(Model.) 4 Sheets—Sheet 1.

O. C. WHITE.

DENTIST'S CHAIR.

No. 316,100. Patented Apr. 21, 1885.

Fig. 1.

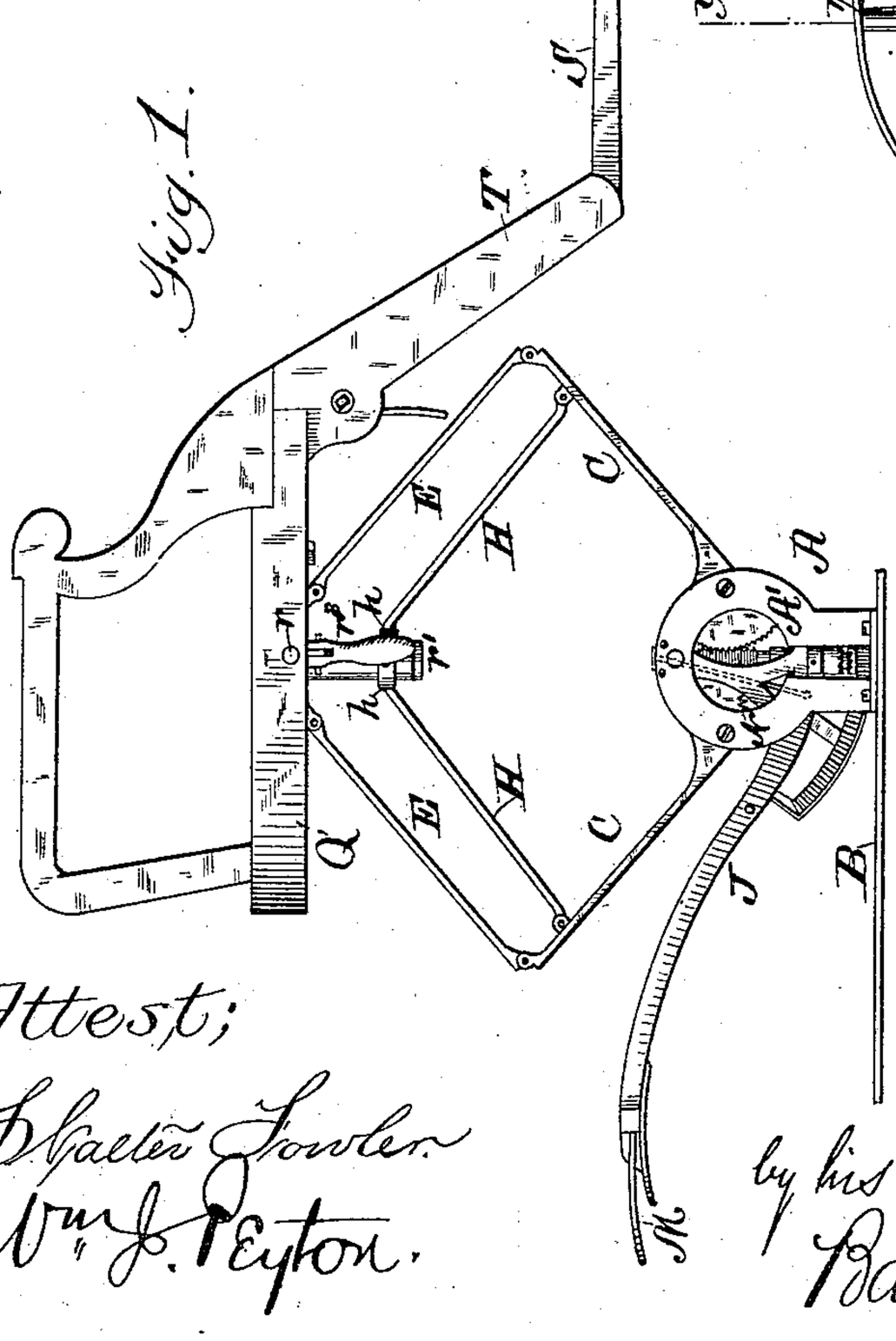


Fig. 7.

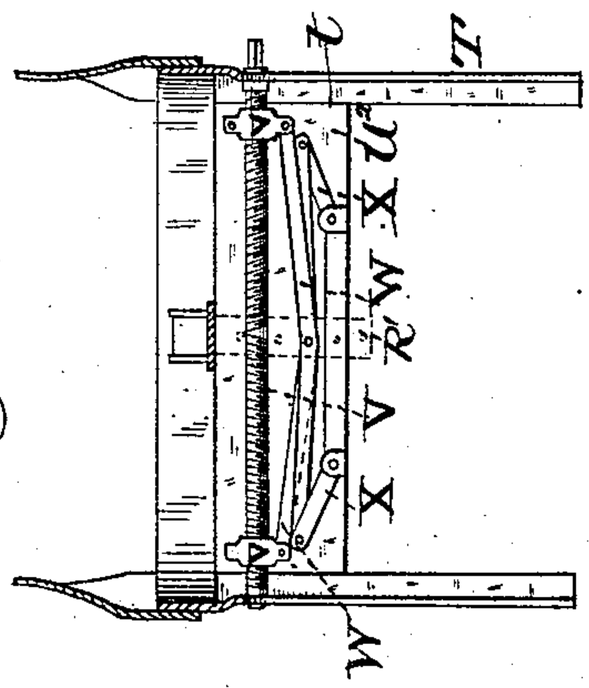
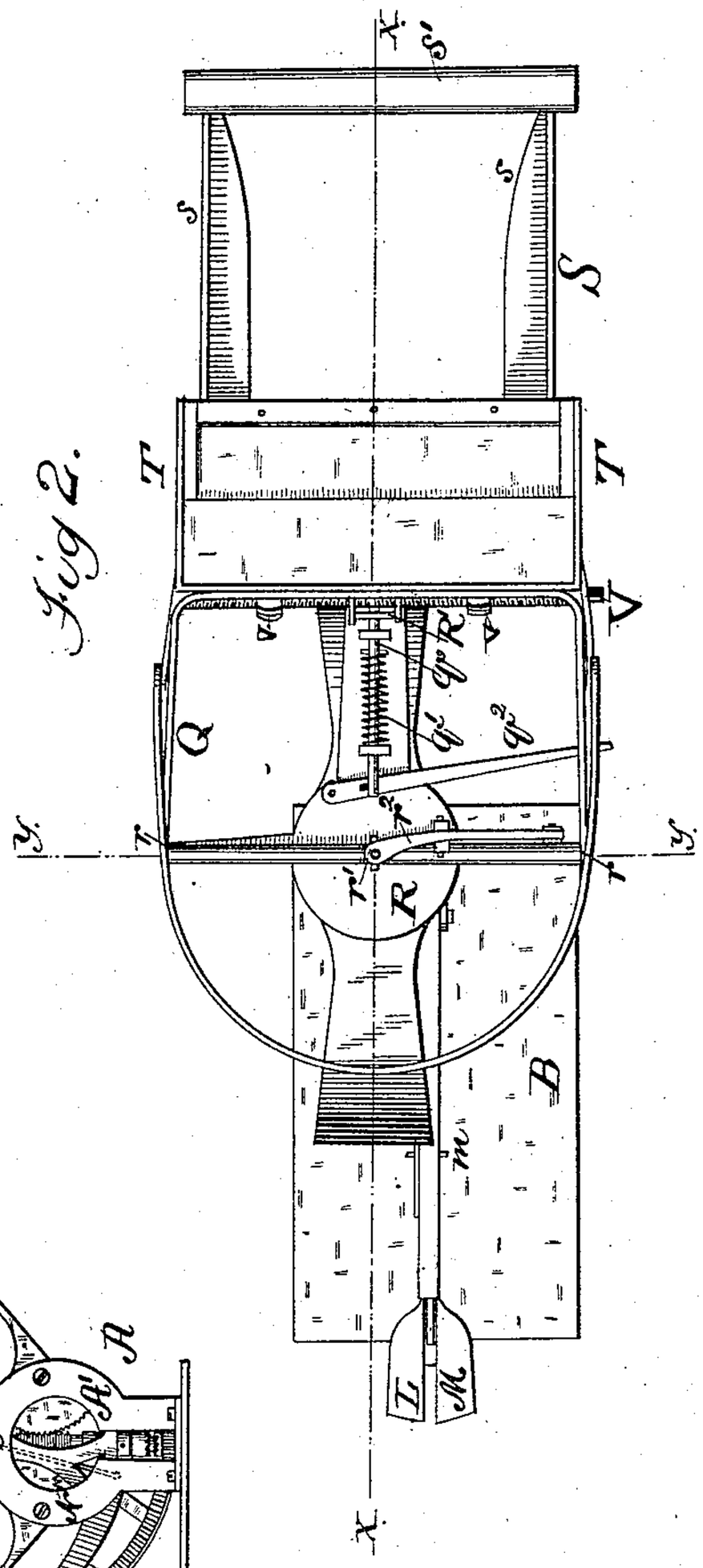


Fig 2.



Attest;
Charles Fowler
Wm J. Peyton.

Inventor;
Otis C White,
by his attys
Baldwin, Hopkins & Peyton

(Model.)

4 Sheets—Sheet 2.

O. C. WHITE.

DENTIST'S CHAIR.

No. 316,100. Patented Apr. 21, 1885.

Fig. 3.

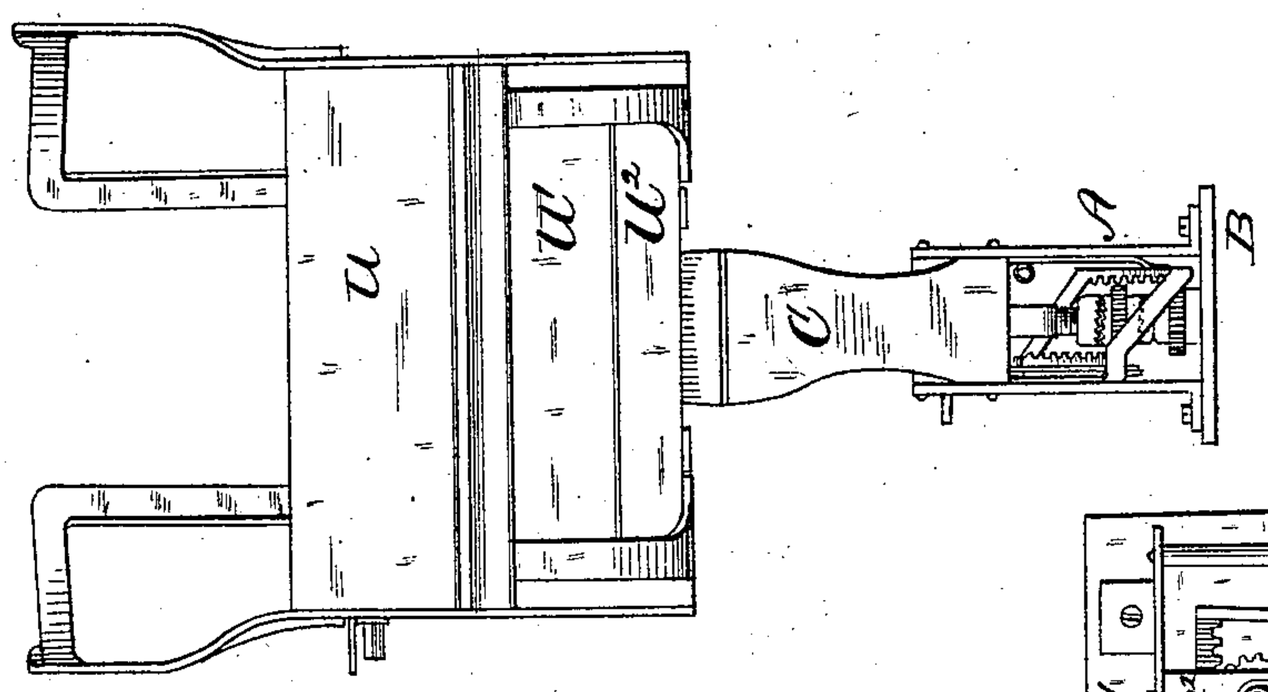


Fig. 10.

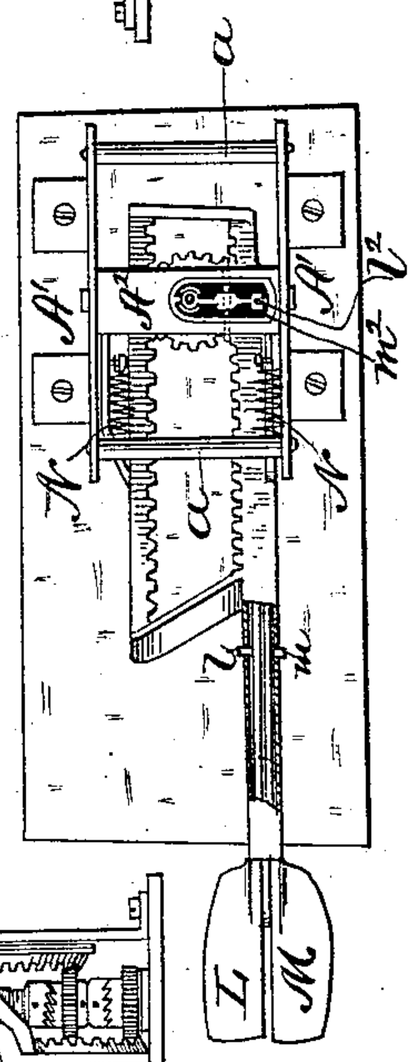
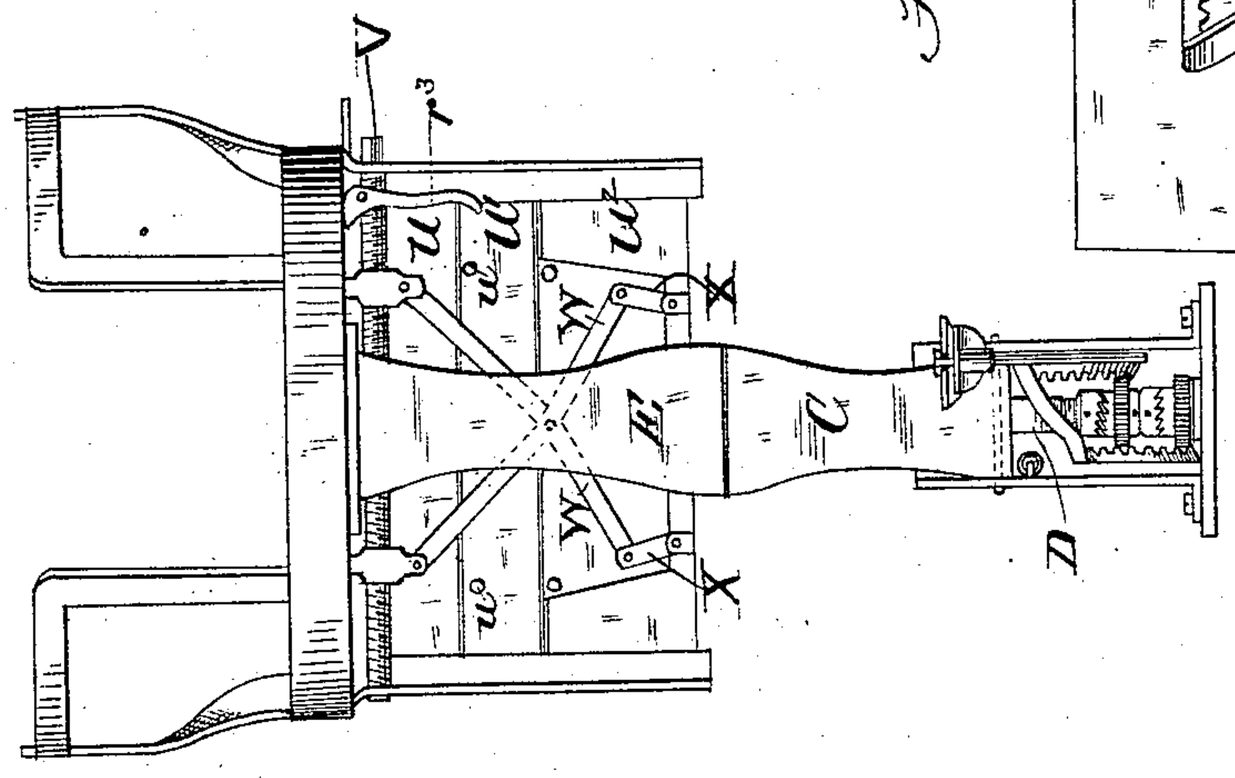


Fig. 4.



Attest;
S. Wales Fowler.
Wm. J. Peyton.

Inventor;
Otis C. White,
by his attys
Baldwin, Hopkins & Peyton.

(Model.) 4 Sheets—Sheet 3.

O. C. WHITE.

DENTIST'S CHAIR.

No. 316,100. Patented Apr. 21, 1885.

Fig. 6.

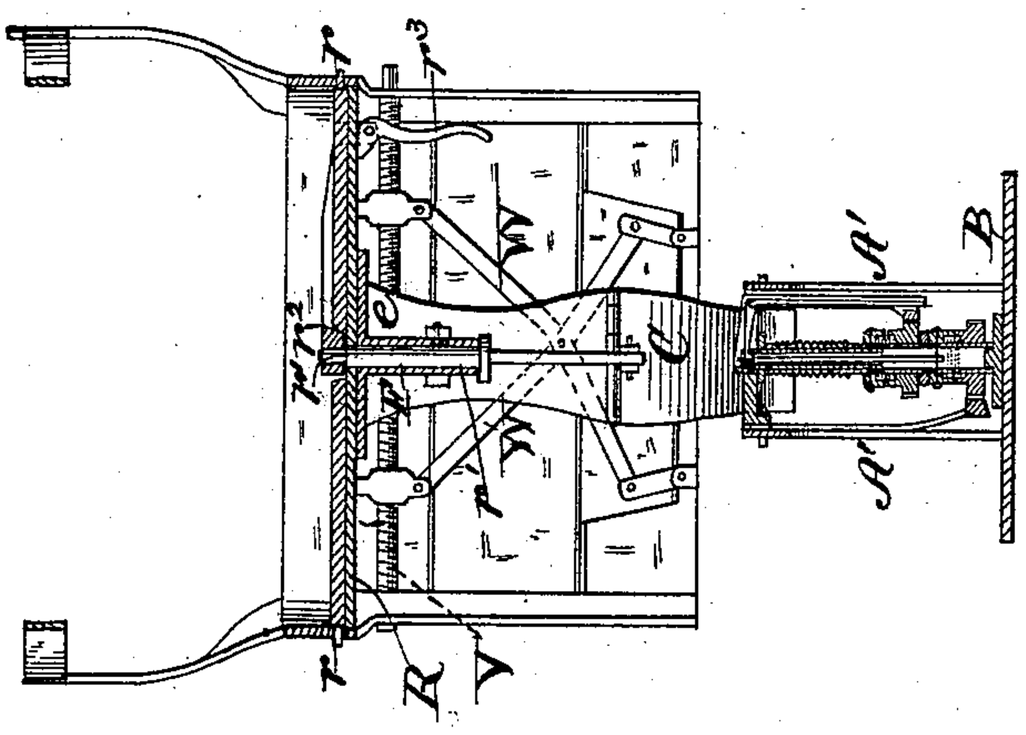
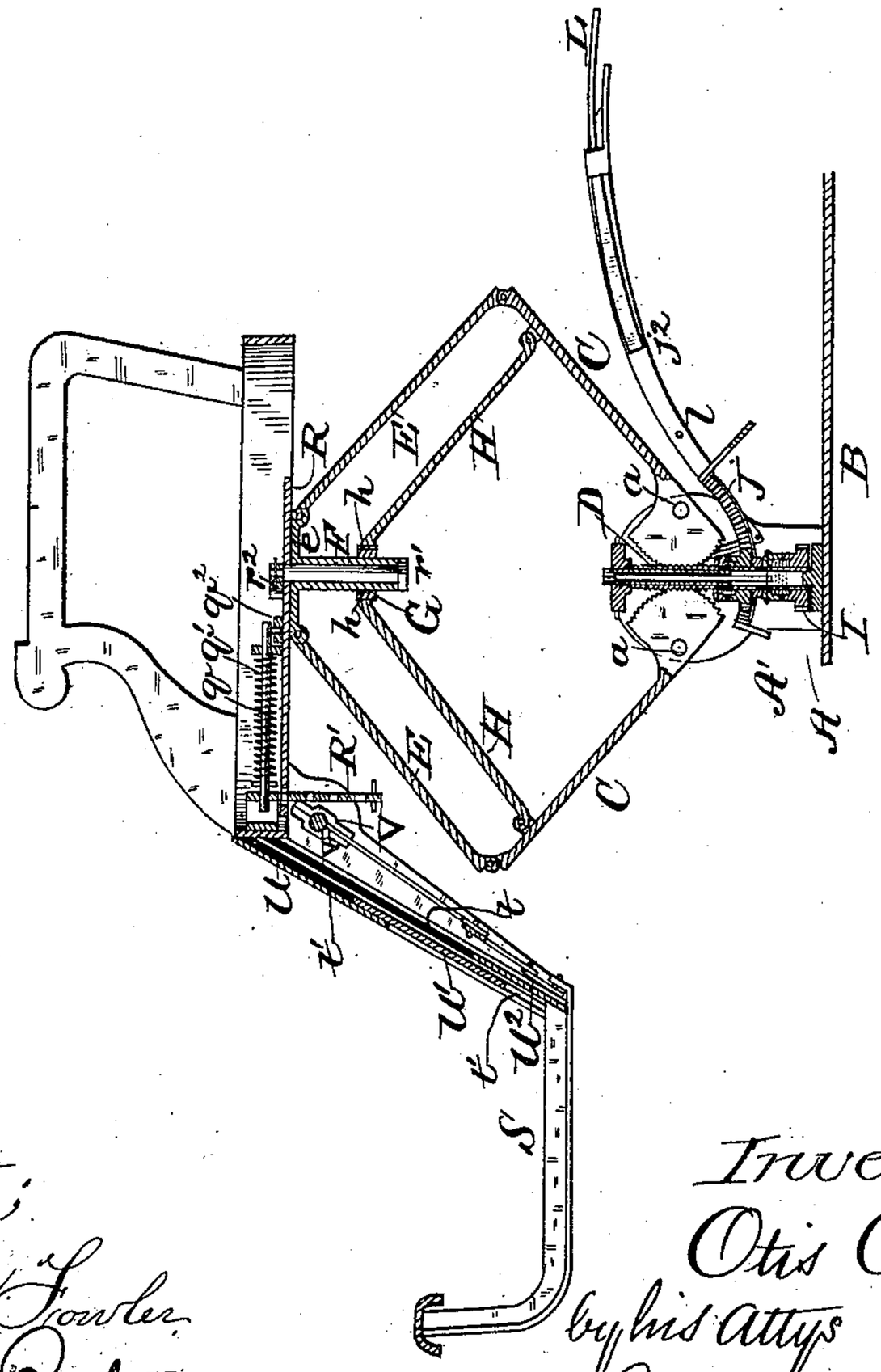


Fig. 5



Attest;
Fr Gaillard Fowler.
Wm. J. Peyton.

Inventor;
Otis C. White,
by his attys
Baldwin Hopkins & Peyton.

(Model.)

4 Sheets—Sheet 4.

O. C. WHITE.

DENTIST'S CHAIR.

No. 316,100. Patented Apr. 21, 1885.

Fig. 8.

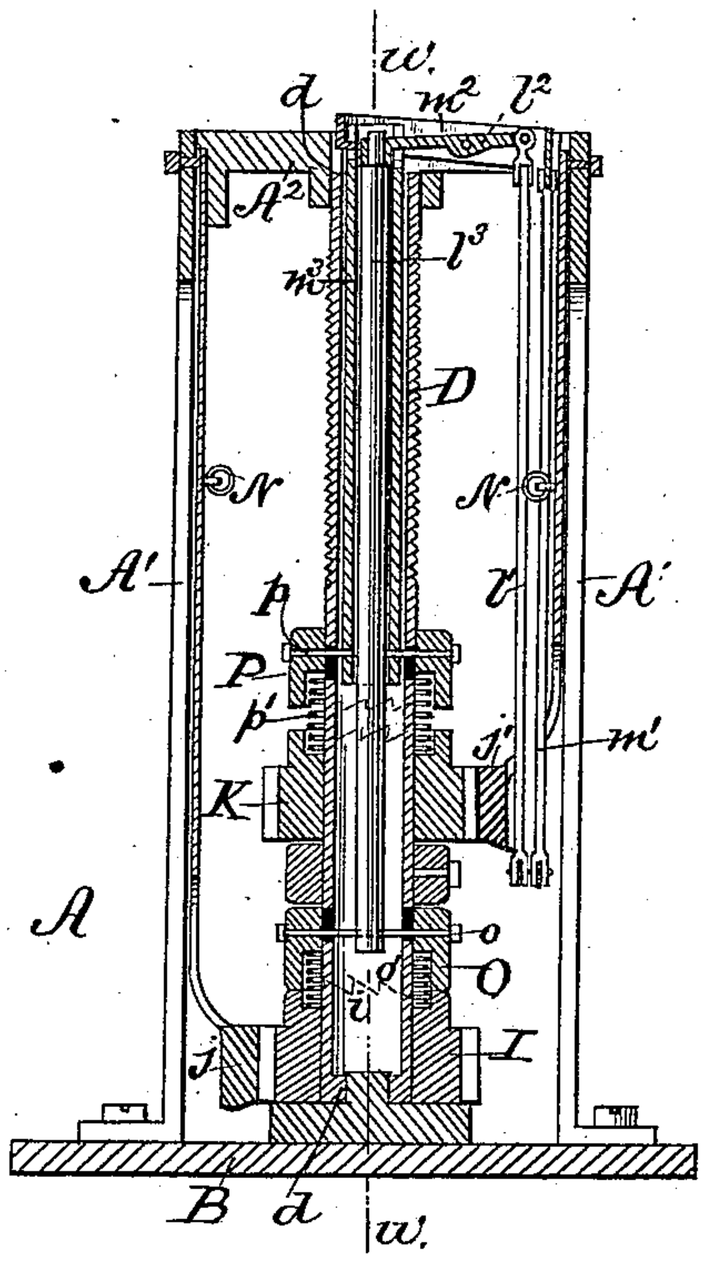
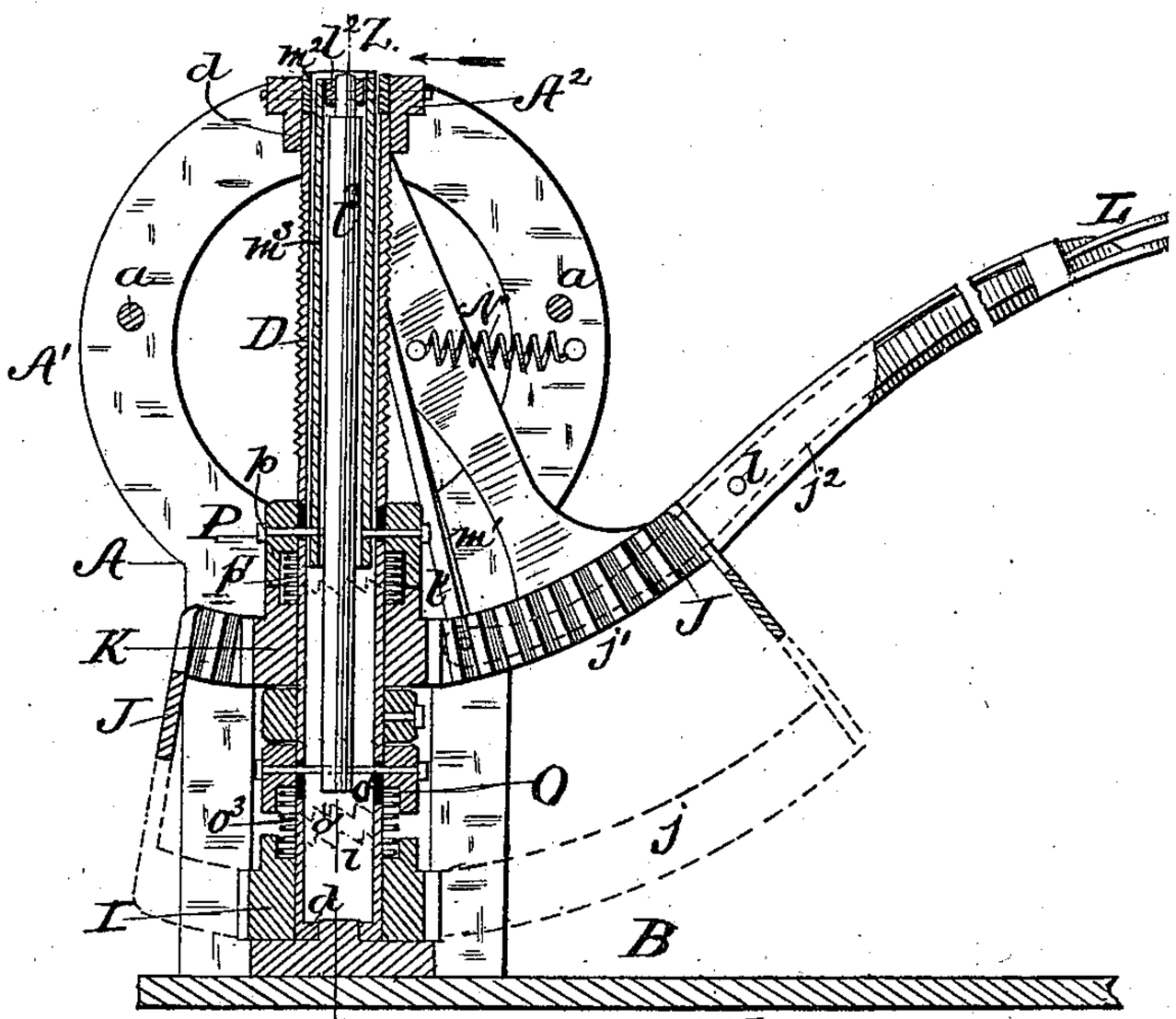


Fig. 9.



Attest;
Charles Fowler,
Wm. J. Payton

Inventor;
Otis C. White,
by his attys
Baldwin, Hopkins & Peyton.

UNITED STATES PATENT OFFICE.

OTIS C. WHITE, OF HOPKINTON, MASSACHUSETTS.

DENTIST'S CHAIR.

SPECIFICATION forming part of Letters Patent No. 316,100, dated April 21, 1885.

Application filed April 16, 1883. (Model.)

To all whom it may concern:

Be it known that I, OTIS C. WHITE, of Hopkinton, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Dentists' Chairs, of which the following is a specification.

My invention relates to adjustable chairs, more especially organized for the use of dentists to facilitate their operations.

The objects of my improvements are, first, to provide an improved lift for the body of a chair, whereby it may be elevated or lowered with ease and rapidity by means of a pedal-lever operated by the foot of the operator, the operations of the lift being certain and effective and without jar to the patient, while the operations of the lift are also quiet and smooth; second, to so organize the elevating mechanism of the body of the chair as to enable the chair-body to be brought down very low or be elevated very high; or, in other words, my object is to give the chair-body a wider range of adjustability vertically than has heretofore been possible with a successful elevating apparatus; third, to provide means for revolving the chair-body relatively to the base or elevating apparatus, so as to enable the chair-body and patient seated therein to be turned around or adjusted horizontally; and, further, to so mount the chair-body as to enable it to be readily inclined or tipped in a backward and forward direction and securely locked in its adjusted position; and, fourth, to so organize the foot-board of a chair as to give it and the foot-rest carried thereby a wide range of vertical adjustment, and to accomplish its adjustment by positive and efficient means with ease and rapidity.

The subject-matter claimed herein as my invention is first fully described and then particularly recited at the close of this specification.

The description which follows is of the best way now known to me of embodying my improvements. It is to be understood, however, that some of my improvements may be used without the others, and in chairs differing from that particularly described herein. The details, it will be readily seen after perusing this specification, may also be varied, some of which variations will readily suggest themselves to mechanicians skilled in the construction and use of adjustable chairs.

In the accompanying drawings, Figure 1 is a view in elevation of so much of my improved chair as is necessary to illustrate the subject-matter claimed, and Fig. 2 is a plan or top view thereof, with the seat of the chair removed to expose the parts beneath. Fig. 3 is a front view of the chair with the body in an elevated position, and Fig. 4 is a rear view thereof, showing particularly the mechanism for adjusting the foot-board of the chair. Fig. 5 is a vertical central section through the chair from front to rear on the line *x x* of Fig. 2, and Fig. 6 is a similar view therethrough on the line *y y* of Fig. 2, the section being at right angles to the plane of section of Fig. 5, looking from the rear toward the front of the chair. Fig. 7 is a view of a portion of the chair-frame, with the foot-board shown as raised or adjusted to its uppermost position. Fig. 8 is a transverse section, on an enlarged scale, through the elevating apparatus of the base of the chair on the line *z z*, Fig. 9, looking in the direction of the arrow thereon, and Fig. 9 is a section therethrough on the same scale, the plane of section being taken on the line *w w* of Fig. 8, and being at right angles to that of said figure. Fig. 10 is a top or plan view of the base of the chair.

The base A of the chair in this example is shown as mounted upon the base-board or platform B; but in practice the base will preferably be inclosed and provided with feet or legs, which reach well forward and back to prevent the chair from tipping over with the occupant, or, while the occupant is getting into the seat, as usual. The base A in this instance consists of two upright side frame-pieces, A′ A′, united at their lower ends to the base-board B, and higher up by cross bars or rods *a a*, which form the fulcrum or pivots of two segmental levers, C C, said levers being mounted upon said rods *a a*, so as to turn thereon and move about them as an axis. The inner ends of these levers C C are segmental, as clearly shown, and are provided on their curved segmental edges with slightly-concaved teeth or threads to fit snugly on opposite sides of a cylindrical screw post or spindle, D, whereby, when said screw-spindle is rotated, as hereinafter explained, the levers C C will

be moved about their axes. The outer ends of said levers C C are hinged or jointed to the outer or lower ends of another pair of levers, E E, the inner or upper ends of which in turn are hinged or jointed to the plate or disk *e*, upon which the chair-body is mounted. Projecting from beneath said plate or disk *e* is a cylindrical rod, F, on which a ring, G, is fitted to slide endwise a limited distance. The upper ends of stays or brace-rods H H, by suitable yokes, *h*, are pivoted to this ring G, so as to be capable of free independent rocking movement thereon, and the lower ends of said rods are also jointed or hinged to the inside of the levers C C, near their upper ends, as clearly shown in the drawings. When the screw post or spindle D is revolved, the levers C C, by the action of the threads on the screw and the teeth or threads on said levers, are moved about their axes and cause their outer ends to move vertically either up or down, according to the direction of the rotation of the spindle, and inasmuch as the said upper or outer ends of the levers C C are jointed to the lower ends of the levers E E, said latter levers will be operated by the movement of the levers C C, so as to expand or contract and force the plate or disk *e* and the object (the chair-body) which it carries up or draw it down. The brace-rods aid materially in steadying the folding and unfolding movements of the levers C C and E E and prevent them from collapsing or swaying under the weight of the occupant when seated in the chair.

In order to operate the levers C C or move them about their axes to raise or lower the chair-body carried by the plate or disk *e* at the upper ends of the folding levers, I have provided effective mechanism for rotating the screw-spindle D in either direction at pleasure, and have further so organized this mechanism as to be operated by the foot of the operator, whereby he is enabled to raise and lower the chair while operating without using his hands or stooping for the purpose. To this end the screw-spindle D is a hollow spindle fitted at its upper and lower ends in suitable bearings, *d d*, in the base of the chair, which permit it to be rotated without endwise movement.

Loosely mounted upon the hollow screw-spindle D, near its lower end, is a pinion-wheel, I, meshing with the teeth of one arm, *j*, of a double-armed rack-frame, J, while also mounted upon said spindle, so as to rotate freely thereon, is another pinion, K, the teeth of which mesh with the teeth of the upper arm, *j'*, of said double-armed rack-frame J. These arms *j j'* of the rack-frame J are curved, and the upper end of said frame is pivoted at or near the upper end of the chair-base, so as to be capable of swinging freely when pressure is applied to said frame to move it about its pivots or axes. This rack-frame constitutes a part of a pedal-lever, the extended arm j^2 of which reaches backward, so as to enable the foot of the dentist to be readily applied thereto to vibrate the rack-frame, and, as will presently appear, elevate or lower the chair. This pedal-lever at its outer end is fitted with two independently-pivoted pedals, L M, and vibrating or operating the pedal-lever through the instrumentality of pressure applied to either one or the other of these pedals determines, as will hereinafter appear, whether the chair-body is to be elevated or lowered. A spring, (or springs,) N, acts upon the pedal-lever, so as to keep it in a normal position with its outer or pedal end elevated, in readiness for a depression by the foot of the operator, either to elevate the chair or permit it to be lowered, and said spring or springs, when the pressure of the foot is removed, automatically returns the pedal-lever to its normal position. Were the pedal-lever, of which the rack-frame J constitutes a major part, vibrated about its axis by pressure applied at some other point than upon one of the pedals L M, the rotation of the pinions I and K around the spindle-shaft D would take place without affecting said spindle D, because the pinions would revolve loosely upon their axes.

In order to cause the rotation of either the pinion I or the pinion K, due to the vibration of the rack-frame or pedal-lever, to act upon the screw-spindle and revolve it as the pinion is revolved, I have provided independent clutch devices for the said pinions, one of the clutches being controlled by the pedal L and the other by the pedal M, whereby when pressure is applied by the foot of the operator to the pedal L to vibrate the pedal lever or frame J the pinion I, for instance, will be clutched with the spindle D, while if pressure is applied to the pedal M to rock the pedal-lever J about its axis the pinion K will be clutched to said spindle, so as to rotate it as the pinion K is rotated. As these pinions I and K are rotated in opposite directions by the vibration of the pedal-lever or rack-frame, it will be seen that the direction of rotation of the spindle D, and consequently the direction of movement of the elevating-levers C C, E E, and of the chair-body carried thereby, would depend upon which pedal receives the pressure of the operator's foot. These clutches in this instance are of the ordinary ratchet-clutch type, and their particular organization, as shown in this illustration of my improvements, I will now describe. The lower clutch, O, is fitted upon the spindle D, so as to be capable of slight endwise movement, but is incapable of turning independently of the spindle. The connection of the clutch and spindle is formed by a pin, *o*, which passes through the clutch-sleeve and through longitudinal slots in the walls of the spindle. (Clearly shown in Figs. 8 and 9.) The clutch-teeth *o'* are opposed to similar teeth, *i*, on the upper edge of the hub of the pinion I, and when the clutch is engaged with the pinion the two are rigidly connected together by a firm and positive driving-connection, and con-

sequently the rotation of the pinion I by the vibration of the pedal-lever J causes the motion of the pinion to be imparted to the spindle, and by the threads of the latter to the elevating-levers C C E E. The clutch O is connected with the pinion I each time the pedal L receives the pressure of the foot of the operator in vibrating the pedal-lever J, said pedal L being pivoted upon the pedal-lever J, at *l*, for instance, and connected at its inner end by a pivoted link, *l'*, and lever l^2 with the rod l^3, the latter extending down through the hollow spindle D, and connected to the clutch by the through-pin *o* above mentioned. A spring, o^3, interposed between the clutch and pinion, keeps the two normally separated and the pedal L in an elevated position. The result of this organization is that as soon as the pressure commences upon the pedal L the pedal is rocked down upon the pedal-lever, and the clutch O is moved down into connection with the pinion I, and as the pinion is revolved by the movement of the pedal-lever the spindle D is also revolved, and the result of its revolution in this example is to elevate the chair-body. The upper clutch, P, like the clutch O, is mounted upon the hollow spindle D, so as to be movable endwise, but be incapable of rotation independently of the spindle. This clutch P is thrown into engagement with the teeth of the pinion K when the pedal-lever J is depressed by the pedal M, the connection between the pedal M, which is pivoted, for instance, at *m*, being by a similar arrangement to that before described in connection with the clutch O—to wit, a pivoted link, *m'*, pivoted lever m^2, and hollow rod m^3. The upper end of the latter rod is connected with one end of the lever m^2, while its lower end is connected with the clutch P by a through-pin, *p*, which connects the clutch P with the spindle D. A spring, *p'*, is also interposed, as in the first instance, between this clutch and its pinion, to normally keep the two separated and the pedal M elevated on the pedal-lever.

The hollow rod m^3 is contained within the hollow spindle D and surrounds the rod l^3, above described, as a part of the operating connection of the clutch O. The pivoted levers l^2 and m^2 are in this instance pivoted in an opening in the cross-bar, A^2, which connects the upper ends of the side frames A' A', of the base or standard. Fig. 10 shows a plan view of these lever-connections. The operation of the screw-spindle D by the pedal M causes its rotation in a reverse direction to that caused by the depression of the pedal-lever by the pedal L—that is to say, it causes the lowering operation of the chair-body in this organization.

It will be obvious that a friction-lever and friction-gear applied to the spindle D might be substituted for the toothed pedal-lever and tooth-pinions with the same result and without a departure from my invention.

The chair-body is mounted by its seat-frame Q upon trunnions *r r* at the side of the revolving frame plate or spider R, as usual, so as to be capable of rocking freely backward and forward to enable the dentist to incline or tilt the patient to the desired angle of inclination, and the chair is maintained in this adjusted position by means of a sliding detent-rod, *q*, carried by the revolving plate R, the rod being thrust in one direction by a spring, *q'*, and retracted by a pivoted lever, q^2, the handle end of which extends outward to the side of the chair within convenient reach of the dentist. The detent-rod engages one of a series of holes formed in a depending lug or plate, R', attached at its upper end to the front side of the seat-frame, as clearly shown in Fig. 5, and by this means the chair-body may be tilted to any desired angle and securely locked in its adjusted position. Horizontal adjustability is given to the chair-body by mounting it upon the elevating devices through the instrumentality of the revolving plate or spider R. This plate is connected to the disk *e* of the elevating devices by a loose central pin or bolt, *r'*, extending through said plate and disk and through the guide-sleeve F on the latter, the pin or bolt being provided with a head to fit against the lower end of said guide-sleeve F, and connected at its upper end to the inner end of the lever r^2, pivoted upon the plate R and acted upon at its outer end by a cam-lever, r^3, at the side of the chair. By this cam-lever the outer end of the lever r^2 is rocked downward, and this draws the head of the bolt *r'* firmly up against the end of the rod F, and thereby clamps the plate R and disk *e* firmly together.

It only remains to describe my improvements in the foot-board and foot-rest and the devices for manipulating them.

The foot-board is supported by the frame S, as usual. I have omitted to show the board in the drawings. It will occupy the space between the two side arms, *s s*, and front rail, *s'*, of the foot-board frame S, as usual. Said frame is fitted at its sides to slide in guides or grooves *t* at the sides of the front portion, T, of the frame of the chair. The space between the rails T is composed of panels or sections—in this example three such sections, U, U', and U^2. These sections, together with the side frame, T, make up the inclined front portion or apron of the chair. The upper panel or section, U, is rigidly connected to the side frames, T. The section U' is fitted to slide vertically in guides or grooves *t'* in said side frames, T, while the third section, U^2, is rigidly united to the frame S, so as to be adjustable up and down therewith. When the adjustable sections U' U^2 of the apron are extended, as in Figs. 5 and 6, it is intended that the distance of the foot-board from the seat of the chair shall be ample for the comfort of long-limbed patients, while for patients having shorter limbs the board is adjustable vertically. This range of adjustment is wider than heretofore obtained, and the foot-board

can be brought up nearly to the edge of the seat, as seen by Fig. 7. This vertical adjustment of the foot-board and foot-rest carried thereby I have accomplished by the rotation of a screw-rod, V, by means of a suitable crank or handle. This screw-rod V has right and left hand screw-threads cut or formed upon it, each series of threads commencing from about the center of the rod and extending outward to its ends, as clearly shown in Fig. 7. Internally-threaded heads *v v* are mounted upon this rod, so as to be reciprocated or moved back and forth on the rod by its rotation. The lower ends of the heads *v v* are connected to the upper ends of preferably bent links W W, the lower or opposite ends of which are jointed to the inner side of the foot-board by means of shorter links X X. The links W W, at or about their center, are pivoted together, and this pivot constitutes the fulcrum of the links. When the screw-threaded heads *v v* are close together or near the center of the rod, the links W W assume a nearly vertical position, as shown in Figs. 4 and 6, for example. Now, by rotating the screw V in the right direction, the heads *v v* will be moved apart by the action of the threads of the screw, inasmuch as said heads cannot turn with the screw-rod V, and this will cause the upper ends of the links to spread apart, and consequently, as the links do not descend, will cause their lower ends to move upward and carry the foot-board frame S and panel U^2 with them. The upper edge of the said panel U^2 of the foot-board, as the foot-board is moving upward, comes in contact with projecting lugs or pins *u u* on the back of the independently-sliding panel or section U′, and slides said section vertically upward. The spreading of the links W W may continue to the limit of their movement, which will result in elevating the foot-board frame S to the position shown in Fig. 7, the panels U, U′, and U^2 being brought up parallel with each other. This adjustment may be effected with ease and rapidity. By bending the links W W, I get a wider range of movement upward than would be the case were the links straight. In the organization shown the foot-board may be brought up very nearly to the level of the seat of the chair.

It will be understood, of course, that instead of one independently-sliding panel or section U′ more than one may be employed, so as to get a still wider range of adjustment of the foot-board vertically. Of course the chair will be provided with a suitable back and head-rest, and will be suitably upholstered and otherwise finished in the usual or in any preferred manner.

I claim as of my invention—

1. The combination, substantially as hereinbefore set forth, of the supporting-frame, the rotatable spindle mounted therein, the gear carried loosely by the spindle, the clutch for rigidly connecting the gear with the spindle, and the pedal-lever provided with a segmental gear engaging with the gear on the spindle.

2. The combination, substantially as hereinbefore set forth, of the supporting-frame, the rotatable spindle mounted therein, the independent gears carried loosely by the spindle, the pedal-lever provided with a pair of segmental gears engaging with the gears on the spindle, the clutch mechanism, the independent pedals carried by the pedal-lever, and connections between the clutch mechanism and the pedals for rigidly connecting the gears with the spindle.

3. The combination, substantially as hereinbefore set forth, of the supporting-frame, the rotatable spindle mounted therein, the gear carried loosely by the spindle, the clutch for rigidly connecting the gear with the spindle, the pedal-lever provided with a segmental gear engaging with the gear on the spindle, and the springs for returning the lever to its normal position.

4. The combination, substantially as hereinbefore set forth, of the supporting-frame, the screw-spindle mounted therein, the independent gears carried loosely by the spindle, the clutch mechanism for connecting said gears rigidly with the spindle, the pedal-levers provided with segmental gears engaging with the gears on the spindle, the independent pedals carried by the pedal-lever, the connections between the pedals and the clutch mechanism for rigidly connecting the gears with the spindle, and the levers mounted in the supporting-frame that engage with the screw-spindle and are raised and lowered thereby.

5. The combination, substantially as hereinbefore set forth, of the supporting-frame, the rotatable screw-spindle mounted therein, the pedal-lever provided with segmental gearing engaging with the spindle, the chair-body, and the pivoted levers arranged between the chair-body and the spindle, for the purpose specified.

6. The combination, substantially as hereinbefore set forth, of the supporting-frame, the rotatable screw-spindle mounted therein, the pedal-lever provided with segmental gearing engaging with the spindle, the chair-body, the levers C, provided with segments that engage with the spindle, and the levers E, that are jointed to the levers C, and are connected with the chair-body.

7. The combination, substantially as hereinbefore set forth, of the supporting-frame, the chair-body, the two sets of levers jointed together, and also jointed to the supporting-frame and to the chair-body, the stay-rods jointed at one end to one set of said levers, the collar connecting the other ends of said rods, and the guide F on which the collar slides.

8. The combination, substantially as hereinbefore set forth, of the chair-body, its rising and falling supporting-frame, the loosely-seated bolt that connects the chair-body to its frame, and on which the chair-body turns, a pivoted lever attached at one end to the bolt, and a pivoted cam-lever attached thereto that

bears against the chair-body and rocks the lever, thereby tightening or loosening the bolt in its seat, for the purpose specified.

9. The combination, substantially as hereinbefore set forth, of the chair-body, the foot-rest, and a sliding section or panel between the chair-body and foot-rest.

10. The combination, substantially as hereinbefore set forth, of the chair-body, the foot-board, the two panels arranged between the foot-board and the chair-body, and the sliding section or panel interposed between the other panels.

11. The combination, substantially as hereinbefore set forth, of the chair-body, the foot-board, the levers, screw-rods, and nuts for elevating the foot-board, the independently-sliding section or panel, and the lugs or projections on the panel, with which the foot-board engages when it is moved vertically, for the purpose specified.

In testimony whereof I have hereunto subscribed my name this 11th day of April, A. D. 1883.

OTIS C. WHITE.

Witnesses:
WM. J. PEYTON,
EUGENE V. BROWN.