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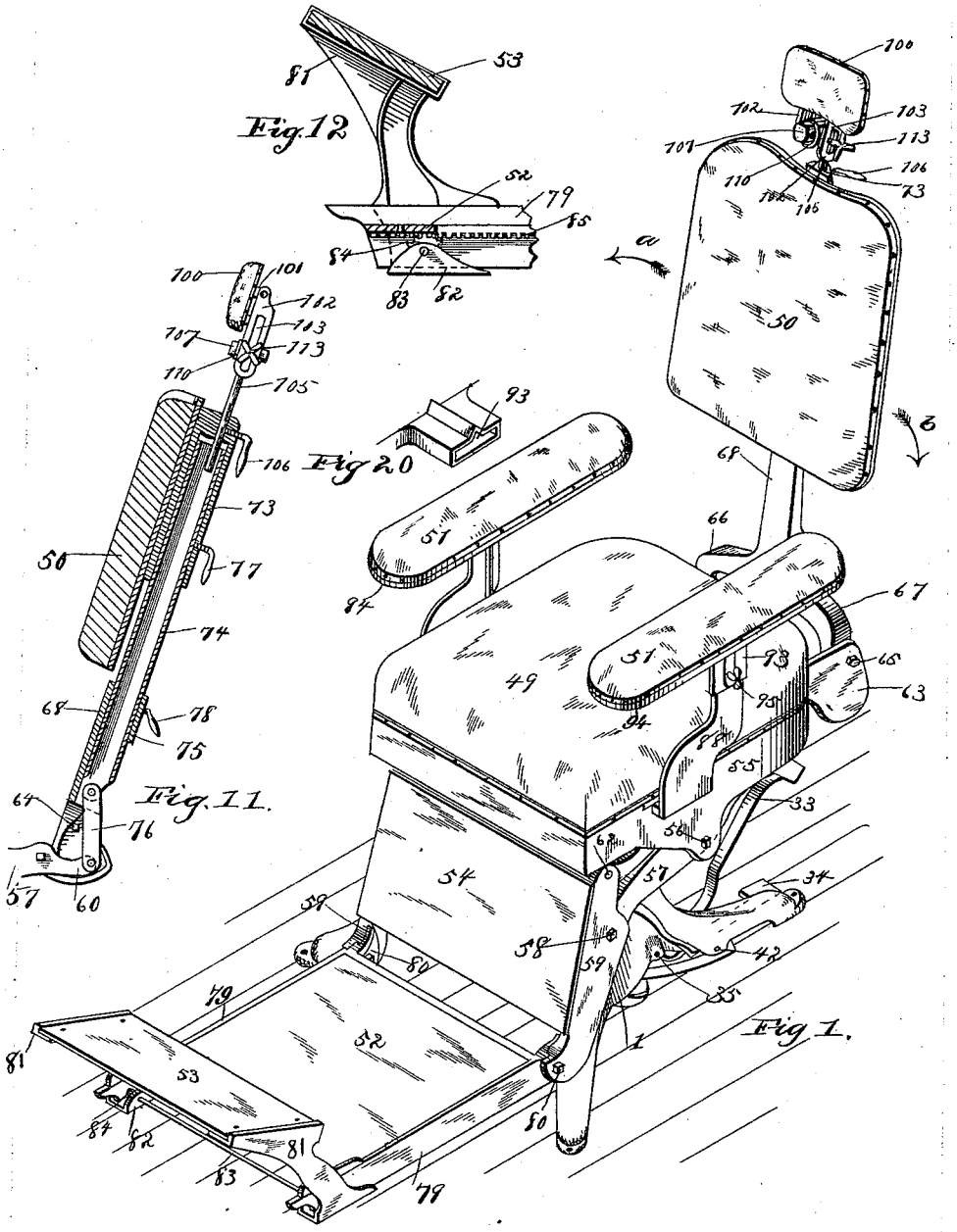
F. E. CASE.

DENTAL CHAIR.

No. 455,168. Patented June 30, 1891.



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DENTAL CHAIR.

No. 455,168. Patented June 30, 1891.

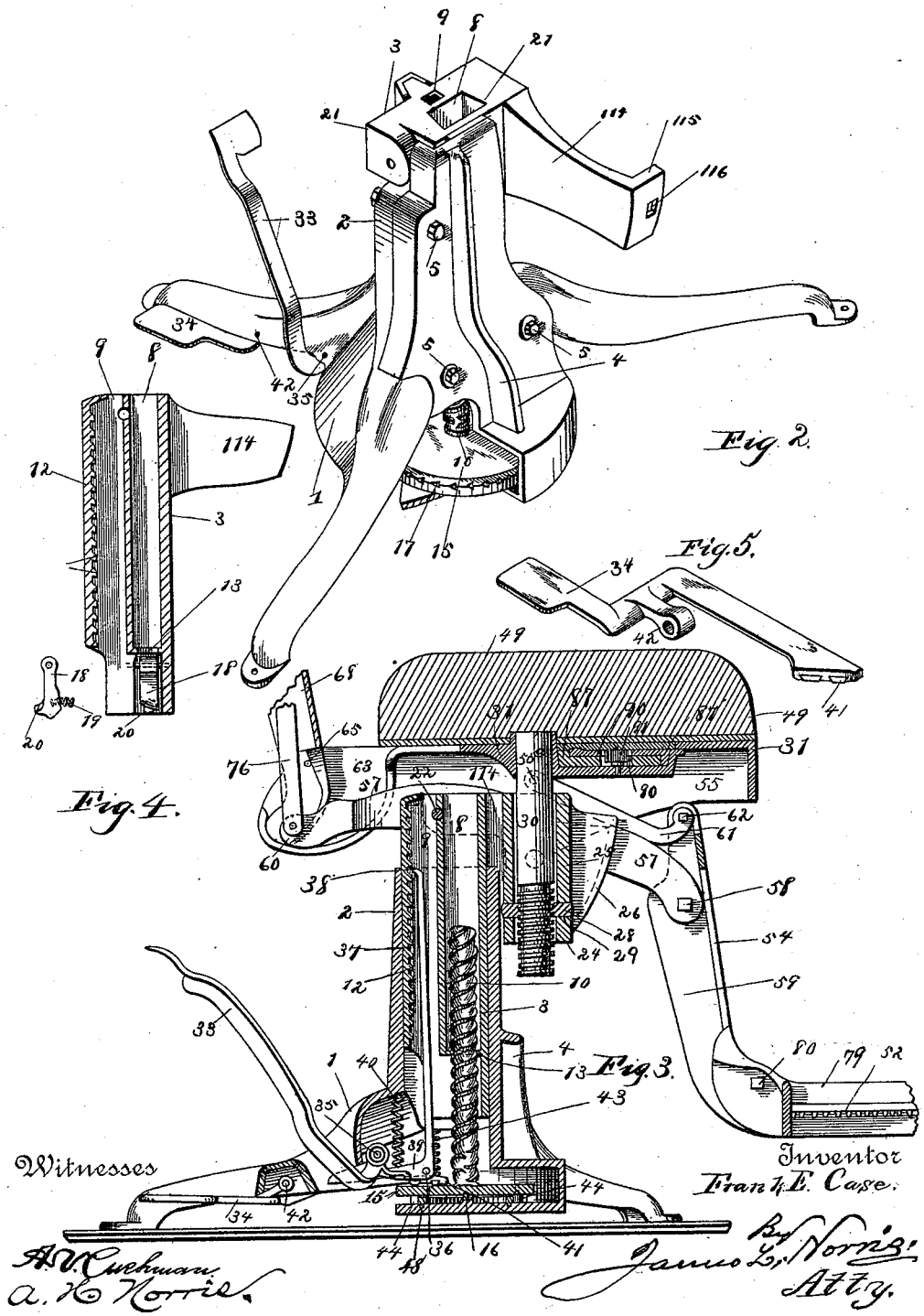

Fig. 2.

Fig. 5.

Fig. 4.

Fig. 3.

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DENTAL CHAIR.

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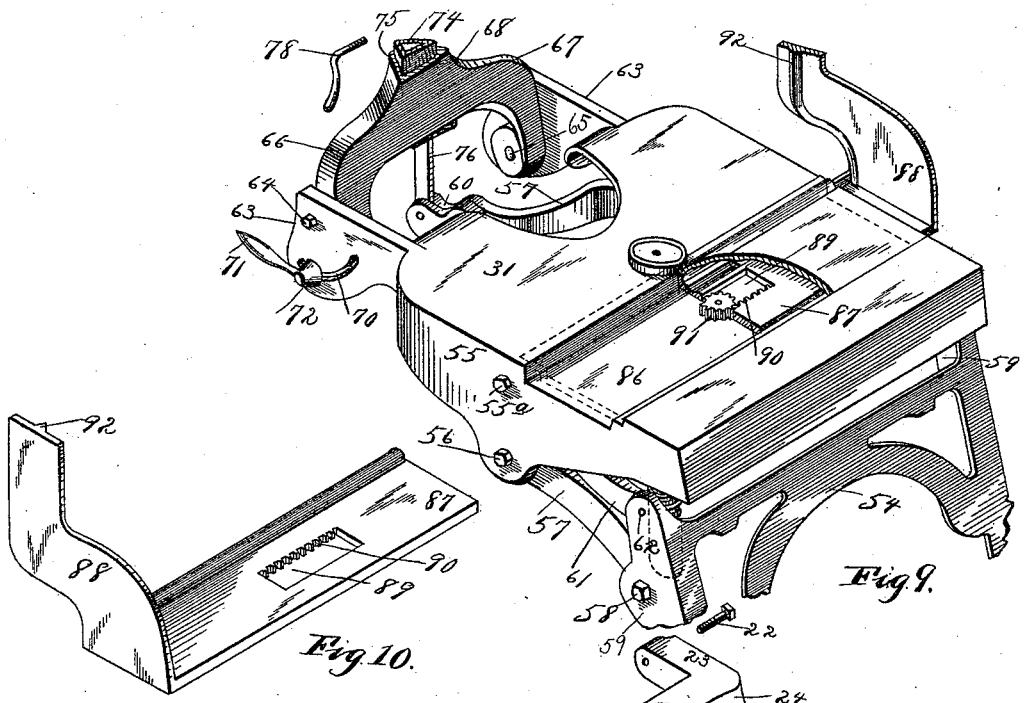

Fig. 9.

Fig. 10.

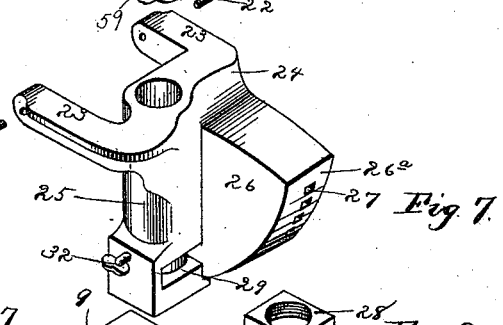

Fig. 7.

Fig. 8.

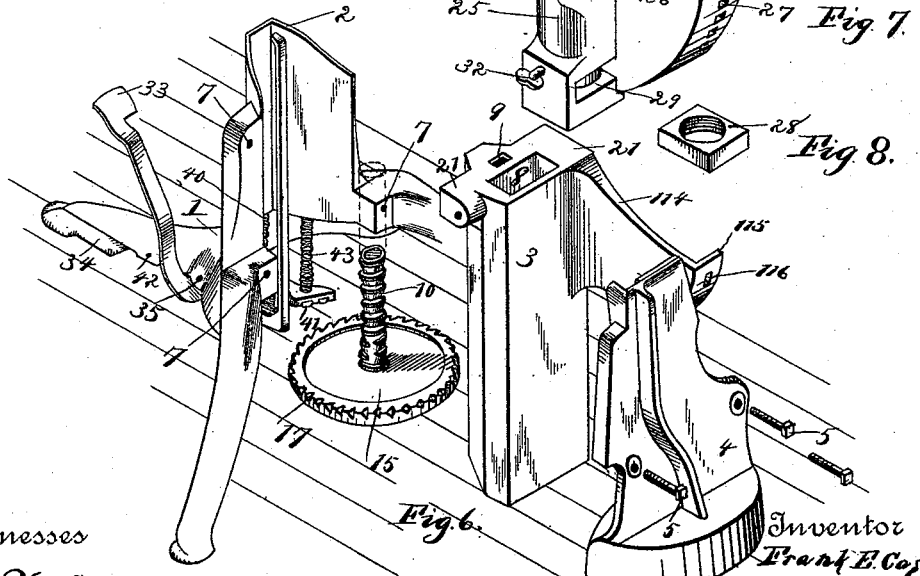

Fig. 6.

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DENTAL CHAIR.

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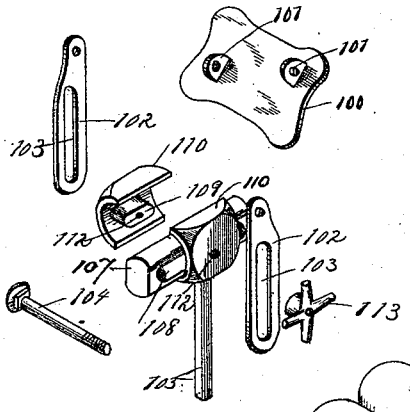
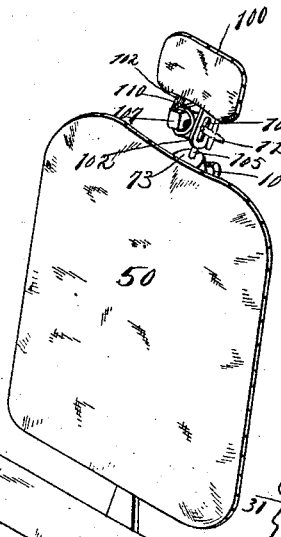


Fig. 14.



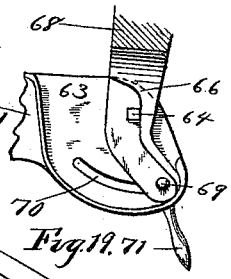


Fig. 19.

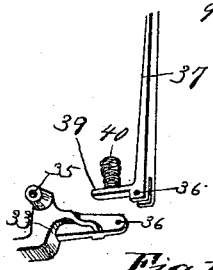


Fig. 18.

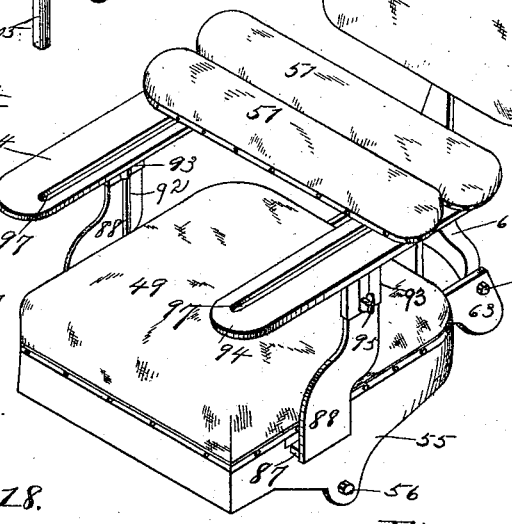


Fig. 13.

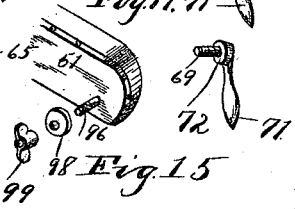


Fig. 15.

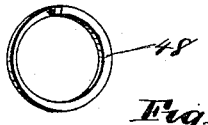
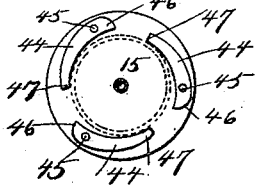


Fig. 17.



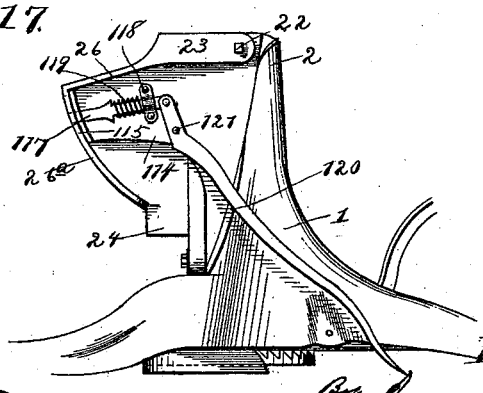


Fig. 16.

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UNITED STATES PATENT OFFICE.

FRANK E. CASE, OF CANTON, OHIO.

DENTAL CHAIR.

SPECIFICATION forming part of Letters Patent No. 455,168, dated June 30, 1891.

Application filed October 22, 1889. Serial No. 327,758. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. CASE, a citizen of the United States, residing at Canton, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Dental Chairs, of which the following is a full, clear, and exact specification.

This invention relates to dental chairs, and has for its objects to provide novel means for raising and lowering the chair-body; to provide novel means whereby the chair-body can be rotated and inclined backward and sidewise; to provide novel means for placing the back in the reclining or horizontal position; to provide novel means for raising and lowering the back independent of the seat; to provide novel means for governing the speed of the chair-lowering screw; to provide novel means for raising and lowering the step and foot-rest independent of the seat; to provide novel means whereby the step and foot-rest can be adjusted by the dentist through the medium of the chair-back, and thereby avoid undignified stooping; to provide a novel head-rest which is adjustable to various positions, as occasion may render desirable, and to provide novel means for adjusting the foot-rest forward and backward, as treatment or manipulation by the dentist may require, and to otherwise improve and render dental chairs more useful, desirable, and efficient.

To accomplish all these objects, my invention involves the features of construction, the combination or arrangement of devices, and the principles of operation hereinafter described in detail, and specifically set forth by the claims, reference being made to the accompanying drawings, in which—

Figure 1 is a perspective view of a dental chair embodying my invention, showing all the parts in normal position or adjustment. Fig. 2 is a detail perspective view of the chair-base or base-frame. Fig. 3 is a vertical sectional view of the same, showing the chair-seat and portions of the back-support and the step. Fig. 4 is a detail vertical sectional view of the rising and falling standard. Fig. 5 is a detail perspective view of the brake-lever for locking the chair-lowering screw against rotation. Fig. 6 is a detail perspective view showing the base-frame, the sliding standard, the bracket, and the balance-wheel and screw separated from each other. Fig. 7 is a detail perspective view of the yoke-hub or frame for connecting the chair-body with the chair-base. Fig. 8 is a detail perspective view of the nut for the yoke-hub or frame. Fig. 9 is a detail broken perspective view showing a portion of the back-support and the chair-seat frame without upholstering. Fig. 10 is a detail perspective view of one of the side-arm supports. Fig. 11 is a detail vertical sectional view of the chair-back, showing the head-rest and the means for connecting the back-support with the seat-frame. Fig. 12 is a detail sectional view of the foot-rest, showing a portion of the step. Fig. 13 is a detail perspective view of a portion of the chair-body, showing the side arms adjusted to form a child's seat. Fig. 14 is a detail perspective view showing parts of the head-rest separated from each other. Fig. 15 is a perspective view of a part of a side arm, showing its fastening-nut and washer. Fig. 16 is a side elevation showing a portion of the chair-base and the devices for locking the rocking yoke-hub. Fig. 17 is a detail plan view of the balance-wheel and governor mechanism for regulating the speed of rotation of the chair-lowering screw. Fig. 18 is a perspective view of portions of the lifting-lever and dog separated from each other. Fig. 19 is a sectional side elevation showing portions of the back-support and the rear extension of the seat-frame. Fig. 20 is a detail view of a sleeve for rendering a side arm vertically adjustable.

In order to enable those skilled in the art to make and use my invention, I will now describe the same in detail, referring to the drawings, wherein—

The numeral 1 indicates the base-frame, which comprises supporting-legs, preferably three, suitably spread to provide stability and avoid overturning the chair. The base-frame is provided with an upright standard 2, angular or V-shaped transversely at the upper end portion to receive the vertically-sliding tubular standard 3, confined in place by a bracket 4, which is flat on its inside and secured to the standard 2 by screw-bolts 5, engaging screw-holes 7, Fig. 6. The angular or

V-shaped formation of the tubular standard 3 to accurately fit the correspondingly-shaped standard 2 of the base-frame provides for the compensation of wear by tightening up the bracket 4 through the medium of the screw-bolts 5, it being understood that in assembling the parts the vertical face of the bracket is left a short distance from the vertical face of the standard 2, in order to permit subsequent adjustment of the bracket.

The tubular standard is divided into two chambers 8 and 9, one adapted to receive the screw 10 and the other having within it a vertical row of teeth forming a ratchet 12, which is preferably formed integral with the tubular standard. The lower end of the chamber 8 is constructed open or with an orifice 13, so as to pass over the screw 10, the thread of which is preferably, but not necessarily, about one revolution to the inch, this screw being rigidly attached at its lower end to a horizontally-rotating balance-wheel 15, having at its under side a pivot-bearing 16 on the base part of the bracket 4 and provided on its periphery with an annular series of notches or ratchet-teeth 17. A pendent pawl 18, Fig. 4, is pivoted to each side of the tubular standard directly beneath the opening 13, and is pressed by a spring 19 to throw the tooth 20 of the pawl into engagement with the screw. I have shown one pawl detached and one attached in Fig. 4; but in practice one will be applied at each side of the screw. The upper end of the tubular standard is provided with two oppositely-arranged lugs or parts 21, Fig. 6, to which are pivoted by suitable pivot-screws 22 the arms 23 of a yoke-hub or frame 24, comprising a tubular neck 25 and an arm-extension 26, having a curved or segmental flange 26^a, provided with a line of bolt or catch orifices 27.

A screw-nut 28 is detachably arranged in a seat 29 in the yoke-hub in coincidence with the vertical opening through the tubular neck 25, and with this nut engages the screw-stem 30, rigidly attached to the lower section 31 of the seat-frame, whereby the entire chair-body, hereinafter described, is supported from the yoke-hub through the medium of the screw-stem 30. This stem may be locked by a screw-bolt 32, tapped through a part of the yoke-hub to bind against the screw-stem and hold the chair-seat stationary as regards rotary movement, while by rotating the screw-stem 30 the chair-seat can be raised or lowered relatively to the yoke-hub. If, however, this vertical adjustment of the chair-seat is undesirable, the screw-nut 28 may be removed and the stem 30 simply axially rotate without rising or falling.

To elevate the tubular standard and lock and release the screw operating conjointly therewith, I provide a lifting-lever 33 and a brake-lever 34, pivoted in or to the rear supporting-leg, as in Figs. 1, 2, 3, and 6. The lifting-lever 33 is mounted on a pivot-pin 35, and at its forward end, in advance of this pivot-pin, said lever is pivoted at 36 to a vertically-arranged lifting-dog 37, having at its upper end a tooth 38 to engage the ratchet 12. The lifting-dog is provided at its lower end with a tail-piece 39, so that the dog is approximately L-shaped, and on this tail-piece bears one end of a spring 40, which at its other end bears against the inside of the leg part of the base-frame 1. The lifting-lever is made at its rear end as a pedal for the foot of the dentist or operator, and the parts are so constructed that when the lifting-dog is in its normal position its tail-piece 39 rests upon and bears against the upper side of the lifting-lever in advance of the pivot-pin 36. The shape of the connected ends of the lever and dog is best shown in Fig. 18, where the parts are slightly separated. It will be evident that when the lifting-lever is depressed by the foot of the operator the front end thereof is raised, and the spring 40, bearing on the tail-piece 39, causes the tooth 38 of the dog to move toward and engage the ratchet 12, so that the continued depression of the rear end of the lifting-lever 33 elevates the lifting-dog, and thereby raises the tubular standard for adjusting the chair-body to the desired height, while the spring 40 when the foot is removed from the lifting-lever restores the latter and the dog to their normal positions for subsequent operation to again lift the standard.

To lock the standard in its raised position, the teeth 20 of the pawls 18 engage the thread of the screw 10, this being effected by the springs 19, for while the pawls can oscillate and yield and ride over the threads of the screw the toothed ends 20 are promptly thrown into engagement with the flattened upper sides of the threads, as will be quite obvious, thereby effectually preventing the descent of the tubular standard so long as the screw 10 is held against rotation, this being effected by the toothed end 41 of the brake-lever 34, which is pivoted in or to the supporting-leg by a pivot-pin 42, located, preferably, in rear of the pivot 35 of the lifting-lever.

A spring 43 bears upon the front or toothed end of the brake-lever to throw the same into engagement with the notched or toothed part 17 of the balance-wheel 15, and the rear end of the brake-lever is made as a pedal, so that the dentist or operator can depress the same, and thereby lift the front or toothed end of the brake-lever from engagement with the balance-wheel.

The tubular standard can be more or less elevated by successive depressions of the lifting-lever, which impart elevating impulses to the lifting-dog, for each time the lever is depressed and released it is restored by the spring 40 to its normal position for a subsequent depression and consequent elevation of the tubular standard by the impulse given to the dog.

The inclination of the thread of the screw 10 is such that the weight of the chair-body and tubular standard sustained by the pawls

engaging the threads would rotate the screw, except for the holding or braking action of the brake-lever on the balance-wheel, and consequently when the rear end of the brake-lever is depressed and the balance-wheel thereby released the weight alluded to causes the screw to rotate, whereby the tubular standard and chair-body descend gradually and without shock the required degree, subject to the length of time the brake-lever is held out of engagement with the balance-wheel, for the instant the brake-lever is released it engages and locks the balance-wheel against further rotation. The spring-pawls 18 act as an open nut to permit an ascending movement of the tubular standard without rotation of the screw 10, but prevent a descending movement of the standard, except by rotary movement of the screw, as explained. By the means described the operator is enabled to raise the chair by the lifting-lever and to lower the same by simply depressing the brake-lever.

To regulate the speed of the balance-wheel in the descent of the chair and prevent too rapid rotation of the screw 10, I provide a speed-governor comprising features which are best shown in Fig. 17, where the numerals 44 indicate brake-shoes, of which there may be any suitable number, but preferably three, pivoted near one end portion, as at 45, to the under side of the balance-wheel, so that each shoe comprises what I will term a "heel" 46 and a "toe" 47.

A rigid and immovable friction ring or annulus 48 is arranged beneath the balance-wheel to co-operate with the brake-shoes, and this ring is preferably attached to or made as a part of the horizontal portion of the bracket 4, Fig. 3, in such manner that the ring projects into the space between the brake-shoes. As the balance-wheel revolves the tendency of the toe ends 47 is to automatically fly outward, and thus force the heel ends 46 against the external surface of the immovable friction-ring. The more rapidly the balance-wheel revolves the greater is the centrifugal force imparted to the toe ends 47 and the more firmly are the heel ends 46 pressed against the friction-ring, thereby retarding the speed of the balance-wheel and permitting only a uniform rotary movement of the wheel and screw.

The screw-stem 30 is useful to provide for considerable elevation of the chair-body without correspondingly increasing the height of the base-frame 1 and the length of the tubular standard 3, which increase would not permit the chair-body to be lowered sufficiently for operating on the patient with convenience.

The chair-body comprises, in general, a seat 49, back 50, side arms 51, a step 52, a foot-rest 53, and a step-support 54, all properly upholstered or otherwise finished in any manner that may be desired or conditions require.

The lower section 31 of the seat-frame is provided with two pendent flanges 55, one at either side, connected by pivot pins or bolts 56 to levers 57, having their front ends pivoted at 58 to the side bars 59 of the step-support 54, said levers 57 extending back to the rear side of the chair-seat, where they converge, unite, and extend rearward as a central arm 60. The side flanges 55 are also pivoted, as at 55^a, to the rear ends of the levers or links 61, having their front ends pivoted at 62 to the upper ends of the side bars 59, the said links being placed above the levers 57.

The lower section 31 of the seat-frame is provided with a pair of rearwardly-projecting arm-extensions 63, one at either side, to which are respectively pivoted at 64 and 65 the branch arms 66 and 67 of a back-support 68, the branch arm 66 extending lower than the one 67 and at its lower extremity having a screw-threaded orifice, Fig. 19, with which engages a screw-rod 69, extending through a segmental slot 70 in one of the arm-extensions 63 and provided with a crank-handle 71 and a collar or flange 72 to bear against the slotted arm-extension 63, Fig. 9. The crank-handle serves to rotate the screw-rod, and if the latter is loosened the back-support 68 may be turned on the pivot-pins 64 and 65 and adjusted forward or backward to any desired angle of inclination and then locked in its adjusted position by tightening the screw-rod 69, which thereby rigidly clamps the branch arm 66 to the slotted arm-extension 63 by means of the collar or flange 72.

To the back 50 is rigidly attached a hollow frame 73, in which is arranged a standard 74, Figs. 9 and 11, triangular or approximately so in cross-section and passing through and movable lengthwise in a correspondingly-shaped socket 75 in the back-support 68. This standard is pivotally connected at its lower end with the arm-extension 60 of the levers 57 through the medium of a link 76 in such manner that the lengthwise movement of the standard oscillates the levers for adjusting the step-support and the step, as will be more fully described hereinafter. The back-frame 73 has a limited vertical movement on the standard 74 and is provided with a set-screw 77 to bind against the latter and hold the back in a fixed position relatively to the standard, so that the back and standard can be moved in unison. The standard and the back-support can be rigidly connected by a set-screw 78, tapped through the socket 75 to bind against or engage the standard, and if this set-screw be loosened the back is adapted to slide up or down, carrying with it the standard and oscillating the levers 57, and as the latter are fulcrumed or pivoted at 56 a reverse movement is imparted to the step-support 54. For instance, as the back is lowered the step-support is elevated, and vice-versa. As the two levers 57 and 61 are pivoted to either side of the chair, as at 55 and 55^a, and to the step-support, as at 58 and 62, at points about equally distant from each other, the step-sup-

port is preserved approximately vertical in its rising and falling movements, and consequently when the sliding standard 74 is secured in a fixed position by its locking set-screw 78 the step-support is held stationary, and as the step-support carries the step 52 the latter is also held in a fixed position as regards vertical movement. The step comprises side flanges 79, which are pivoted at 80 to the lower ends of the side bars 59 of the step-support, so that while the step is sustained in an approximately horizontal position when in use it can be swung up against the step-support for convenience in shipping. By the mechanism described the operator can raise and lower the step by vertical movements of the chair-back, and as the step is designed to carry the foot-rest 53 the position of the latter is also controlled by the vertical movement of the back.

The foot-rest 53 is supported at the ends by standards 81, which at their lower ends underlie the flanges 79 and serve as bearings, as at 82, for a rotating shaft 83, having at the ends rigidly-attached pinions or cog-wheels 84, housed in the parts 82, and engaging racks 85, provided on the under sides of the flanges 79, Fig. 12, and along which the pinions or cogs can travel back and forth in engagement with the racks, so that as the end of the foot-rest is forced backward or forward by the operator from either side the pinion or cog-wheel at the end operated upon is caused to rotate, and thereby impart a corresponding rotary motion to the opposite pinion or cog-wheel, thereby accurately moving both ends of the foot-rest in unison and avoiding all tendency of binding.

The section 31 of the seat-frame is provided with a rectilinear channel or recess 86, running transversely from side to side, Fig. 9, in which are placed the horizontal portions 87 of the arm-supports or standards 88 for the side arms 51, Figs. 1 and 13, which portions 87 each have a rectangular slot 89, provided at one edge with a series of gear-teeth 90 to engage a rotary pinion 91, journaled centrally in the rectilinear channel or recess 86, Figs. 3 and 9. The gear-teeth of one arm-support are on the rear edge of its slot, and the gear-teeth of the other arm-support are on the front edge of its slot, and consequently the movement of one arm-support correspondingly moves the opposite arm-support, the arrangement being such that one of the horizontal portions 87 overlies and moves upon the other. By this means the operator is enabled by moving one side arm in or out to simultaneously move the other to a corresponding degree in or out for increasing or decreasing the distance between the side arms, which is very useful in a dental chair.

The vertical parts or standards of the arm-supports are each provided with a rib 92, Figs. 9 and 10, to fit a corresponding groove in a sleeve 93, Figs. 1, 13, and 20, formed with or attached to the lower section 94 of a side arm 51 and having a set-screw 95 tapped through the sleeve to bind against the outer face of the arm-support, whereby the side arm has a limited vertical adjustment to vary its height relatively to the chair-seat.

The upholstered upper sections of the side arms are coextensive with and rest upon the lower sections 94, and each upper section is provided with a screw-stem 96, Fig. 15, to pass through a slot 97, formed lengthwise of the lower section 94, and engage a washer 98 and a thumb-nut 99 for clamping or binding the two arm-sections together, while by loosening the nut the stem serves as a pivot for swinging the upper arm-sections at right angles to the lower sections to extend across the chair, as in Fig. 13, thereby providing a child's seat, which is convenient in a dental chair. When the upper arm-sections are adjusted across the chair, the free end of one rests upon the opposite lower arm-section, and therefore the seat so provided can be raised or lowered by adjusting the sleeves 93.

In Figs. 1, 11, 13, and 14 is shown a head-rest 100, having ears 101 on its rear side, to which are pivoted pendent links 102, provided with longitudinal slots 103 to engage a horizontal screw-bolt 104, passing through a head on a shank 105, which is circular in cross-section and fits a socket-bearing in the upper end of the frame 73 on the back 50, where the shank is adjustably secured by a set-screw 106, tapped through said frame to bind against the shank. The head of the shank comprises a rigid cross-bar 107, preferably oval in cross-section and formed with or attached to the shank, such cross-bar having a longitudinal slot 108, receiving the lugs 109 on the inside of two washers 110, having through-orifices 112 for the passage of the screw-bolt 104. This bolt extends through the slotted links 102, the washers, and the cross-bar, and on its threaded end is placed a thumb or wing nut 113, so that by tightening the latter the washers and the links are rigidly clamped to the cross-bar for holding the head-rest stationary in relation thereto. The axial rotation of the shank 105 provides for turning the head-rest to the right or left, and also raising and lowering the same in a right line, while by loosening the thumb or wing nut 113 the head-rest may be slid backward or forward on the cross-head or swung with the links backward or forward and raised and lowered, the links moving on the screw-bolt back and forth and up and down. The parts are rigidly held in any adjusted position by tightening the thumb or wing nut 113 and the set-screw 106. The upper ends of the links 102 are bent in opposite directions for pivoting with the ears 101, which, as shown in Fig. 14, are near different corner portions of the head-rest. The lugs of the washers are of a thickness somewhat less than the slot in the cross-bar, so that the washers

can be slightly turned or rotated on the cross-bar to set the head-rest more or less inclined to the right or left.

It is desirable in a dentist-chair to give the entire chair-body a backward inclination on the base-frame, especially if it be necessary to place the head of the patient below the horizontal position, and it is also desirable to provide for tilting or inclining the chair-body laterally or sidewise. These results I accomplish by the yoke-hub 24 in the manner and by the means which I will now describe. The yoke-hub, as hereinbefore explained, embraces and is pivoted to the upper end of the vertically-sliding standard 3, and the arm-extension 26 can oscillate beside a forwardly-projecting arm 114, formed with or attached to the upper end portion of the sliding standard, Figs. 3, 4, 8, and 16. The arm 114 is provided at its outer end with a lateral segmental flange 115, conforming to and underlying the curved face 26^a of the arm-extension 26, Figs. 6 and 16, and the flange is provided with an opening 116, Fig. 6, adapted to register with any one of the orifices 27 in such manner that a locking-bolt 117 can enter an orifice for rigidly connecting the yoke-hub with the arm of the sliding standard, while, if the locking-bolt be retracted from engagement with one of the orifices 27 the yoke-hub can be oscillated or rocked in a vertical plane to incline the chair-body backward, and thereby lower the head of the patient the required extent. The locking-bolt 117 slides in a keeper 118 on the arm 114, and is thrown into locking position by a spring 119, and to conveniently retract the bolt a lever 120 is pivoted at 121 on the arm 114 and connected with the bolt. The bolt-actuating lever is preferably arranged that its lower end may be pressed upon by the foot of the operator at a point near one of the chair-supporting legs. The lateral or sidewise inclination of the chair-body is effected in a very simple way, as will be quite obvious by assuming that when the parts are in the position shown in Fig. 3 the entire chair-body extends in a plane parallel with a line drawn centrally between the arms 23 of the yoke-frame, and that by turning the chair-body one-quarter of a revolution through the medium of the screw-stem 30 the chair-body as a whole will then extend in a line at right angles to the line drawn centrally between the arms 23 of the yoke-hub. Consequently if the yoke-hub now be swung upward on its pivots 22 the chair-body is more or less inclined or tilted to the right or left, according to the direction in which the quarter-revolution referred to is made. This will be more clearly understood by referring to Fig. 1, where the chair-body extends parallel to a line drawn centrally between the arms of the yoke-hub. The yoke-hub is not seen in Fig. 1; but its relative position will be understood by reference to Figs. 3 and 6. If now the chair-body as a whole be turned one-quarter of a revolution in the direction of the arrow *a*, Fig. 1, and the yoke-hub be swung upward, the chair-body will be inclined or tilted sidewise to the left, looking from the head-rest, while, on the contrary, if the chair-body be turned one-quarter of a revolution in the direction of the arrow *b*, Fig. 1, and the yoke-hub similarly swung upward, the chair-body will be inclined or tilted sidewise to the right, looking from the head-rest.

The back of the chair, the step-support, the step, and the foot-rest can be raised and lowered independent of the seat, and the back can be placed at any angle of inclination or brought to a horizontal position, as will be evident.

I do not confine myself to a pair of sustaining-pawls on the vertically-movable standard, since a single pawl can be used.

Having thus described my invention, what I claim is—

1. The combination of a base-frame, a vertically-adjustable standard guided thereby, a rocking yoke-hub or frame pivoted to the standard and having a screw-nut, a seat-frame attached to and carrying a chair-back, and a screw-stem arranged in the yoke-hub or frame, supporting the seat-frame and back, and serving to rotate and simultaneously raise and lower the chair back and seat, substantially as described.

2. The combination of a base-frame, a vertically-sliding standard guided thereby, a foot-lever mechanism for elevating the standard, a yoke-hub or frame pivoted to the standard, oscillating on its pivots in a vertical plane, and provided with a screw-nut, a seat-frame attached to and carrying a chair-back, and a rotary screw-stem arranged in the yoke or frame, supporting the seat-frame and back, and serving to simultaneously raise and lower the seat and back, substantially as described.

3. The combination of a base-frame, a vertically-adjustable standard guided thereby, a yoke-hub comprising arms pivoted to the standard and a tubular neck containing a screw-nut, a seat-frame attached to and carrying a chair-back, and a rotary screw-stem engaging the nut, supporting the seat-frame and back, and serving to simultaneously raise and lower the seat and back, substantially as described.

4. The combination of a base-frame, a vertically-adjustable standard guided thereby, a yoke-hub or frame pivoted to the upper end of the standard and adapted to swing upward on its pivotal attachment, a screw-nut arranged in the yoke-hub or frame, a seat-frame attached to and carrying a pivoted swinging back, a rotary screw-stem engaging the nut, supporting the seat-frame and back, and serving to simultaneously raise and lower the seat and back, and locking mechanism for rigidly connecting the yoke-hub or frame to the standard, substantially as described.

5. The combination of a base-frame, a ver-

tically-adjustable standard guided thereby, a yoke-hub or frame pivoted to the upper end of the standard and containing a nut, a seat-frame attached to and carrying a pivoted chair-back, and a screw-stem engaging the nut, solely supporting the seat-frame and back, and serving to simultaneously raise and lower the seat and back, whereby the seat and back can be rotated and also tilted or inclined sidewise, substantially as described.

6. The combination of a base-frame, a sliding standard guided thereby, a lifting mechanism for raising the standard, a lowering mechanism which is independent of the lifting mechanism for gradually depressing the standard, a rocking yoke-hub or frame pivoted to the standard and having a screw-nut, a seat-frame attached to and carrying and supporting a chair-back, and a screw-stem engaging the nut, supporting the seat-frame and back, and serving to simultaneously raise and lower the seat and back, substantially as described.

7. The combination of a base-frame, a vertically-adjustable standard guided thereby, a rocking yoke-hub or frame pivoted to the standard and having a nut, a chair-body, a rotary screw-stem engaging the nut, supporting the chair-body, and serving to raise and lower the latter, and a locking device acting on the screw-stem to hold it against rotation, substantially as described.

8. The combination of a base-frame, a vertically-sliding standard guided thereby, a foot-lever mechanism for elevating the standard, a lowering mechanism independent of the lifting mechanism for gradually lowering the standard, a rocking yoke-hub or frame pivoted to the standard and having a tubular neck containing a screw-nut, a chair-body, a rotary screw-stem engaging the nut, supporting the entire chair-body, and serving to raise and lower the same, and means for locking the screw-stem against axial rotation in the tubular neck, substantially as described.

9. The combination of a hollow base-frame, a vertically-adjustable standard guided therein, a yoke-hub or frame located outside of and depending beside the base-frame, pivoted to the upper end of the adjustable standard to oscillate on its pivotal attachment in a vertical plane outside the standard and base-frame, and having a screw-nut, a chair-body comprising a seat attached to and carrying and supporting a swinging adjustable back, and a rotary screw-stem engaging the nut and solely supporting the seat and back, whereby the seat and back can be raised, lowered, and the back be inclined rearward and forward and with the seat tilted laterally or sidewise, substantially as described.

10. The combination of a base-frame, a vertically-adjustable standard guided thereby, a rocking yoke-hub or frame pivoted to the standard and having a screw-nut, a rotary screw-stem engaging the screw-nut, a seat-frame rigidly attached to and raised and lowered by and rotating with the screw, and a chair-back pivoted to the seat-frame and adapted to be lowered to a horizontal position, substantially as described.

11. The combination of a base-frame, a vertically-sliding standard guided thereby, a lever mechanism for lifting the standard, a sustaining and lowering mechanism independent of the lifting mechanism for sustaining the standard and gradually lowering the same, a yoke-hub or frame pivoted to the standard and having a screw-nut, a seat-frame attached to and carrying and supporting a chair-back, and a rotary screw-stem engaging the nut, supporting the seat-frame, and serving to simultaneously raise and lower the chair seat and back, substantially as described.

12. The combination of a base-frame, a vertically-sliding standard guided thereby, a lever mechanism for lifting the standard, a sustaining and lowering mechanism independent of the lifting mechanism, a rocking yoke-hub or frame pivoted to the standard, and a chair-body having a pivoted swinging back and a stem vertically adjustable and rotating in the yoke-hub or frame, substantially as described.

13. The combination of a base-frame, a vertically-sliding standard having a yielding pawl, a lifting mechanism for elevating the standard, a rotary screw engaging the pawl to sustain and also gradually lower the standard independent of the lifting mechanism, a yoke-hub or frame carried by the standard, and a chair-body supported by the yoke-hub or frame, substantially as described.

14. The combination of a base-frame, a vertically-sliding standard having a yielding pawl, a lifting mechanism for elevating the standard, a rotary screw having a balance-wheel and engaging the pawl to sustain and also gradually lower the standard independent of the lifting mechanism, a rocking yoke-hub or frame carried by the standard, and a chair-body provided with a supporting stem rotating and rising and falling in the rocking yoke-hub or frame, substantially as described.

15. The combination, with a chair-body, of a base-frame, a vertically-sliding standard guided thereby and having a yielding sustaining-pawl, a lifting mechanism for elevating the standard, a rotary screw engaging the pawl to sustain and also lower the standard, and over the threads of which screw the pawl slides in the ascent of the standard, and a brake mechanism for locking the screw stationary, substantially as described.

16. The combination, with a chair-body, of a base-frame, a vertically-sliding standard having a yielding pawl, a lifting mechanism for elevating the standard, a rotary screw engaging the pawl to sustain and also lower the standard and having a balance-wheel, and a brake-lever for engaging and locking the screw and wheel stationary, substantially as described.

17. The combination, with a chair-body, of

a base-frame, a vertically-sliding standard having a yielding pawl, a lifting mechanism for elevating the standard, a rotary screw engaging the pawl to sustain and also lower the standard and having a notched or toothed balance-wheel, and a pivoted brake-lever for engaging the balance-wheel to hold the wheel and screw stationary, substantially as described.

18. The combination, with a chair-body, of a base-frame, a vertically-movable standard guided thereby and having a ratchet, a swinging lifting-lever, a dog carried by the lifting-lever to lift the standard, a rotary screw, a yielding pawl carried by the standard, adapted to ride over the screw-thread in the ascent of the standard, while the screw stands stationary and to engage and sustain the standard against descending, and a brake for holding the screw stationary, substantially as described.

19. The combination, with a chair-body, of a base-frame, a vertically-sliding standard guided thereby and provided with a pivoted spring-pressed pawl having a tooth, a lifting mechanism for elevating the standard, a rotary screw engaging the pawl-tooth and over the thread of which the said pawl slides in the ascent of the standard, while the screw is stationary, a balance-wheel on the screw, and a brake mechanism for locking the balance-wheel against rotation, substantially as described.

20. The combination of a base-frame, a vertically-sliding standard guided thereby, a foot-lever mechanism for elevating and lowering the standard, a rocking yoke-hub or frame pivoted to the standard, a chair-body having a stem movable in and supported by the rocking yoke-hub or frame, means for raising and lowering the chair-supporting stem independent of the yoke-hub or frame, and means for holding the stem against movement, substantially as described.

21. The combination, with a chair-body, of a base-frame having a bracket extending thereunder, a rotary chair-lowering screw having a balance-wheel provided with a pivot-bearing on the bracket thereunder, the brake-shoes pivoted intermediate their ends to the under side of the balance-wheel and having their heel ends thrown inward by the outward movement of the toe ends, and a friction-ring located in a fixed position on the bracket of the base-frame beneath the balance-wheel and at a point between the brake-shoes and the chair-lowering screw, substantially as described.

22. The combination, with a chair-body, a base-frame, a vertically-sliding standard having a ratchet, and a lifting-lever pivoted to the base-frame, of a toothed lifting-dog pivoted to the forward end of the lifting-lever and having a tail-piece which rests upon the upper side of the lifting-lever at a point between the pivot-pins of the lifting-lever and the lifting-dog, and a spring acting to press the tail-piece of the lifting-dog downward upon the upper side of the lifting-lever, substantially as described.

23. The combination, in a chair, of a base-frame, a seat, a back-support, a back rising and falling on the back-support, a step-support, a step, and connections operated by the sliding movements of the back to raise and lower the step-support and step, substantially as described.

24. The combination, in a chair, of a base-frame, a seat-frame, a back-support, a back rising and falling on the back-support, levers pivoted on the seat-frame and oscillated by the rising and falling back, and a step-support suspended from the levers, carrying a step, and moving up and down in an approximately right line as the levers are oscillated, substantially as described.

25. The combination, in a chair, of a base-frame, a seat, a swinging back-support, a back which can rise and fall independent of any movement of the back-support, a step, and suitable connections operated by the rising and falling movements of the back to adjust the step, substantially as described.

26. The combination, in a chair, of a base-frame, a seat-frame, a back-support, a back having a sliding connection with the back-support to rise and fall while the latter remains stationary, a step-support carrying a step, and suitable connections operated by the rising and falling movements of the back on the back-support to adjust the step-support and step, substantially as described.

27. In a chair having a seat and back susceptible of being raised or lowered, a rising and falling step, levers fulcrumed to the seat-frame and pivotally connected at the front end to the step-support and at the rear end to an arm connected with a vertically-sliding standard, and links pivoted to the step-support and to the seat-frame, substantially as described.

28. The combination, in a chair, of a base-frame, a seat-frame, a back-support, a standard sliding lengthwise on the back-support and carrying a back, pivoted oscillating levers connected with the standard, and a step-support carrying a step and suspended from the levers, whereby the rising and falling movements of the back raise and lower the step-support and step, substantially as described.

29. The combination, in a chair, of a back susceptible of rising and falling independent of a swinging movement, levers fulcrumed intermediate their extremities and connected at their rear ends with the back, a step connected with the front ends of the levers and adjusted thereby as the back is raised or lowered, and a locking device for rigidly holding the back against its rising and falling movements.

30. The combination, in a chair, of the suspended step-support, the step having side flanges provided with lateral rack-bars, the

foot-rest having end standards extending round the outside of and underlying the side flanges and rack-bars to form bearings in which is journaled a rotary shaft, and pinions rigid on the shaft, housed by the underlying bearings of the foot-rest standards, and engaging the rack-bars, substantially as described.

31. The combination, in a chair, of a seat-frame having a transverse channel in its top surface which is covered by the upholstering, the vertical arm-supports carrying side arms and having the horizontal toothed portions overlapping in the transverse channel and superimposed and sliding one upon the other, and a pinion journaled between the overlapping toothed portions for simultaneously adjusting the side arms to and from each other independent of any movement of the seat, substantially as described.

32. The combination, with the back of a chair, of a head-rest having pivoted side links, a shank having a slotted cross-head, a pair of washers having sliding engagement with the slotted cross-head, a bolt passing through the links, the washers, and the cross-head, and means for acting on the bolt to rigidly clamp the links and washers to the cross-head, substantially as described.

FRANK E. CASE.

Witnesses:
FANNIE LEVINGER,
S. D. MCKELVEY.