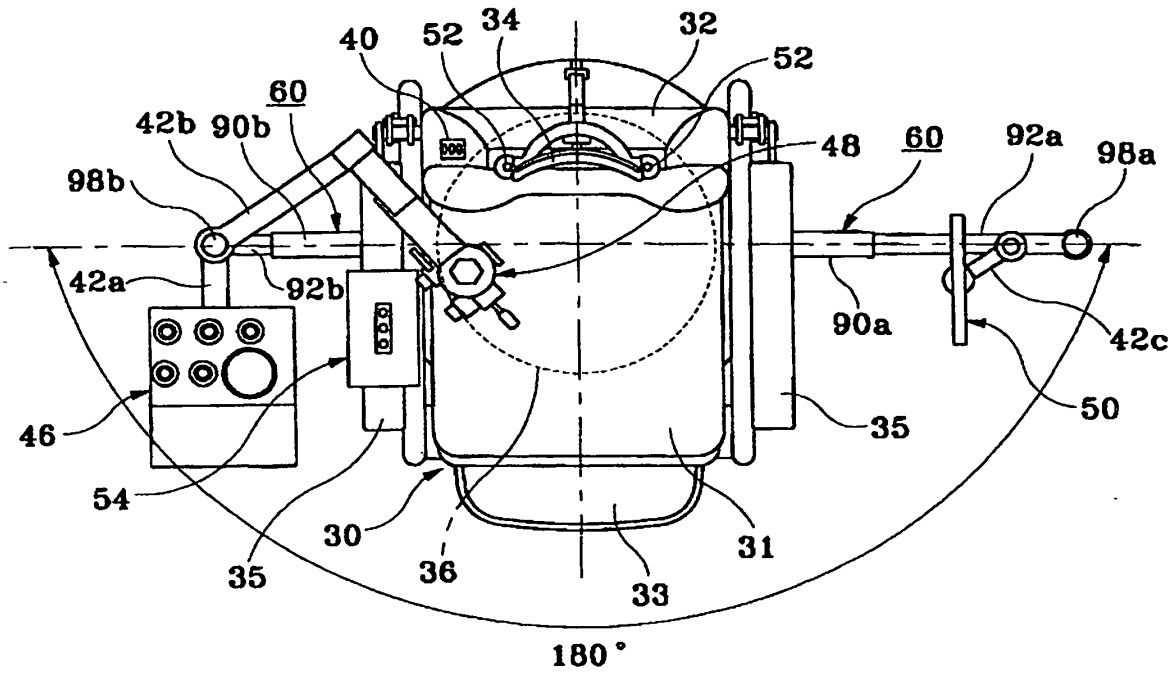
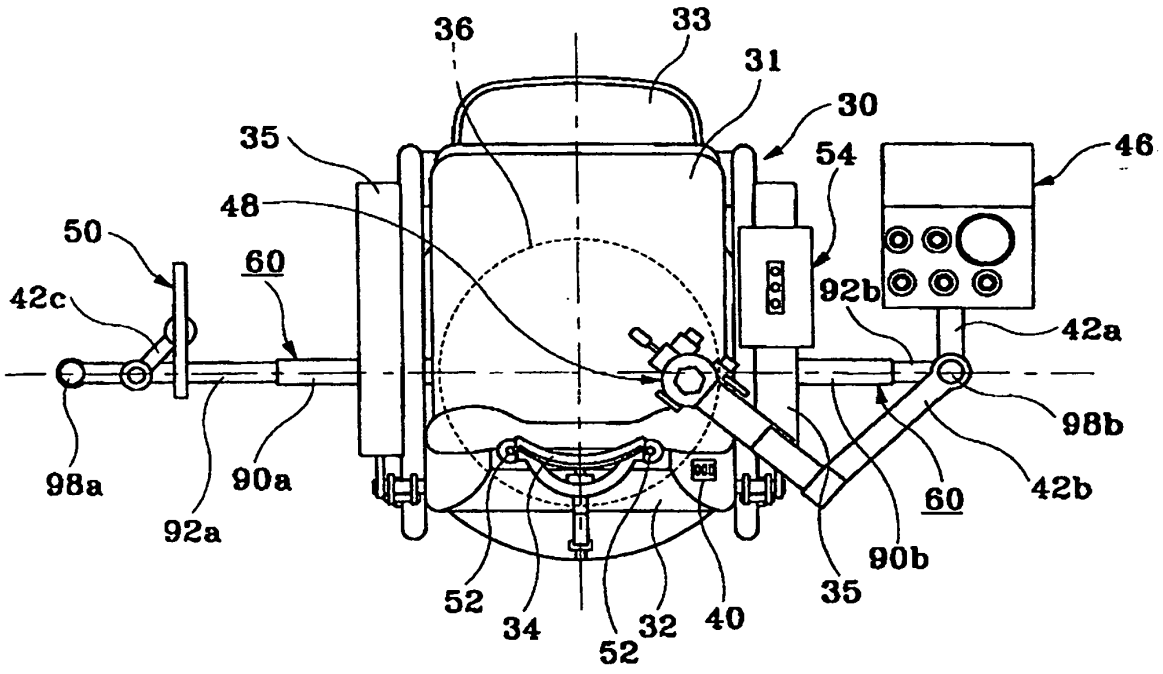

40
52
34
32
52
60
42b
90b
98b
48
60
92a
98a
42a
92b
90a
42c
46
50
35
54
30
36
33
31
35
180°

FIG.7c


36
33
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54
46
48
50
60
42c
92b
42a
98b
98a
90a
92a
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42b
90b
35
52
34
32
40
52

FIG.8

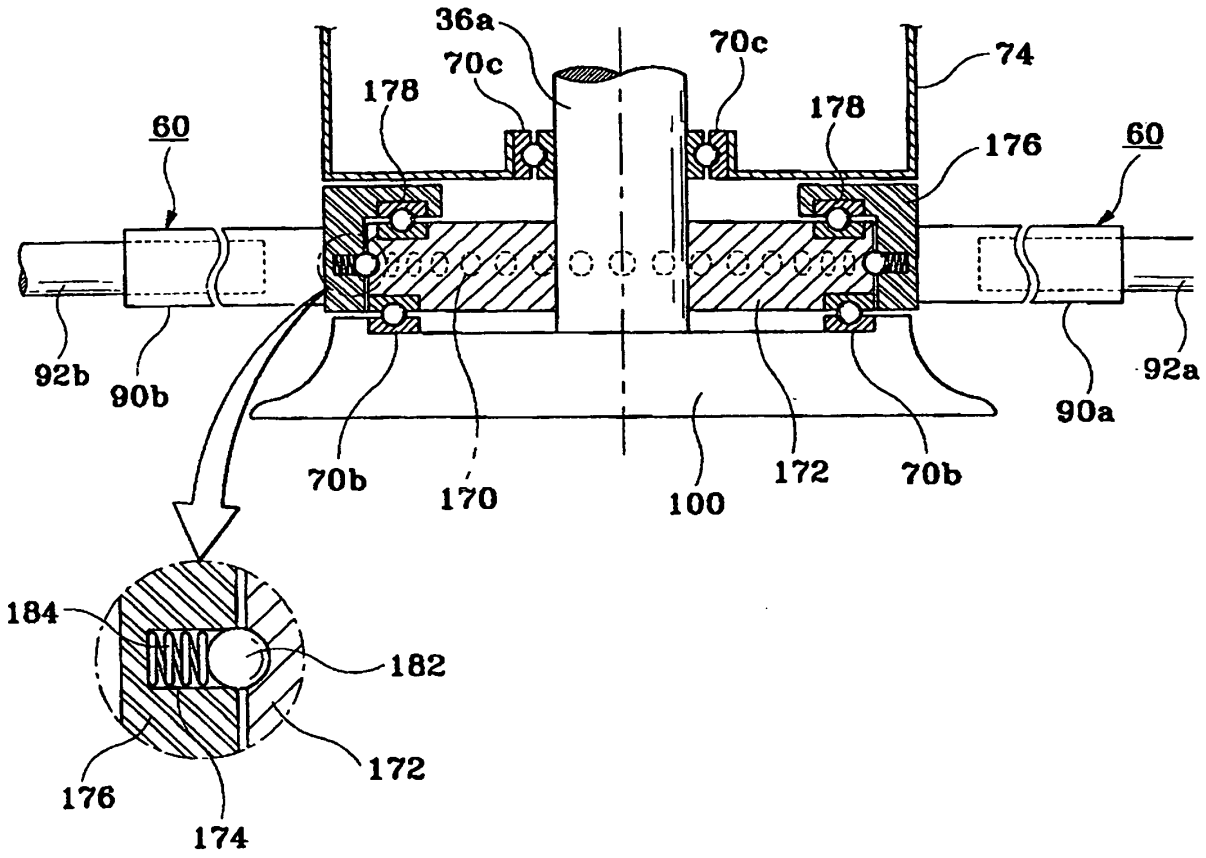

36a
70c
70c
74
178
178
176
60
60
92b
90b
92a
90a
70b
170
100
172
70b
184
182
172
176
174

FIG.9a

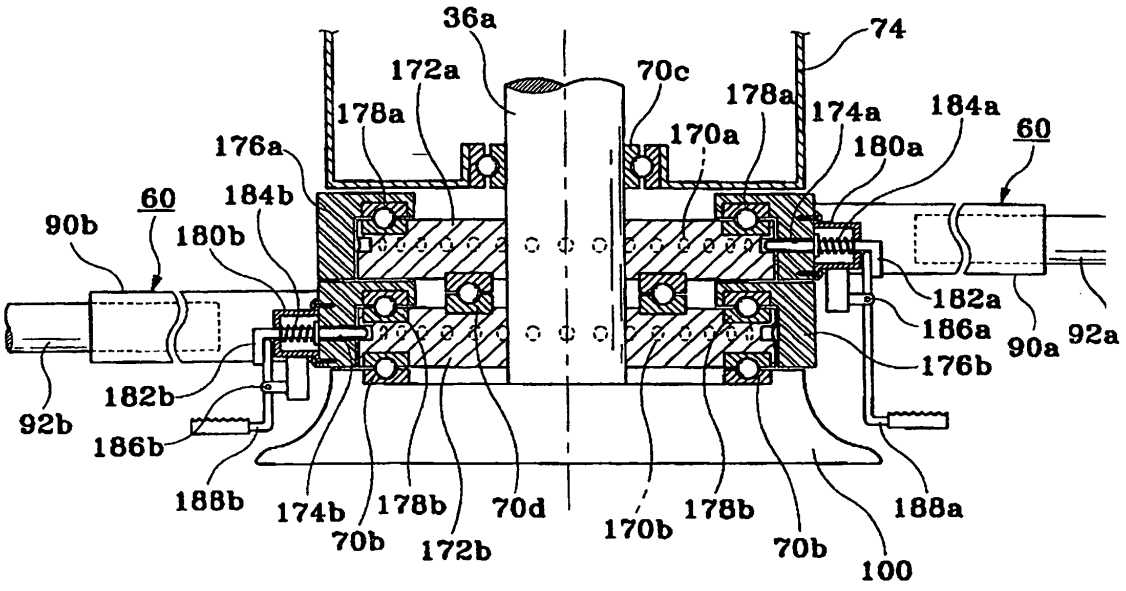

36a
74
172a
70c
178a
178a
174a
184a
170a
176a
180a
60
60
184b
90b
180b
182a
186a
90a
92a
176b
92b
182b
186b
188b
174b
178b
70d
170b
178b
188a
70b
172b
70b
100

FIG.9b

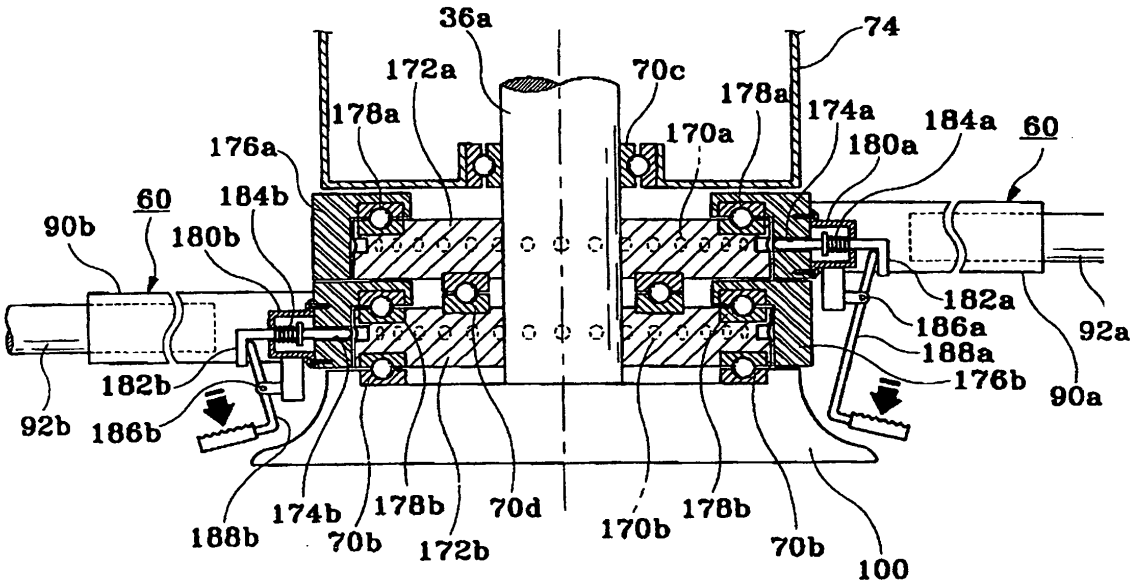

36a
74
172a
70c
178a
178a
174a
184a
60
176a
170a
180a
60
184b
90b
180b
182a
186a
92a
188a
182b
176b
90a
92b
186b
188b
174b
178b
70d
178b
70b
172b
170b
70b
100

FIG.10

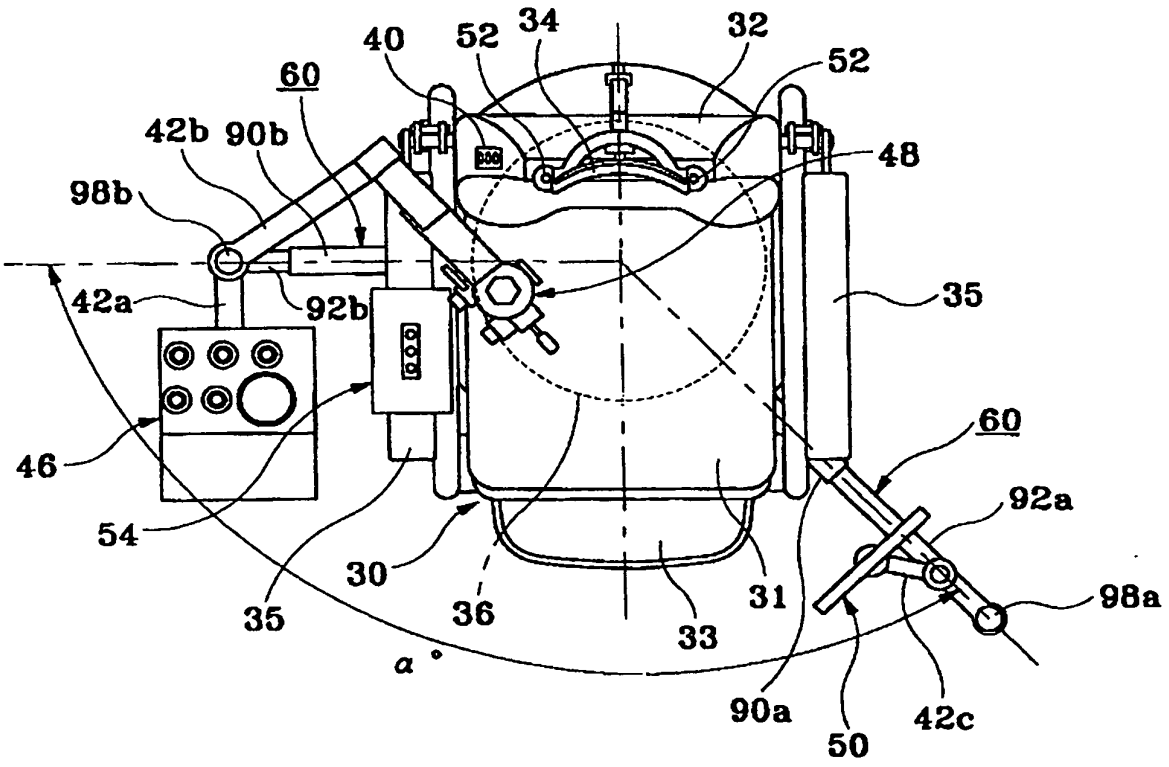

40
52
34
32
52
60
42b
90b
48
98b
35
42a
92b
60
46
92a
54
30
31
98a
35
36
33
α °
90a
50
42c

FIG.11

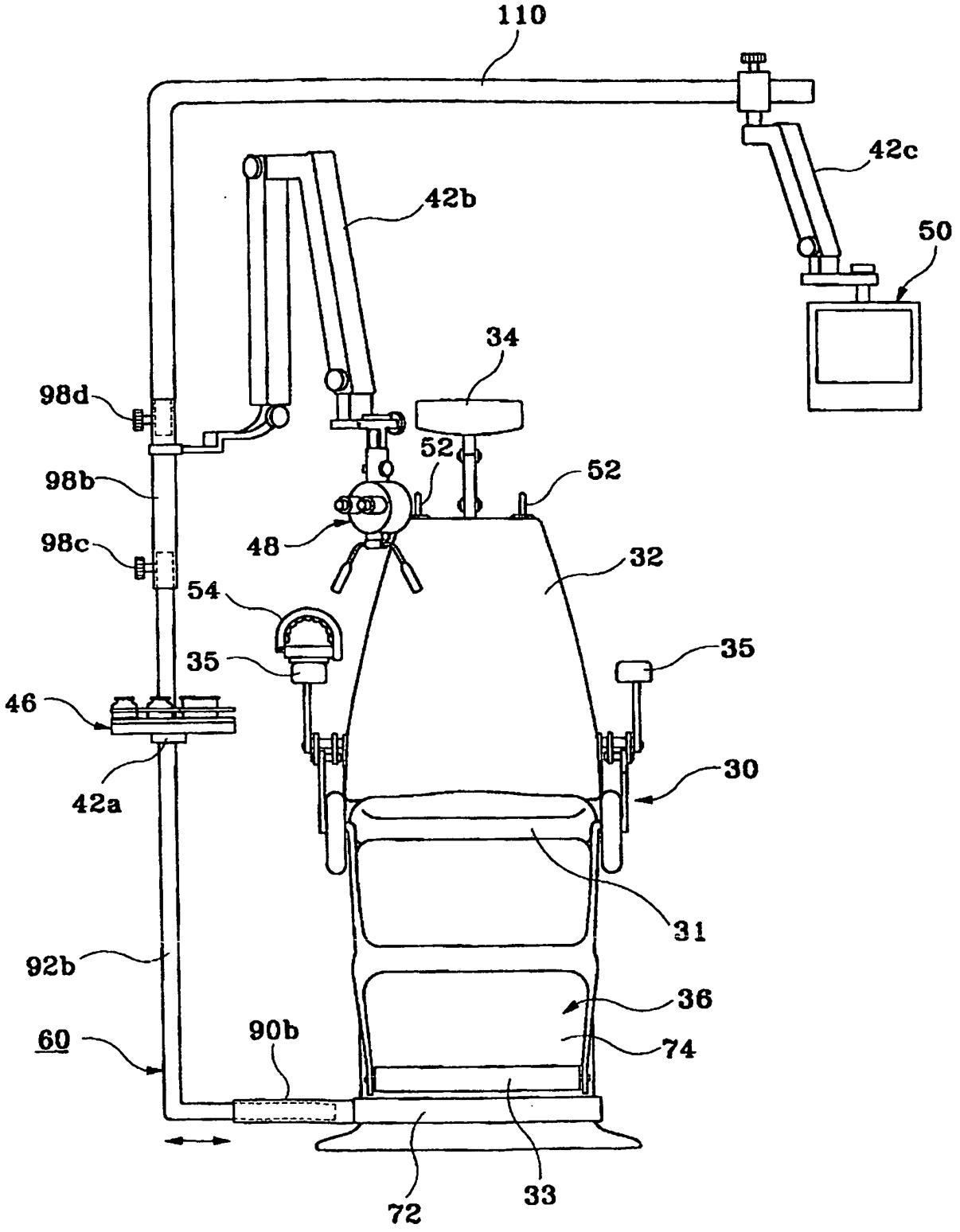
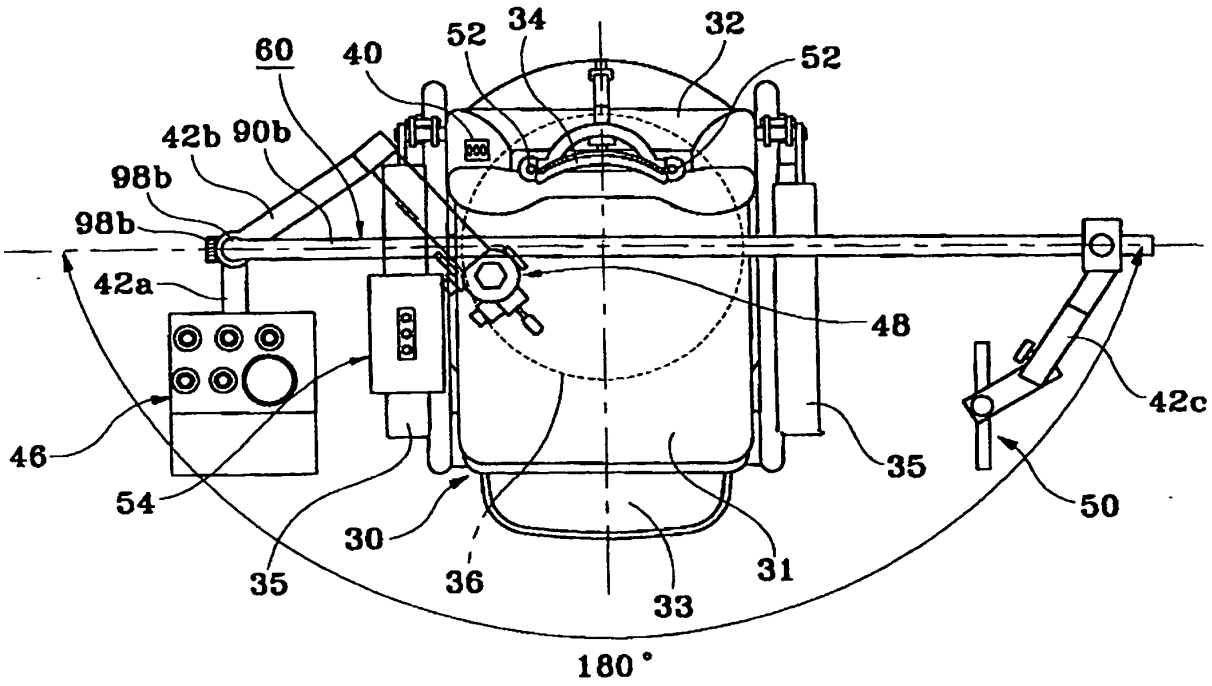

110
42c
50
42b
34
98d
52
52
98b
48
32
98c
54
35
35
46
30
42a
31
92b
36
60
90b
74
72
33

FIG.12


60
40
52
34
32
52
42b
90b
98b
98b
42a
48
42c
46
54
35
30
36
31
33
35
50
180°