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DENTAL CHAIR AND THE LIKE

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My invention relates to chairs of the type having a back rest movable relatively to the seat for supporting the back of the occupant in either an upright position or in a reclining position at any desired angle of inclination to the horizontal, and while I have shown and will describe my invention as applied to a dental chair, I desire it to be understood that the invention may be applied also to other surgical chairs, barber chairs, and any other type of chair in which it may have utility.

An object of my invention is to provide such a chair of simple construction wherein the back rest or support may be quickly, easily, and conveniently moved from one position to another with respect to the seat portion of the chair.

Another object is the provision of an efficient and reliable means for locking the back portion in any desired position of adjustment and against inadvertent movement in either direction.

Other objects and advantages of my invention will be apparent from the following description when taken in connection with the accompanying drawings, in which:

Fig. 1 is a side elevation of a dental chair in which my invention is embodied with some parts broken away and others in dotted lines to better illustrate the invention;

Fig. 2 is a view similar to that of Fig. 1 with the back rest or support in an inclined position;

Fig. 3 is a view taken on the line 3—3 of Fig. 2 in the direction indicated by the arrows;

Fig. 4 is a view taken on the line 4—4 of Fig. 3 in the direction indicated by the arrows;

Fig. 5 is a plan view of the chair of Fig. 1 with parts removed to better illustrate the invention;

Fig. 6 is a view taken on the line 6—6 of Fig. 5 in the direction indicated by the arrows;

Fig. 7 is a rear view of the chair with parts removed to better illustrate the invention;

Fig. 8 is a view taken on the line 8—8 of Fig. 1 in the direction indicated by the arrows;

Fig. 9 is a view of a part of the back of the chair showing the locking mechanism for the back rest;

Fig. 10 is a view taken on the line 10—10 of Fig. 9 in the direction indicated by the arrows;

Fig. 11 is a view similar to that of Fig. 9 on an enlarged scale, with additional parts in section, showing the locking mechanism in released position;

Fig. 12 is a top plan view of the locking clamp and associated parts;

Fig. 13 is a view from the right of Fig. 12;

Fig. 14 is a fragmentary rear view somewhat similar to Fig. 7 showing a modified form of my invention;

Fig. 15 is a view taken on the line 15—15 of Fig. 16 in the direction indicated by the arrows;

Fig. 16 is a view taken on the line 16—16 of Fig. 15 in the direction indicated by the arrows;

Fig. 17 is a view taken on the line 17—17 of Fig. 15 in the direction indicated by the arrows;

Fig. 18 is a side elevation of a portion of Fig. 14.

The same reference numerals throughout the several views indicate the same parts.

The dental chair of my invention comprises a base 21, a seat part 22, a foot rest 23 and a back rest or support, generally indicated by the numeral 24. The base of the chair comprises a vertically extending housing or column 25 adapted to enclose a motor and suitable mechanism adapted to raise and lower the level of the whole chair and the patient seated therein. Such elevating mechanism constitutes no part of my present invention and need not be particularly described.

The seat part of the chair comprises, as shown more clearly in Figs. 1 and 5, a seat frame 26 which has a central opening 27, of suitable shape, at its center and a raised marginal edge 28 for the reception of a cushion 29 of leather or other suitable material. The seat frame 26 and the base column 25 are provided with cooperating parts as indicated at 31 for enabling the tilting of the seat frame with respect to the base column. The foot rest is secured beneath the seat frame by means of bolts 30. Detachably secured to the seat frame, as shown at 32 (Fig. 1), are a pair of arms which may be of any suitable shape and construction. Extending upward from the seat frame at each side thereof is a raised lug or support 33. Each of the supports 33 is provided with a trunnion 34 for the pivotal reception of an arm 36, constituting part of the back rest or support 24. Extending from the rear of the seat frame 26 is a lug or bracket 37, which is apertured to receive a pin 38 for pivotally connecting a back bar or post 39 to the seat frame.

Formed integral with the arms 36 is a back support 41, which is provided at its rearward side with slide grooves or ways 42 (Figs. 5 and 10). The ways 42 are adapted to receive cooperating slide parts 43 formed on a slide 44, which supports a back cushion frame and cushion 45. Suitable means are provided for adjusting the position of the slide 44 in the ways 42 and
retaining the slide 44 in a desired position. The slide may be adjustably locked in position by suitable mechanism, not part of my present invention, actuated by the hand lever 45. A support 47 for the cushion frame is pivoted to the slide 44, as indicated at 43. The support 47 is pivoted to the frame of the back cushion, as shown at 45. A stop 51 and a spring 53 are provided on the support 47 for enabling a slight movement of the back cushion 46 about the pivot 48 so that the back cushion will automatically adjust itself to the comfort of the patient.

Pivoted to the back support, as shown at 53, is a casting or member 54, which has an elongated opening 55 extending therethrough, adapted to receive the free end of the back bar 39. Mounted in a cutaway portion or enlarged opening 61 in the member 54, and communicating with the opening 55, is a lock or clamp mechanism generally indicated by the numeral 58. The lock mechanism is adapted to grip the back bar 39 to hold the back rest or support 24 in any desired pivotal relation with the seat against movement of the back rest either forwardly or rearwardly. Upon release of the lock mechanism the back rest may be pivoted on the pin 54 and with respect to the seat, under the control of a counterbalance mechanism hereinafter described. During the pivotal movement of the back rest the back bar 38 slides in the opening 55.

The lock mechanism, as shown more clearly in Figs. 11, 12 and 13, comprises a gripping part or clamp 59, which embraces the back bar 39 and is provided with a slot 61 which separates the clamp into two sections which by means later described are drawn together to provide the clamp action. At the rear, as shown in Fig. 12, the clamp is extended to form two lugs 62 and 63, which are separated by the slot 61. Mounted in the lower part of the lug 63 is a hardened steel pin 64, shown in dotted lines in Fig. 11. Mounted in the lug 62 is a pivot pin 65 adapted to pivotally receive a locking lever 67 the lug being slotted at 70 to receive the locking lever. The righthand end of the locking lever, as viewed in the drawings, has its lower portion split, as shown at 68, the locking lever is the split portion 68 and provided with a screw 69, the end of which engages the hardened steel pin 64 as shown in Fig. 9. A set screw 71 extends through the lower ends of the split portions of the locking lever, and when the set screw 71 is tightened, the screw 69 is held in any desired adjusted position.

The other or left end of the locking lever 67 extends angularly with respect to the remainder of the locking lever, as shown at 72, and is provided with an aperture 73, which is tapered upward and outward. Extending upward through the aperture 73 in the locking lever is a bar or rod 74, the lower end of which is threaded to receive jam nuts 76. The rod 74, above the locking lever 67, is threaded, as shown at 77, the threaded portion extending through the member 54. The threads of the rod 74 have a rather long lead so that a relatively slight rotational movement of the rod causes a relatively large movement of the locking lever 67. A washer 78 of suitable material may be interposed between the lower end of the threaded portion of the rod and the locking lever 67.

The rod 74 extends upward at an angle to the back bar (Fig. 11) and projects through the member 54 and has at its upper end a manually operable control lever or handle 79. The hand lever may be secured to the rod in any suitable manner, as by a screw 81 which extends into the end of the rod. The hand lever is given a projecting finger 82 adapted to limit the movement of the hand lever 79 by the engagement of the lug 83 with the back support 47, as shown at 83 (Fig. 9). Mounted on the rod 74, by means of a collar 84, is a spring 85. A tubular housing 87 is secured to the collar and encloses the projecting portion of the rod 74. Encircling the rod and inside the tubular housing 87 is a torsional spring 88, one end of which, as shown at 89, is secured in the collar and the other end of which, as shown at 91, is anchored in the member 54.

The action of the torsional spring is to rotate the collar 86, and therefore the rod 74 from the position of the parts shown in Fig. 11 to that shown in Fig. 9. The rotation of the rod 74 threads the rod out of the member 54 or in an upward direction so that the rod is moved upward to thereby engage the jam nuts 76 against the lower part of the locking lever 67 and thereby raise the lefthand end of the locking lever. This produces a relative tilting or angular motion between lever 67 and the member 54, about the connecting pin 65, as clamp 59 remains in alignment with the bar 39 on which it slides. Preferably, for positive action, the right hand end 92 of lever 67 has a loose fit in a recess 93 in member 54, to insure such tilting actuation of the lever by rod 74, while clamp 59 may slide slightly on rod 39. Screw 69 of the lever is thus press against pin 64 of lug 63 of the clamp which is thus pressed toward lug 52 to clamp the rod 25 therebetween. The parts, as the jam nuts 76 and screw 69, are preferably so adjusted as to bring about a sufficient gripping of the rod by the clamp just prior to or upon engagement of the lug 82 with the back support 47.

Upon manual rotation of lever 75 from the position shown in Fig. 9 to that shown in Fig. 11, the rod 74 is moved in the opposite direction, or downwardly, to thereby move the left hand end of the locking lever downwardly, reversing the above movement of the locking members and allowing the clamp to receive rod 35. As soon as the control lever 73 is released, spring 88 returns the locking parts to the position first described with the clamp tightly gripping the rod to lock the back of the chair in adjusted position, against movement in either direction. The counterbalancing mechanism for the chair back will now be described. Secured in a cord out part 191 of one of the arms 36, and pivoted to the arm, as shown at 192, is a link 103, the lower end of which is secured to a lever 104. The other end of the lever 104 is provided with an opening 106 (Fig. 4), which merges into a right angle slot 107 at the periphery of the end of the lever. The link has a rounded end 103 which fits into the opening 106 and slot 107 on the end of the lever 104. The end of the link has an opening for the reception of the opening 109 of a screw 111. A second screw 112 on the other face of the lever 104 has a threaded portion 113 which fits in a threaded bore formed in the stem of the screw 111. There is thus formed a pivot between the link 103 and the lever 104.

The lever 104 is pivoted to the inside of seat frame as shown at 116, extends through the opening 27 in the seat frame and at its other
end is provided with an opening for the reception of a pin 117 (Fig. 8). A U-shaped fitting 118 is mounted on the pin, straddles the end of the retainer 119 and is held in position upon the rod 120 as shown at 119 for the reception of a rod 120. The rod 120 is provided at its lower end with a threaded portion 121 for the reception of a nut 122 provided with a washer, serving as an adjustable stop for a spring 123. The upper end of the rod is formed as a housing 124. threaded into the cap 125 which encircles the spring and the rod. The lower end of the housing 127 is open so that the end of the rod may move into and out of the opening as shown by a comparison of Figs. 1 and 2. The housing 127 is provided with two mixing openings 128 which enables a screw driver to be inserted through the openings for the purpose of fastening a bracket 129 to a part of the leg rest 23. The bracket 129 may be welded or otherwise secured to the housing 127.

It will now be apparent, with the parts in the position shown in Fig. 1, that when the dentist desires to adjust the patient to a reclining position, he releases the hand lever 79 and moves the back rest 23 forward from the position shown in Fig. 1 or to any intermediate position of inclination. During this movement of the back rest, through the link 103 and the lever 104, the spring 123 is being compressed, as shown by the lever 128 and the position shown in Fig. 1 or to that shown in Fig. 2. As soon as the patient is in the desired inclining position, the dentist releases the hand lever 79 and the back rest support is automatically locked in the desired position with the spring 123 in a compressed condition. When the dentist desires to erect the patient, he releases the clamp on the back bar 39 by moving the hand lever 79 and raising the back rest from the position shown in Fig. 2 to that shown in Fig. 1, carrying with it the patient from the reclining position to an upright position.

A counterbalancing spring 123 is preferably selected of such force, adjusted if necessary by the nut 122, as to substantially counterbalance the weight of the back rest and also the average weight of the occupant of the chair, in order to lower the back. In some instances, as in the ease of an unusually heavy patient, the operator may find it necessary to exert a small additional force to support the back. In other instances, as in the case of an occupant of light weight, it may be necessary for the operator to exert a small force in order to lower the back, but it has been found that by suitably selecting and adjusting the counterbalancing spring, the force required to be exerted by the operator may be reduced to a small amount capable of being exerted by one hand while grasping and operating the control handle 79 for the locking mechanism. This relieves, in a large measure, the labor required of the operator in the adjustment of the back rest of the chair.

The combination with such a counterbalancing mechanism, of mechanism for locking the back against movement in either direction by a locking handle located as described and automatically actuated to locking position, is highly convenient and advantageous in facilitating the ready adjustment of the inclination of the seat of the chair. The provision of such two-way locking mechanism makes feasible the use of a substantial counterbalancing force approximately equaling the weight of the back rest and of the pressure thereon of the occupant of the chair, greatly reducing the effort required on the part of the operator, because it provides means for readily controlling the use of a counterbalancing force which may be greater in some cases than the combined weight of the back rest and of the pressure thereon of the occupant of the chair, and furthermore prevents any inadvertent movement of the back by such counterbalancing means when the patient raises himself to an upright position. The back rest is positively locked against upward movement under any such conditions, the spindle 74 being self-locking in position and prevented from sliding in the part 54 by reason of its threaded bearing in the part 54. Any downward pressure of the occupant, in excess of the counterbalancing force, tends to turn lever 71 clockwise in Fig. 11 and tighten the grip of the clamp on bar 39. These advantages are particularly important for some of the operators of such chairs, as, for example, dentists, for the reason that one hand is often preoccupied, leaving only one hand available to manipulate the lock and raise or lower the back of the chair.

In Figs. 14-18, 19-24, I have shown a modification of my invention wherein the arms 35 are loosely mounted on trunnions 131, which are held in position in the lugs or supports 33 of the seat frame by means of setscrews 132. Interposed between the meeting faces of the arms 35 and the supports 33 are cranks 133. The cranks 133 are held in position and rotated with the arms 35 by means of pins 134. Pivoted to the ends of the cranks 133 by means of pins 136 are rods 137. The rods 137 are enclosed by bored out portions of the seat frame 35 and are provided with springs 138, which serve the same function as the spring 123. The upper ends of the springs seat on washers 139 which engage projecting parts 141 in the bored portions of the seat frame. The lower ends of the springs are seated upon nuts 142 threaded on the ends of the rod 137. The construction of the locking lever and the locking clamp in this modification is preferably the same as in the preferred form of invention, and it will be appreciated that the operation of the invention is substantially the same. The only essential differences lie in the provision of a spring in each side of the chair and the locking of a construction whereby the levers for connecting the back rest or support to the spring, as in the first modification, are eliminated, so that the parts for providing a counter-balancing action on the back rest are hidden from view by the seat frame.

It will thus be seen that the invention accomplishes the desired objects. It provides a counterbalancing means for the chair back and substantially balances the weight in a simple and reliable form of construction, which is located in an accessible but out-of-the-way position on the chair, without interference with the other mechanisms of the back, and substantially out of view. The movement of the back, under the force of this counterbalancing means is easily and conveniently controlled by an efficient locking mechanism which operates automatically and positively, upon release, to clamp and lock the back against movement in either direction by the weight of the occupant of the chair or the force of the counterbalance. This locking mechanism is so located and operated that the
dentist or other operator of the chair, with a single hand and but a slight exertion, may both control the locking mechanism and raise or lower the chair back. While I have shown the preferred form of my invention, it will be apparent that various modifications may be made in the form and relation of parts without departing from the spirit of my invention as set forth in the appended claims.

I claim:

1. A chair of the character described comprising a seat, a back rest connected with said seat and movable to and from an inclined position, an element connecting said seat and back rest and movable relatively to said back rest during said inclining movement thereof, clamping means for engaging said element, a lever pivoted to said clamping means and extending in opposite directions from its pivotal connection therewith, one end of said lever being engaged by said back rest, means on said lever for actuating said clamping means, and positive actuating means on said back rest and engaging the other end of said lever for moving the same to actuate said clamping means to grip said element for securing said back rest in adjusted position.

2. A chair of the character described comprising a seat, a back rest connected with said seat and movable to and from an inclined position, an element connecting said seat and back rest and movable relatively to said back rest during said inclining movement thereof, clamping means for engaging said element, a lever pivoted to said clamping means and extending in opposite directions from its pivotal connection therewith, one end of said lever being connected with said back rest, means on said lever for actuating said clamping means, a member rotarily supported on said back rest and provided with means for positively actuating the opposite end of said lever to actuate said clamping means, spring means for rotating said member to automatically clamp said element, and manual means for rotating said member to release said element for movement of said back rest.

3. An adjustable chair comprising a seat, a back rest connected with said seat and movable to and from an inclined position, a bar pivotally connected to said seat and movably connected with said back rest, clamping means for gripping said bar to hold said back rest against movement in either direction, a member rotarily supported on said back rest and connected with a manually operable element for rotating said member in one direction to actuate said clamp operating means and release said bar, and a spring having one end connected to said back rest and its other end to said member and tensioned to rotate said member in the other direction to actuate said clamp operating means for clamping said bar.

4. An adjustable chair comprising a seat, a back rest connected with said seat and movable to and from an inclined position, an element pivotally connected to said seat and having a sliding engagement with said back rest, clamping mechanism connected with said back rest for clamping said element to hold said back rest against movement, a member threaded engaged with said back rest and connected with means for actuating said clamping mechanism to grip and release said element, a spring connected with said back rest and with said member for rotating the same in one direction to actuate said clamp actuating mechanism to grip said element, and a handle on said member for rotating the same in the opposite direction to actuate said clamp actuating mechanism to release said element.

5. An adjustable chair comprising a seat, a back rest pivotally connected with said seat and movable to and from an inclined position, an element pivotally connected with said seat and having a sliding engagement with said back rest during said inclining movement thereof, clamping means connected with said back rest for gripping said element to hold said back rest against movement, said clamping means having a lever pivotally thereto for actuating the same, a rotary member threadedly engaged with said back rest and engages with said lever, torsional spring means connected with said back rest and member for rotating the same in one direction to actuate said lever and clamping means to grip said element, and a handle on said member for rotating the same in the opposite direction to actuate said lever and clamping means to release said element for effecting said inclining movement of said back rest.

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