

- [54] **ADJUSTABLE DENTAL CHAIR**  
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340; D26/13 R, 13 C; D6/37

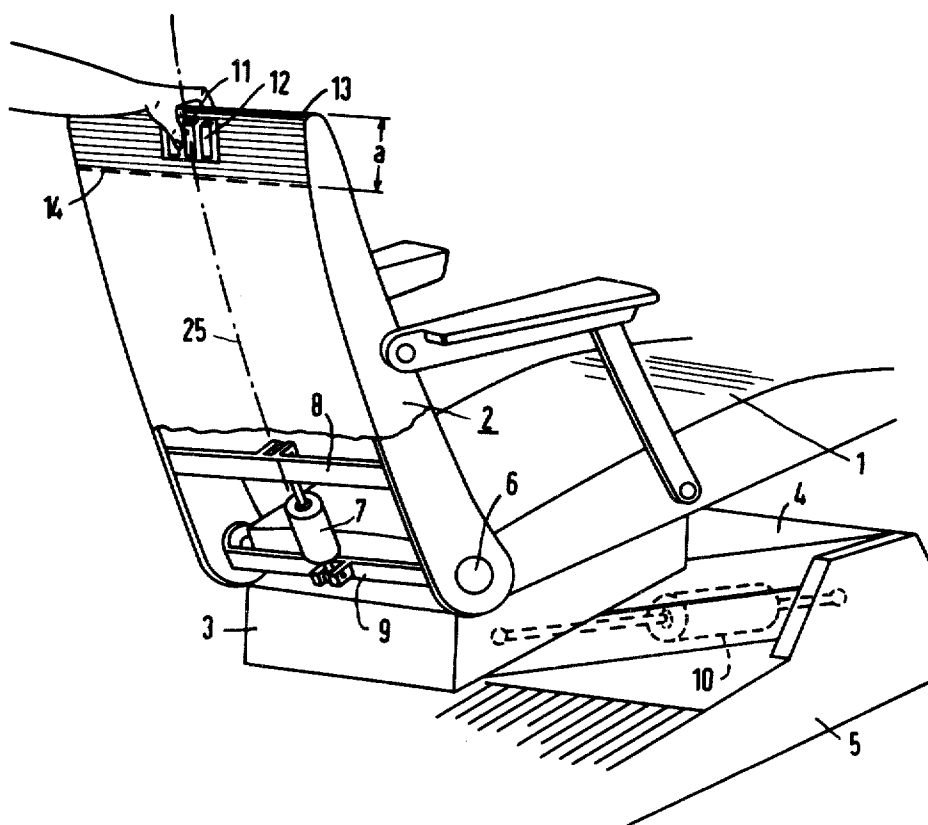
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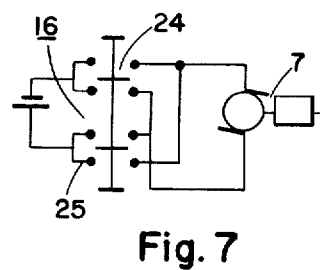
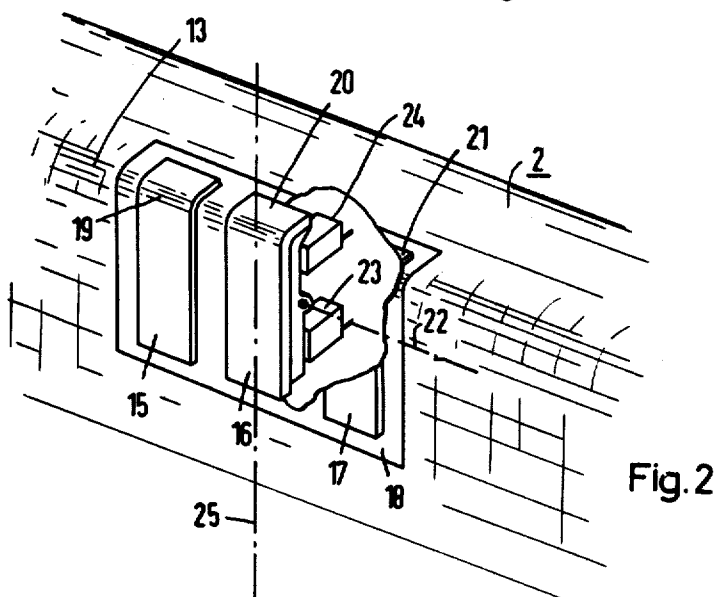
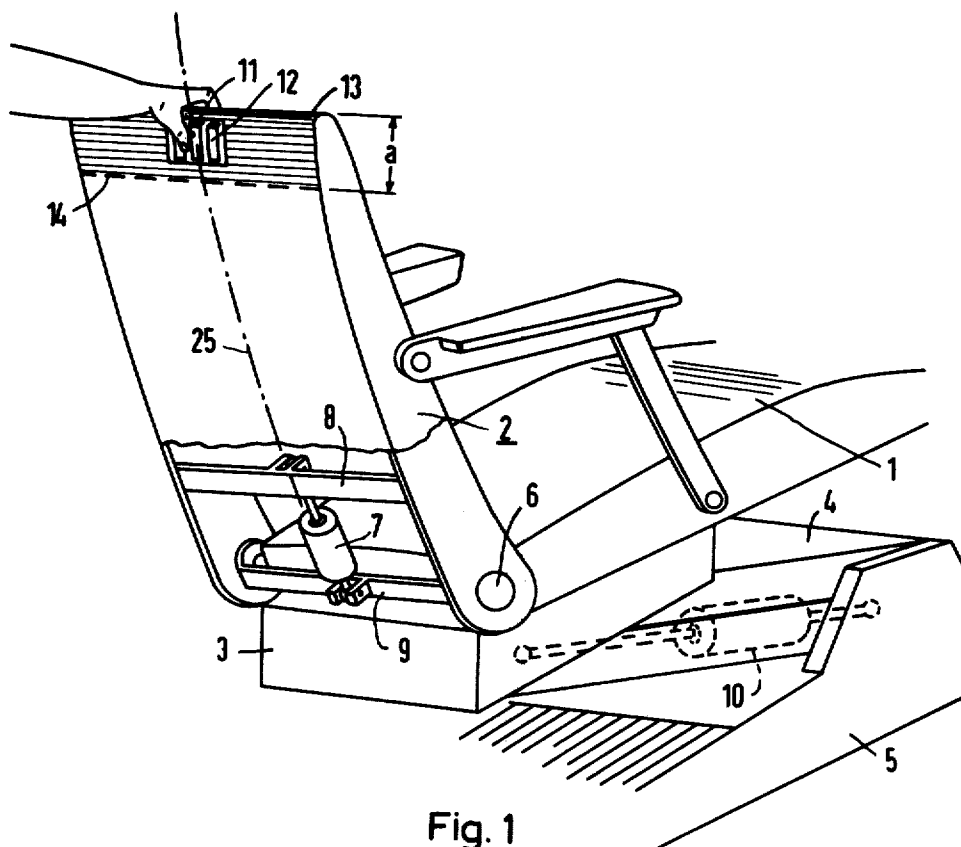
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[57] **ABSTRACT**  
An adjustable dental chair having a back with manually operated switches located upon the upper part of the back for releasing an operating procedure to adjust the chair. The switches are so arranged that actuating members operatively connected with the switches are located in a space defined substantially by the upper edge of the back and a limiting line located substantially by the length of a hand width below the upper edge.

**6 Claims, 7 Drawing Figures**





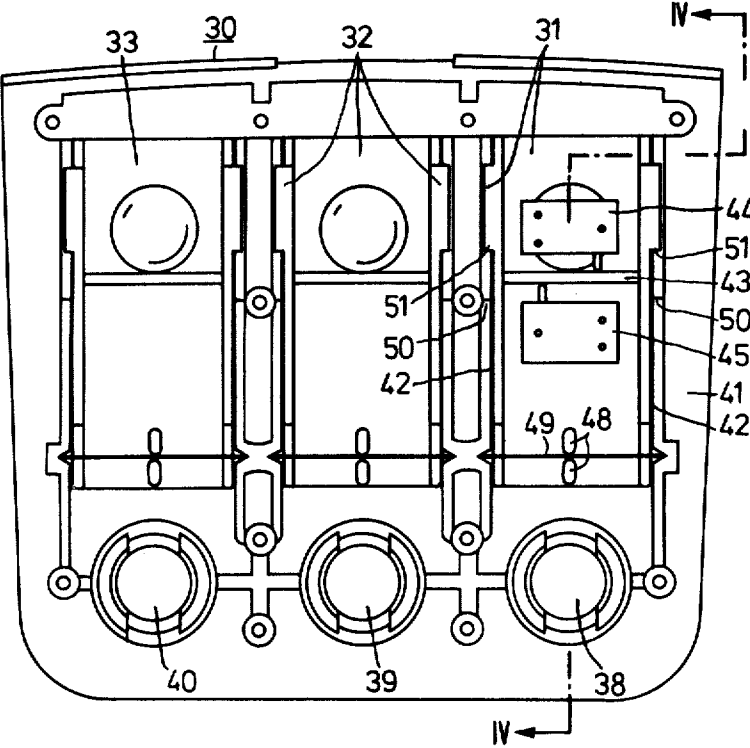


Fig. 4

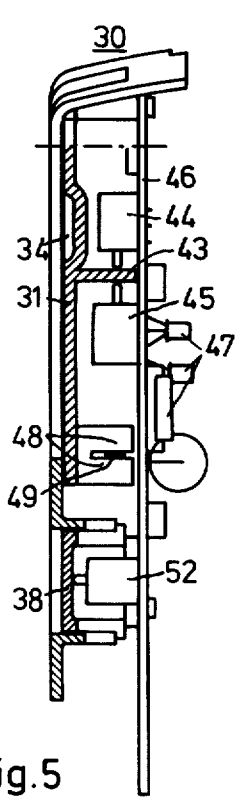


Fig. 5

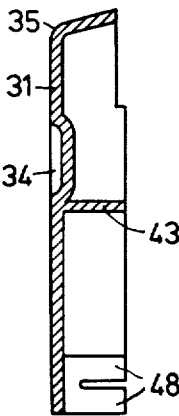


Fig. 6

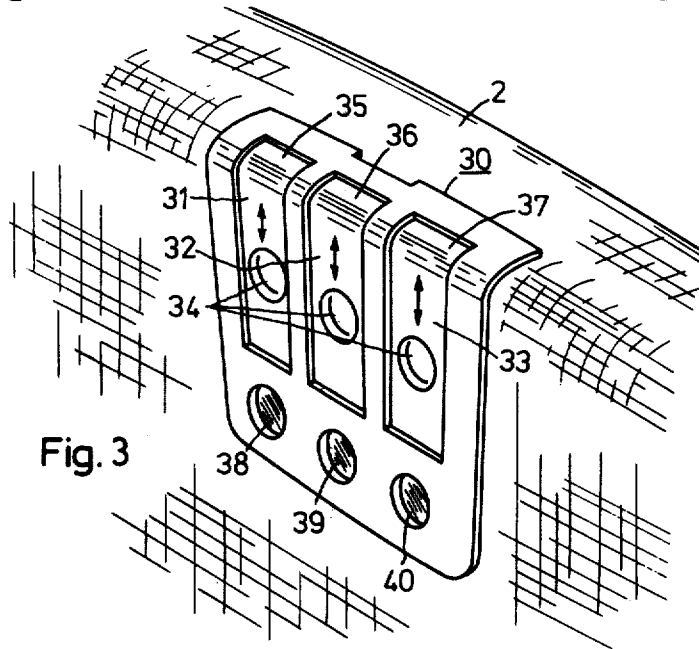


Fig. 3

**ADJUSTABLE DENTAL CHAIR**

The present invention pertains to an adjustable chair for dental patients with a back and manually operated switches located upon the rear side of the back for releasing an operating procedure to adjust the chair.

In a known patients' chair of this type the manual switches are located in a switch casing mounted upon the rear side of the back. This has the drawback that in certain lying positions, particularly in the completely lying position of the chair in which the back extends substantially horizontally, it is difficult to get hold of and operate the switches. Furthermore, the switches are then located close to the knee of the doctor or his assistant so that when the back is greatly bent it can be struck by the knee as the result of an oversight, with the result that wrong switch connections can be produced. In case of a strongly inclined back it is particularly difficult to provide a proper actuation of the switches by the doctor and his assistant.

Patients' chairs are also known wherein the manual switches are located on both sides of the back, namely, upon its side surfaces. The drawback of this arrangement is that a double switch arrangement is required in order to be able to operate the adjusting device equally well from one side of the chair as well as from the other side.

An object of the present invention is the provision of an adjustable chair for dental patients of the described type wherein the manual switches releasing operating procedures for chair adjustment can be uniformly well and easily operated by the doctor and his assistant and wherein the danger of erroneous switching through oversight actuation of switches is greatly reduced particularly when the back is greatly inclined.

Other objects of the present invention will become apparent in the course of the following specification.

In the accomplishment of the objectives of the present invention it was found desirable to provide the manual switches upon the upper part of the back in such manner that actuating members which operate the switches are located in a space defined substantially by the upper edge of the back and a limiting line located below the upper edge substantially to the extent of the length of a hand width.

According to an advantageous further development of the present invention the actuating member is constructed as a substantially flat shaped part which is shiftable in the direction of its flat extension. This provides on the one hand that wrong switching is avoided when there is an erroneous pressing against the actuating surface, and, on the other hand, that the switch can have a very narrow fitting depth, so that it can be advantageously used for very thin backs.

The shaped part can be preferably so constructed and arranged that it can be moved from a specific central position into two opposed switching positions. The central position can be defined by a sheet spring fixed transversely to the shifting direction in the switch casing and serving as a return element in the switching positions. A further advantageous construction consists in making the shaped part narrow and elongated. For better handling the outer surface of the shaped part can be provided with a gripping recess. The shaped part can be provided at an end of the actuating surface with an angular short attachment which is preferably shaped as a one part pad-shaped bent form piece, the curve being directed away from the servicing side of the chair. This

arrangement has the great advantage that the switch can be actuated in at least one switching direction also by the back of a hand or by the arm. The actuating members can be clearly seen by the doctor and his assistant even in the complete lying position of the chair, i.e., when the back is inclined horizontally. Thus wrong switching can be avoided to a great extent. According to another advantageous embodiment shifting switches are replaced by tipping switches which are so arranged that their axes extend transversely to the longitudinal symmetry axis of the back.

Other advantageous features of the present invention are described and claimed hereinafter.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawings showing by way of example only, preferred embodiments of the inventive idea.

In the drawings:

FIG. 1 is a perspective view of a dental chair of the present invention with hand switches upon the back of the chair.

FIG. 2 is a partial perspective view of the top part of a chair back having a switch arrangement with several hand switches.

FIG. 3 is a perspective view similar to that of FIG. 2 but showing a different construction of hand switches.

FIG. 4 is a rear view of the switch arrangement of FIG. 3.

FIG. 5 is a section along the lines IV — IV of FIG. 4.

FIG. 6 is a partial section showing an actuating member of the switches of FIG. 3.

FIG. 7 is a diagram showing the connection of a switch to its motor.

FIG. 1 shows a dental chair for patients having an upper part consisting of a seat 1 and a back 2. The upper part is mounted upon a support 3 which is connected by a parallelogram arm 4 with a base 5. The back 2 can be inclined relatively to the seat 1 by a rotary joint 6. The seat is moved by an electromotor axle drive 7 which is shown diagrammatically in the drawing and which is fixed on one side to a frame part 8 of the back and on the other side to a frame part 9 of the seat. A further axle drive 10 is provided for height adjustment of the upper part 1, 2 of the chair, the drive being supported on the one side at the base 5 and on the other side on the seat support 3. The two electric motors of the axle drives are switched on and off by hand switches 11, 12. The hand switches are provided in the upper part of the back and are operated from the rear side of the back. Parts actuating the switches 11, 12 are located directly under the upper edge 13 and substantially in the middle of the back. As shown in FIG. 1 these parts are located around the longitudinal axis 25 of the symmetry of the chair; they can be conveniently reached and actuated by the doctor who works at the right hand side of the chair as well as by his assistant who helps him from the opposite side. Thus the double switch arrangement used in prior art patients' chairs is eliminated.

Key surfaces of members actuating the switches 11, 12 are preferably located in a section defined by the upper edge 13 of the back and a line 14 located below the back at a distance substantially equal to the width of a hand (about 10 to 15 cm.). An arrangement in this section is particularly advantageous since, as shown in the drawing, the operating person can place his fingers

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upon the upper edge of the back to provide support and direction. Thus the actuating members can be easily and quickly engaged even when the operator does not see them directly. This can be the case, for example, when the back is greatly inclined. The range for the advantageous arrangement of the switches is shown by broken lines in FIG. 1 and indicated as *a*.

A different embodiment of a switch connection is shown in an enlarged view on FIG. 2. It shows switches 15, 16 and 17 combined in a frame 18 into a switch area which is located directly under the upper edge 13 of the back 2. The key surfaces of the actuating members 19 to 21 of the switches 15 to 17 extend in the longitudinal direction, namely, parallel to the longitudinal symmetry axis 25 of the back. At the top they extend around the upper edge 13 of the back. This tipping arrangement makes it possible to easily recognize the switches in all positions of the chair, particularly in lying positions in which the back extends substantially horizontally. The actuating members can be tipped on both sides about an axis 22 extending transversely to the longitudinal axis of the back and they operate upon microswitches. For the sake of clarity only microswitches 23 and 24 pertaining to the switch 16 have been illustrated. They are used to switch on and off the corresponding drives 7 and 10 for moving the back and the seat in one or the other direction. The switch 15 can be used for other purposes.

The connections of the microswitches 23 and 24 of the switch 16 to the motor drive 7 are illustrated in FIG. 7.

The drawing shows that the actuating members 15 and 17 along with the frame 16 are embedded in the back. Their key surfaces extend substantially along the rear surface of the back and lie at least partly in that rear surface.

The advantage of the construction of the present invention is that the switches can be easily engaged even in extreme inclined positions of the back. According to the construction of FIG. 2 the surfaces of the switches which are to be engaged can be easily recognized in these inclined positions so that a mix up among the switches by a user is substantially eliminated even when the back is strongly inclined.

Another embodiment of the hand switches is shown in FIG. 3 illustrating the upper part of the back 4. Actuating members 31, 32, 33 are arranged in the switch area 30. These actuating members are shaped substantially as flat form pieces shiftable in the direction of their flat extension. They can be moved in both directions from a central position, as illustrated by arrows. To provide better engaging and handling the form pieces are provided substantially upon their half lengths with gripping recesses 34. The drawing shows that the form pieces 31 to 33 are narrow and elongated. They are so constructed that their actuating surfaces extend within or parallel to their shifting plane. At their upper ends the form pieces are bent curve-like to form short connecting pieces 35 to 37. The three actuating members 31 to 33 can be used to switch on the adjusting devices for a movement of the seat in height (drive 10 of FIG. 1), for a tipping of the seat relatively to the seat carrier 3 and for the inclination of the back (drive 7 of FIG. 1). The switching elements provided within the switch area 30 are coupled with the corresponding actuating circuits for the adjusting devices in such manner that when the form pieces 31 to 33 are shifted in

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the direction of the base 5 of the chair, there is always a downward movement of the chair part being actuated. The switch area 30 is located in a depression of the back 2, so that actually there are no parts projecting beyond the outer surface of the back. Pressure keys 38 to 40 operate upon the switch members used to switch on an actuating device by means of which the chair can be moved automatically into a preselected position. The pressure keys can provide three different chair positions.

FIG. 4 shows the switch area 30 from the back. Hereinafter only the parts pertaining to the actuating member 31 of the corresponding switch will be described. The form pieces 32 and 33 with the corresponding casing parts and switch elements are similarly constructed.

The switch area 30 includes a casing 41 in which frame members 42 are located. The actuating member 31 shaped as a form piece is mounted between these frame members and is movable in the longitudinal direction of the casing. The form piece 31 has a cross piece 43. When the part 31 moves out of its central position the cross piece actuates either the switch 44 or the switch 45. The two switches 44 and 45 are fixed upon a supporting plate 46 shown in cross section in FIG. 5. The plate 46 serves at the same time as the conducting plate for electronic structural members 47 of the above-mentioned actuating device. The form piece 31 is provided with projections 48 between which is located a sheet spring 49 fixed to the frame parts 42 of the casing 41. The spring 49 serve as return element for the form piece 31. Projections 50 are located on both sides of the frame 42 and serve as a stop for the form piece 31 when the switch is located in the lower switching position. A flange 51 lies upon the projection 50. The pressure key 38 actuates a switch member 52 which serves to release the above-mentioned actuating device.

FIG. 6 shows the movable member 31 as a single part in longitudinal section.

The present invention is not limited to the mechanical structure of the patient's chair shown in the drawings nor in the shown type and arrangement of the moving devices. Thus the hand switches can be also used to switch on and off valves of a hydraulic or pneumatic moving device. One of the switches shown in the drawings can also release a switching operation by means of which the back and the seat are moved automatically into a position permitting the patient to step off.

I claim:

1. An adjustable dental patient's chair, comprising a seat and a back, means for adjusting said seat and said back, manually operated switching means operatively connected with said adjusting means for actuating them, said switching means comprising switch elements and actuating members connected with said switch elements for actuating them, said actuating members having substantially flat key surfaces on their actuating sides and being located in the middle part of the rear side of the upper portion of said back, which part is limited by the upper edge of said back and a limiting line located substantially by the length of 10 to 15 cm width below said upper edge.

2. An adjustable dental patient's chair, comprising a seat and a back, means for adjusting said seat and said back, manually operated switching means operatively connected with said adjusting means for actuating them, said switching means comprising switch elements

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and actuating members connected with said switch elements for actuating them, said actuating members being narrow and elongatedly shaped, having longitudinal axes extending parallel to the longitudinal symmetry axis of said back and having substantially flat key surfaces on their actuating sides, said actuating members being located in the middle part of the rear side of the upper portion of said back, which part is limited by the upper edge of said back and a limiting line located substantially by the length of 10 to 15 cm width below said upper edge, and wherein one of the narrow sides of the actuating members is adjacent to the upper edge of said back.

3. A dental patient's chair according to claim 2, wherein said actuating members comprise arc shaped end portions extending around the upper edge of said

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back, the arch of said end portions are directed toward the chair.

4. A dental patients' chair according to claim 3, wherein said actuating members are flat form pieces, the chair having means supporting said form pieces for movement in their longitudinal extension.

5. A dental patients' chair according to claim 4, wherein said form pieces have gripping recesses upon their outer surfaces.

6. A dental patient's chair according to claim 4, wherein said switches are combined in a switch set, wherein said actuating members of said switches have key surfaces extending at least partly parallel to the plane of the rear side of said back.

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