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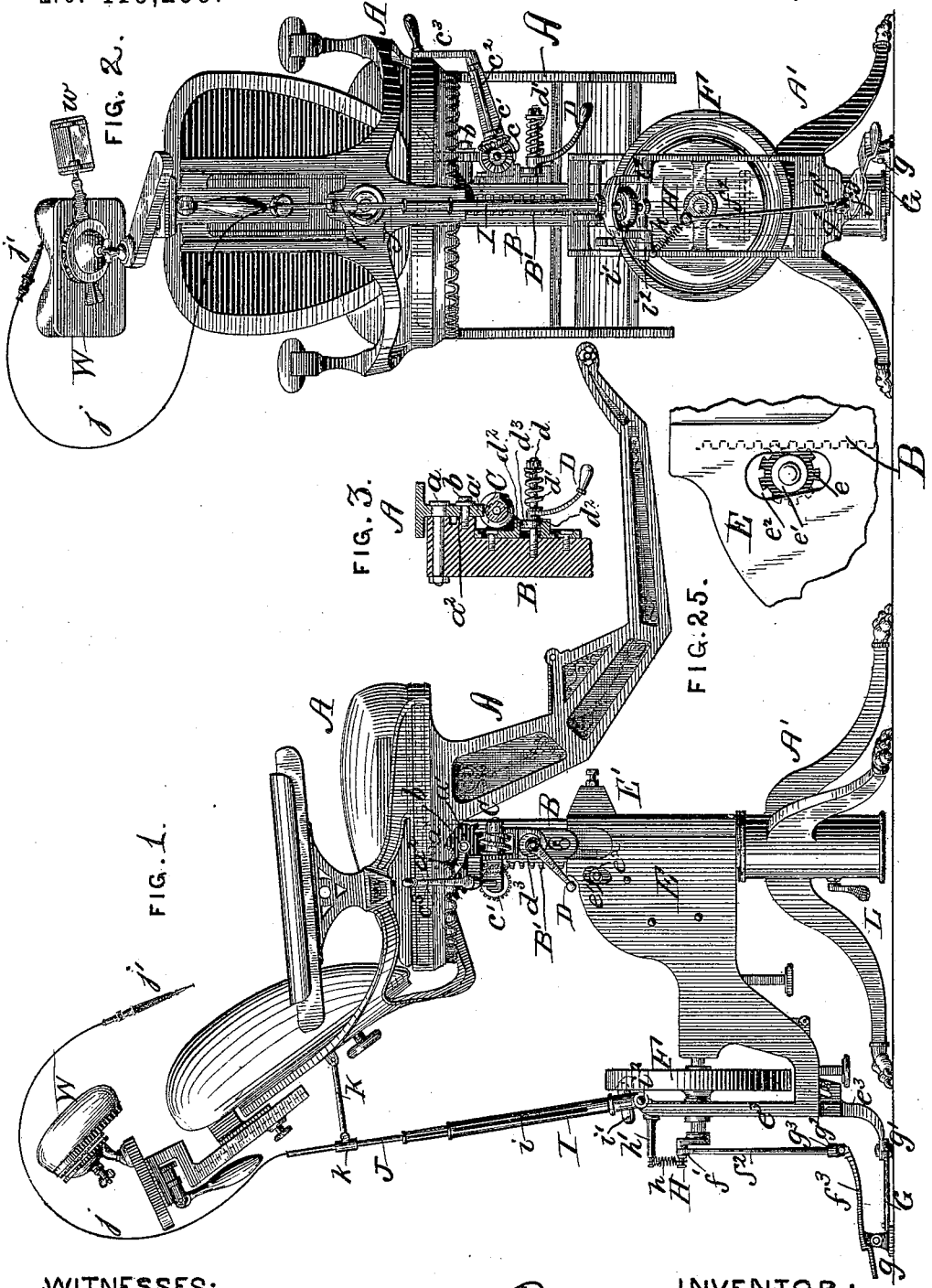
B. M. WILKERSON.

DENTAL CHAIR.

No. 419,299. Patented Jan. 14, 1890.



WITNESSES:

Geo. A. Vaillant.

Cecil Morgan.

INVENTOR:

Basil M. Wilkerson,

by his Atty Wm. J. Egan.

(No Model.) 4 Sheets—Sheet 2.

B. M. WILKERSON.

DENTAL CHAIR.

No. 419,299. Patented Jan. 14, 1890.

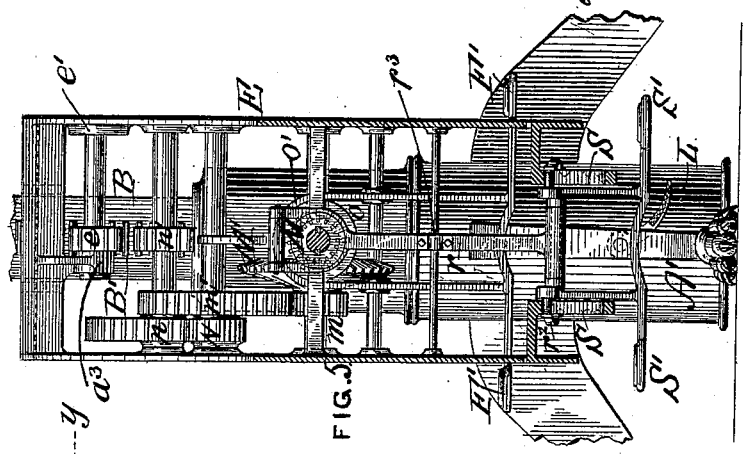


FIG. 3.

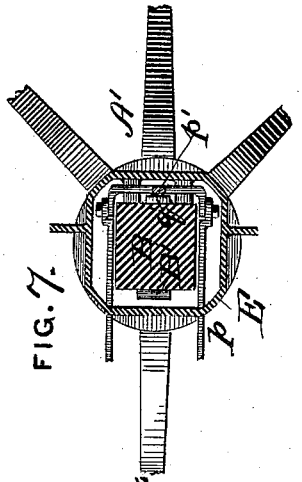


FIG. 7.

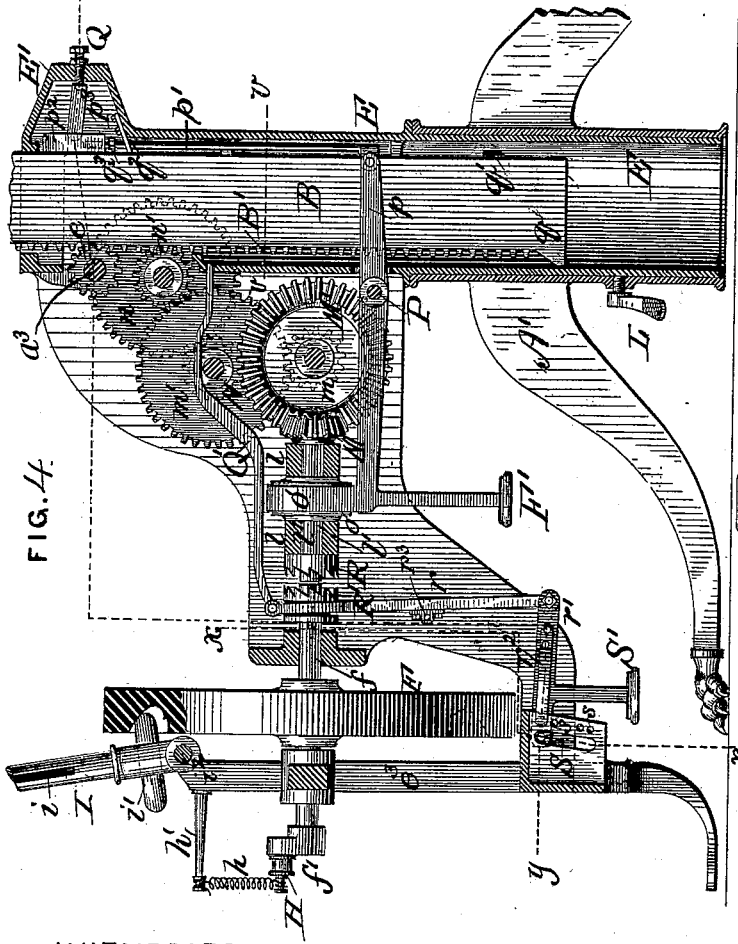


FIG. 4.

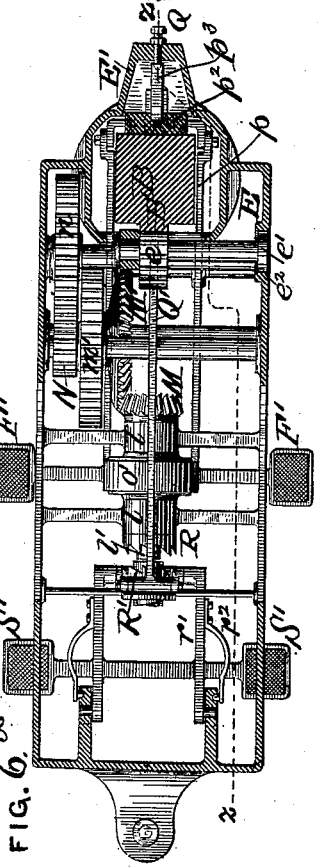


FIG. 6.

WITNESSES:

Geo. A. Vaillant

Cecil Morgan

INVENTOR:

Basil M. Wilkerson,

by his Atty

Wm. P. Taylor

(No Model.) 4 Sheets—Sheet 3.

B. M. WILKERSON.

DENTAL CHAIR.

No. 419,299. Patented Jan. 14, 1890.

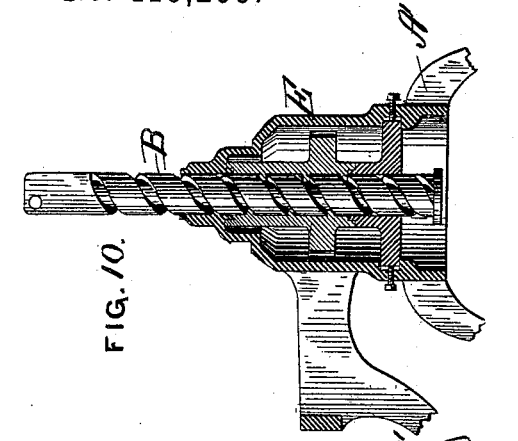


FIG. 10.

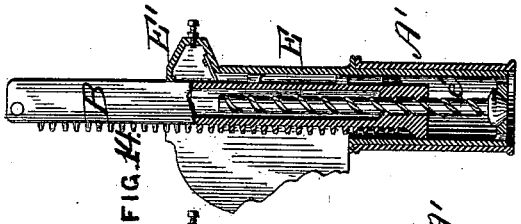


FIG. 14.

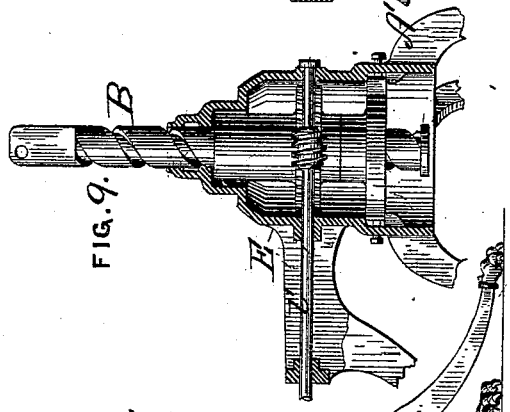


FIG. 9.

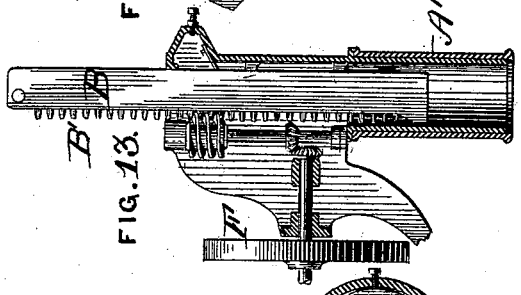


FIG. 13.

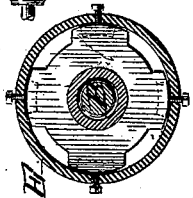


FIG. 12.

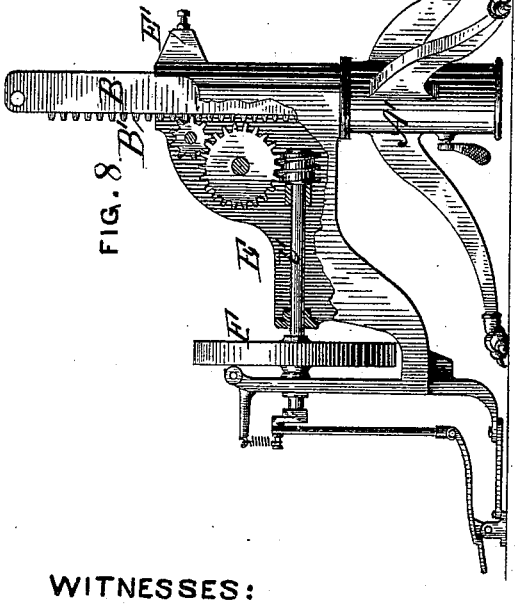


FIG. 8.

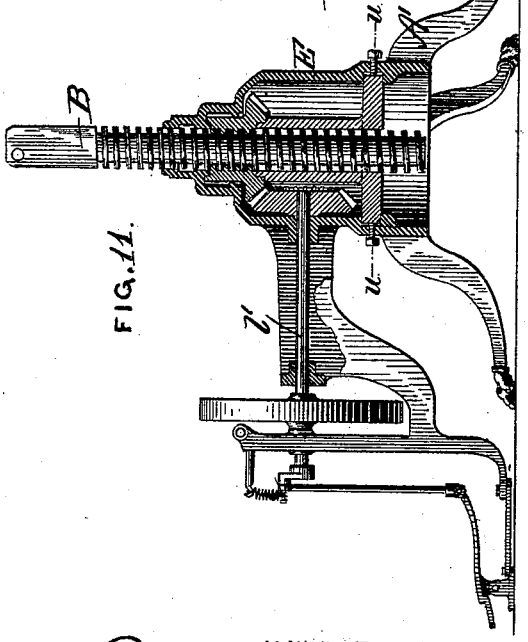


FIG. 11.

WITNESSES:

Geo. A. Vaillant.

Cecil Morgan.

INVENTOR:

Basil M. Wilkerson,

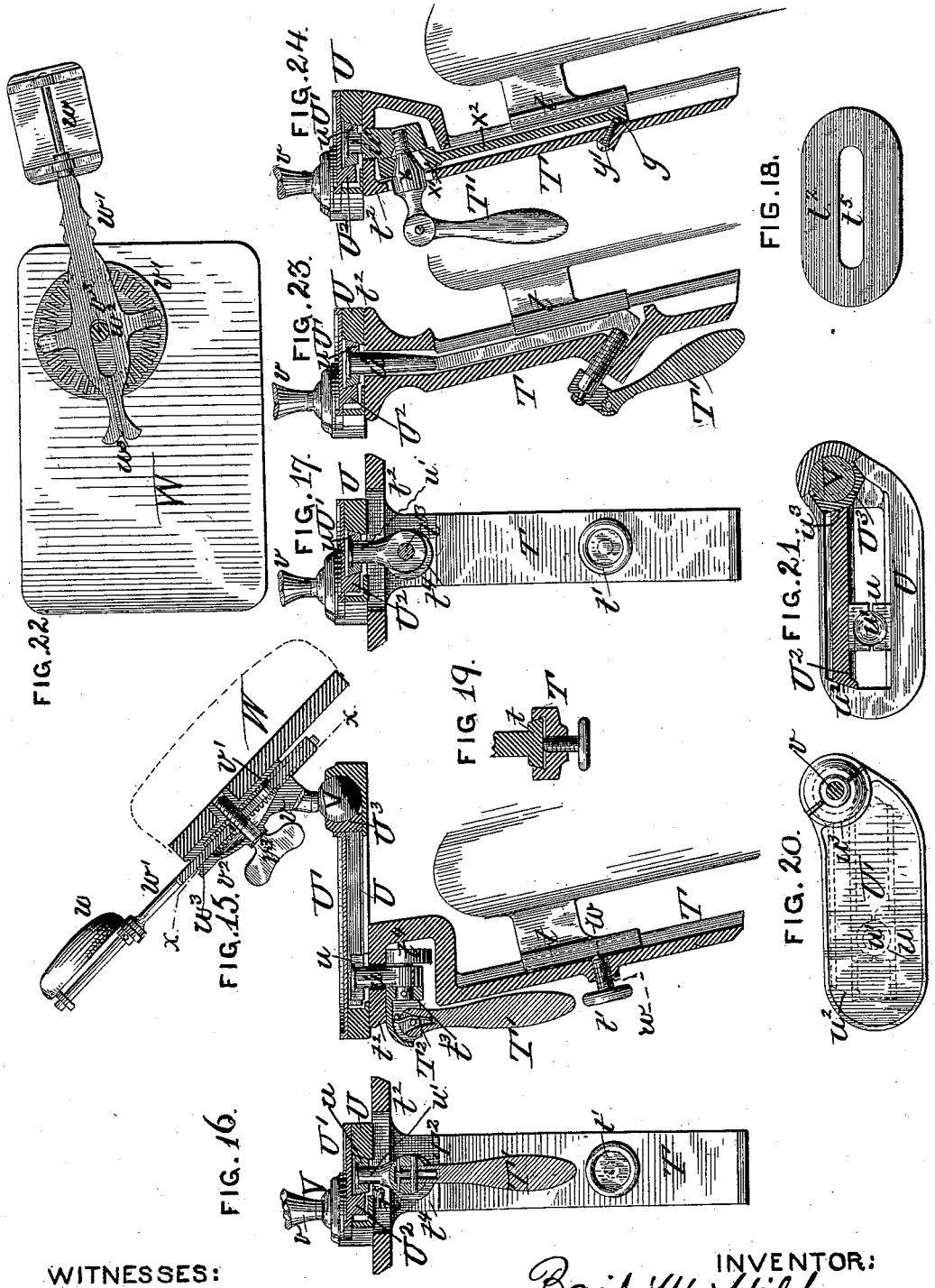
by his Atty Wm. S. Peyton.

(No Model.) 4 Sheets—Sheet 4.

B. M. WILKERSON.

DENTAL CHAIR.

No. 419,299. Patented Jan. 14, 1890.



WITNESSES:
Geo. A. Vaillant.
Cecil Morgan.

INVENTOR:
Basil M. Wilkerson,
by his atty
W. J. Peyton.

UNITED STATES PATENT OFFICE.

BASIL M. WILKERSON, OF BALTIMORE, MARYLAND, ASSIGNOR TO THE S. S. WHITE DENTAL MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA.

DENTAL CHAIR.

SPECIFICATION forming part of Letters Patent No. 419,299, dated January 14, 1890.

Application filed October 11, 1887. Serial No. 251,982. (No model.)

To all whom it may concern:

Be it known that I, BASIL M. WILKERSON, of the city of Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Dental Chairs, of which the following is a specification.

My present invention relates to improvements in dentists' chairs, which in some respects include features the same as or more or less nearly resembling parts shown and described in my prior applications, Nos. 7,392 and 8,822, respectively filed December 21, 1877, and March 14, 1879; and it consists in certain novel constructions and combinations of mechanism made the subject of claims based upon the following description, with reference to the accompanying drawings, in which—

Figure 1 is a side elevation of the chair. Fig. 2 is a rear elevation thereof. Fig. 3 is a sectional view of the tilting mechanism. Fig. 4 is a side elevation, partly in section, on the line *z z* of Fig. 6, showing the elevating mechanism. Fig. 5 is a vertical section on the line *x x* of Fig. 4; and Fig. 6 is a horizontal section on the line *y y*, Fig. 4. Fig. 7 is a cross-section through the supporting-plunger and surrounding parts on the line *v v*, Fig. 4. Fig. 8 is a side elevation, partly in section, of a modification of the elevating mechanism. Fig. 9 is a similar view of another modification thereof, and Fig. 10 is a vertical section of the elevating mechanism of Fig. 9. Fig. 11 is an elevation, partly in section, of still another modification of the elevating mechanism; and Fig. 12 is a section through the mechanism of Fig. 11 on the line *u u* of said figure. Fig. 13 is a view of another modification of the elevating mechanism; and Fig. 14 is an elevation, partly in section, of a modification of the automatic brake or lowering mechanism. Fig. 15 is a vertical sectional view of the head-rest and its attachments. Figs. 16 and 17 are transverse sectional views of the same, and Fig. 18 is a plan view of the supporting-bar. Fig. 19 is a cross-section of the supporting-bar on the line *w w* of Fig. 15. Figs. 20 and 21 are respectively plan and sectional views of the swinging and sliding link of the head-rest devices. Fig. 22 is a rear elevation of the head-rest pad and some of its connections. Figs. 23 and 24 are sectional views of modified forms of the clamp actuating or locking devices of the head-rest. Fig. 25 is a view in elevation, showing a portion of the casing or housing and details of the rotary friction-brake mechanism.

A is the chair frame or body, which is mounted upon a suitable base A′ and is pivoted at *a* to one side of the vertically-adjustable support or plunger B. The chair-frame carries a gear-rack *a′*, curved in the arc of a circle described about the pivot *a* as a center, and through the rack-plate of the chair-frame passes a screw *b*, holding the plate closely, but without binding, against lugs formed on the side of the plunger, (see Fig. 3,) a slot a^2 being formed in the plate for the passage of the screw *b* to allow of a rocking movement of the chair-frame about its pivot *a*. A worm-gear C, mounted in suitable bearings secured to the plunger, engages with the segmental rack-plate *a′*. The worm-gear shaft carries a bevel gear-wheel *c*, which engages with a similar wheel *c′* upon the shaft c^2, which has attached a crank c^3, and has its bearings carried by the chair-frame. Upon turning the crank, motion is communicated to the worm, which, meshing with the teeth upon the segment-plate *a′*, causes the chair-body to tilt in a vertical plane upon the pivot *a*. The angle of inclination of the chair-body is thus readily adjusted as may be desired.

Inasmuch as it is sometimes required to tilt the chair-body more rapidly than can conveniently be done by rotating the crank c^3, mechanism is provided for throwing the worm C out of gear with the segmental gear-rack, and consists of the following elements: A stud-shaft *d* (see Fig. 3) is rigidly attached to the plunger B, and upon it is mounted an eccentric-wheel d^3, to which is attached a lever or handle D. The eccentric-wheel rotates between lugs or bearing projections d^2 above and below it upon a bracket or plate adjustable upon the plunger and carrying the bearings for the worm-wheel. The worm-carrying bracket is rendered adjustable by being slotted, so that it may slide up and down upon the screws that attach to it the plunger B. The stud *d* carries a spring *d′*, that engages with the lever D and normally holds the worm

and rack gearing in engagement. Upon depressing the lever the worm is carried down, leaving the chair-body free to be rapidly tilted upon its pivot *a* by direct application of force. As the lever is released, the worm again rises, gearing with and securing the segment-rack to maintain the chair-frame as adjusted.

The parts thus far described relate to the tilting mechanism and constitute the first part of my invention. The second part of my invention, next to be described, relates to the mechanism for elevating and lowering the chair-body.

E is a housing or casing which contains the mechanism for vertically moving the chair-body, and is mounted on the base A′, in which it is capable of rotation. A screw actuated by a lever L passes through the base and is adapted to clamp the casing, when desired, to prevent rotation. The plunger B slides vertically in the front of the casing E and has on its rear side a gear-rack B′.

Within the casing is mounted in suitable bearings *l l* a shaft *l′*, carrying a small bevel gear-wheel M, which meshes with a similar but larger wheel M′. Upon the shaft of the latter is a pinion *m*, that drives a wheel *m′*, whose shaft also carries a pinion N, that drives the large wheel *n*. The pinion *n′*, mounted upon the shaft of the latter, engages with the rack B′.

The construction and arrangement of the train will readily be understood from Figs. 4, 5, and 6 of the drawings, whence it will be seen that as shaft *l′* is revolved the plunger is raised or lowered. Above the pinion *n′* is a second pinion *e*, which also engages with the rack and has a disk *e′* fixedly mounted on its shaft at the end thereof opposite that to which the pinion is secured. This shaft is allowed slight up-and-down and sidewise play in its bearing a^3 adjacent to the pinion. The disk is likewise allowed movement in its slotted bearing e^2. The disk revolves with the shaft freely in its bearing in the casing E (see Figs. 1, 4, 5, and 6) as the plunger is raised.

Owing to the inclination of the outer or rearmost wall of the slotted bearing e^2, the pressure upon the disk as the plunger descends causes it to act as a friction-brake and automatically regulate the descent of the plunger, the friction being, of course, in proportion to the weight. This descent is therefore practically uniform whatever be the weight of the chair-body and occupant.

E′ is a casing in front of the plunger, and contains the locking-block p^2, that is thrust after the manner of a knee-joint against the face of the plunger by a rod p^3, adjusted by means of a set-screw Q and jam-nut, essentially as shown and described in my beforementioned application No. 8,822 of March 14, 1879.

To unlock the plunger, it is only necessary to lift the block p^2, which in this instance is effected by means of a rod *p′*, threaded for adjustment at p^3, where it is provided with a nut, upon which the block p^2 rests, and actuated by a lever *p*, pivoted at P and provided with a foot-plate F′ at either side of and extending below the casing E. A second brake is provided in the shape of a strap O′, that is brought to bear on the disk *o* on the shaft *l′* as the lever *p* is depressed and the block p^2 lifted. A spring q^2 is secured in the casing E′ and engages with a lug *q′* near the lower end of the plunger when the latter reaches the end of its upward stroke. The shaft *l′* is driven, as will presently be described, by a treadle, and terminates in a clutch-section R, that is adapted to interlock with a clutch-section R′ on the shaft *f*, which latter is slid back and forth to throw the clutch into and out of gear by means of a foot-plate S′, attached to a rod *r′*, which is pivoted to the end of a lever *r*, fulcrumed at r^3. The upper end of this lever is connected in well-known way to the clutch member R′ to slide it on its shaft while leaving it free to revolve. The rod *r′* is provided with a lug that slides in slot S in the lower part of the casing E, which is provided with a series of detent depressions or holes *s* at the side of the slot. A spring r^2, attached to the rod *r′*, snaps into one or other of these depressions and holds the parts normally in position, while admitting of their being moved by the foot-plate S′ when sufficient force is applied to cause the spring to yield and become disengaged from its detent-hole.

As shown, the foot-plate and co-operating parts of the clutch-controlling mechanism are duplicated, so as to be actuated from either side of the chair.

To prevent reverse motion of the gearing should the plunger be rapidly elevated and at the end of its stroke encounter the spring-stop q^2, the driving mechanism is arranged to be automaticallly thrown out of gear, this being accomplished as the beveled lip *q* on the lower end of the plunger encounters the end of the rod Q′, which is pivotally connected with the sliding part R′ of the clutch. As this occurs, the rod Q′ is pushed back, disengaging the parts of the clutch.

As before stated, the shaft *l′* is driven by a treadle, which, as shown, is made part of a dental engine. The shaft *f* is mounted in bearings in the end of the casing E and in a rigid support e^3 exterior to the fly and driving wheel F, where it has the usual crank *f′*, connecting-rod f^2, and treadle f^3. The crank-pin H is attached by a spring *h* to an arm *h′*, located to one side of the support, this being the usual means for preventing the wheel from stopping on the centers. The end of the connecting-rod f^2 is threaded at g^2 and enters a nut g^3, pivoted to the forward end of the treadle, whereby the length of the rod may be adjusted. The treadle f^3 is pivoted at *g* to a block which is attached by means of a rod G to the lower end of the support e^3, where it is pivoted at *g′*. Thus the

treadle may be moved to either side of the chair, as the operator may desire.

To the upper end of the support e^3 is pivoted at i^2 a yoke, through which passes a tube I, slotted, as shown at i. The tube carries at its lower end a rubber disk i', that presses against a groove in the face of the wheel F. This groove is curved transversely in the arc of a circle described about the pivot i^2, so that the disk is maintained in contact with the groove as the chair is tilted. Within the tube slides or telescopes the rigid shaft J of the dental motor-cable j, which is provided with the usual hand-piece j'. A sleeve k embraces the rod J, and is attached to the chair-back by a pivoted bar K, the object being to enable the rod J to fall back with the chair-back as the chair is tilted. It will be seen that the longitudinal motion of the shaft f necessary to throw the clutch R R′ into gear disengages the disk i' from the wheel F, so that the elevating mechanism and drill-shaft cannot operate simultaneously.

The third part of my invention relates to the head-rest, which is illustrated in a general way in Figs. 1 and 2, and more particularly in Figs. 15 to 22, inclusive.

Modifications, in turn to be described, of the locking devices for the head-rest clamp-link and its vertically-adjustable support are shown in Figs. 23 and 24.

On the chair-back is a dovetail rib t, embraced by a main supporting sliding bar T, having a correspondingly-shaped longitudinal groove. Through the main bar passes a thumb-screw t', which engages with the rib t and holds this bar in any position to which it is adjusted by raising or lowering it. The upper end of the bar T is provided with the supporting plate or head t^2 for the head-rest-carrying link or bar U, which plate has a longitudinal slot t^5. The carrying bar or link U is a hollow or slotted casing, the slot extending longitudinally thereof and from top to bottom or vertically therethrough, and one of the longitudinally-extending bounding-walls of the link-slot being inclined. (See Figs. 16, 17, 20, 21, 23, and 24.)

U′ is an adjustable cover-plate or top section for the link U, and has a depending rib U^2, which projects into the link-slot, extends parallel with the inclined bounding-wall thereof, and on its face opposite said wall is inclined correspondingly therewith. In the space intervening between said rib and slot-wall is a tapered block u, made in two parts, Figs. 20 and 21, and having a headed pin u', passing through its central aperture. It is obvious that as the pin is drawn downward the beveled faces of the block u, acting on the inclined wall of the link-slot and the similarly-inclined rib of the cover-plate, will cause them to spread apart. The rib U^2 is beveled at one end in a line inclined to the longitudinal axis of the main bar or link section U, and this end bears against a correspondingly-inclined shoulder u^2 at the end of the slot in the main link-section U. (See Figs. 20 and 21.) Obviously, any spreading of the link-pieces, or transverse motion as regards each other, causes longitudinal motion of the upper part U′ relatively to the lower part U. This longitudinal motion is a desideratum, as the opposite end of the rib U^2 is beveled, as at u^3, and acts upon a block U^3, which constitutes one part of a divided bearing or socket in the end of the link-bar U, clamping the ball V on the end of the head-rest stud v.

The longitudinal motion of the parts U U′ which results in clamping the ball V is brought about as follows: Through the pin u' passes a shaft t^{13}, having a cam t^4, that, as the shaft is rotated, presses against the lower face of the head or plate t^2 of the main supporting-bar T. To the shaft t^{13} is pivoted lever T′ of the clamp-locking devices, that is normally held by a spring T^2 close to the chair-back. The operation of these parts will readily be understood from Figs. 1, 2, 15, 16, 17, 18, 20, and 21, it being obvious that as the lever is turned in one direction the pin u' is retracted and the head-rest link clamped tightly on the top of the plate t^2, the ball V being at the same time secured as above described, and that when the lever is turned in the opposite direction to loosen the clamp the link may swivel or turn about the pin u' as well as slide longitudinally, and also have a transverse sliding movement imparted to it by adjustment of the pin in the slot t^5 of the supporting-bar head or top plate. Were this transverse movement of the link dispensed with, an opening of a size only sufficient for the free passage of the pin u' would be provided in the supporting-bar top plate in lieu of the elongated slot t^5.

W is the head-rest pad, which is properly upholstered and is fastened eccentrically, as shown in Figs. 2 and 22, to a radially-corrugated plate v'. A similarly-formed plate v^2 is made integral with the stud v, to which the ball V is affixed, and a thumb-screw v^3 secures the plates together. An arm-rest w for the operator swivels on a bar w', that terminates in a slotted plate w^2, Fig. 22. This plate is provided on either side with a rib w^3, that engages with the corrugations on the plates v' v^2, the thumb-screw v^3 passing through the slot and clamping the plate w^2 tightly to the head-rest. This construction admits of a motion of the arm-rest to and from the head-rest, while the pad, being eccentrically secured to the plate v', may be adjusted vertically or laterally by a simple revolution about the screw v^3. In case the arm-rest is dispensed with, the corrugations on the plates v' v^2 engage with each other and hold the head-rest firmly.

In Figs. 11 and 12 of the drawings is illustrated a modification of the elevating mechanism, the plunger being shown as threaded and embraced by a collar, also threaded to engage the plunger, and actuated by a bevel

gear-wheel meshing therewith and mounted on the fly-wheel shaft.

In Figs. 9 and 10 worm-gearing is substituted for bevel-gearing, the collar for engaging the plunger resting on bearings and subserving the function of a brake to regulate the descent of the plunger, the worm being, of course, thrown out of gear.

In Fig. 13 a worm is substituted for the pinion that engages with the rack on the plunger, and in Fig. 8 a worm is substituted for the bevel gear-wheel that communicates motion to the train.

In Fig. 14 is shown a modification of the automatic or self-regulating friction-brake hereinbefore described. A hollow plunger contains a swift pitched screw e', that revolves in a threaded collar inside the plunger. A cone on the end of the screw rests in a socket in the chair-base. As the plunger descends, the screw is made to revolve, the resistance (*i. e.*, the friction between cone and socket) being in proportion to the weight imposed.

Figs. 23 and 24 illustrate certain modifications of the locking or securing devices for the head-rest clamp-link and its supporting-bar, designed to secure the supporting-bar to the chair-back by the same operation that tightens the joints of the head-rest link, which link is the same as before described. In Fig. 23 the clamp-lever is shown as actuating a screw that bears upon the retracting-pin u' at an angle to the length thereof. The thrust of the clamp-screw here retracts the pin and at the same time jams the end of the pin against the rib on the chair-back, and so locks it against vertical movement. In Fig. 24 the clamp-screw actuated by the lever carries a cam x, that enters a slot x' in the bar x^2, which latter has an inclined bearing y at its lower end for the adjusting-screw y'. As the lever is turned, the pin u' is retracted and the bar x^2 clamps the support to the chair-back. It will be seen that in these modifications the operation of the clamp-link upon the ball of the head-rest stud is the same as hereinbefore fully described.

It will not be out of place here to briefly advert to the peculiar advantages arising from the several details of construction, as hereinbefore described, as well as to the important results incident upon the combinations of parts. Being pivoted to one side of the plunger, as shown in Figs. 1, 2, and 3, the chair-body is prevented from rattling on its support, as all lost motion is taken up in one direction. The worm-wheel furnishes a ready means of regulating the angle of inclination and adjusting it exactly as may be desired, and, being adapted to be thrown out of gear in an instant, facility is afforded for rapidly tilting the chair. This latter feature is of especial importance, as when teeth are extracted while the patient is under the influence of an anæsthetic there is danger of strangulation from the blood flowing into the throat. The advantage of a means for readily and rapidly bringing the patient to an upright position in the event of such a contingency will be appreciated. I do not herein claim this feature, broadly, as it is so claimed in my before-mentioned prior application, filed December 21, 1877.

The mechanism for elevating the plunger is thoroughly efficient in operation, and its salient feature consists in imparting to the plunger a continuous vertical movement through the medium of mechanism actuated by a foot-lever or treadle. Incidentally this treadle is made a part of that indispensable article in a dentist's office, the dental engine. The descent of the plunger is automatically controlled by the disk e' resting on its bearing e^2 or by some such equivalent, as the friction-screw shown in Fig. 14. Obviously, friction being proportional to pressure, the rapidity of descent is theoretically independent of the weight of the chair-seat and its occupant, and practice in this respect coincides with theory, or nearly so. The clutch p^2 p^3, &c., securely grips the plunger (it is made the subject of a claim in my above-mentioned application filed March 14, 1879, No. 8,822) and holds it in any position to which it is raised. On its release the plunger is free to descend, but may be arrested by the brake O′ *o*, &c., the same serving as a check on the automatic friction device e' in case the latter should from any cause refuse to act properly.

The automatic disengagement of the clutch R R′ has already been sufficiently set forth, as well as its object and function.

The dental engine is made a part of the chair and is carried with the body in its revolution on the pedestal wherein the movable part is locked by a screw actuated by the lever L.

The treadle of the engine swivels freely at g' and g^2, and may be moved to either side of the chair, as the operator desires, without impairing the efficiency either as a motor for the engine or as the means of actuating the elevating mechanism. The pivot g being under the treadle forward of the heel of the operator, positive motion is imparted throughout the downward and upward strokes of the rod f^2.

The engine is always handy for use, is never in the way, and is adapted for use in any possible position of the chair-body.

The handle of the head-rest clamp is preferably pivoted, as shown, and is normally held by a spring T^2 close to the chair-body, the object being to keep it out of the way and prevent its catching in the clothing or watch-guard of the operator as he passes from side to side of the chair.

By the term "vertical" as used hereinbefore and in the claims, in connection with the elevating and lowering of the chair-frame, head-rest, &c., I do not propose, of course, to restrict myself to the communicating of such motions in lines absolutely perpendicular or

in absolute right lines. A slight inclination, even if not desirable, is of no material disadvantage.

I do not claim herein anything shown in my prior applications of December 21, 1877, and March 14, 1879, hereinbefore referred to, nor the particular construction and organization by which the chair and engine are combined, as these will be claimed in another application to be filed by me.

What I claim is—

1. The combination of the chair-frame, its supporting bar or plunger, the curved rack secured to the chair-frame, the worm for engaging said rack, and the worm-carrying bracket vertically adjustable upon the plunger, substantially as and for the purpose set forth.

2. The combination, substantially as set forth, of the chair-frame-supporting bar or plunger, the rotary friction-brake, its shaft, the gearing connecting said shaft with the plunger, and the casing provided with the inclined slotted bearing for the friction-brake, whereby said brake is thrown into action upon the descent of the plunger and controls its movement.

3. The combination, in a dental chair, of the elevating devices thereof, the swiveling operating-treadle for actuating said devices, and the support connected with the chair and to which the treadle is jointed and rendered movable into operative position at either side of the chair, substantially as and for the purpose set forth.

4. The combination of the chair-frame-supporting bar or plunger, the driving mechanism for elevating it, provided with the clutch devices consisting of clutch-sections and the rod for disengaging the clutch-sections, said rod having connection at one end with one of said sections and operated upon at its opposite end and moved endwise by the plunger at the end of its upward movement to throw the driving mechanism out of action, substantially as set forth.

5. The combination, in a head-rest, of the vertically-adjustable supporting-bar having the head or top plate, the horizontally-extending link adjustably supported on said plate, having the longitudinally-extending slot passing therethrough vertically or from top to bottom, a pin passing through the supporting-bar head and through said link-slot and about which the link swivels and slides, the locking devices to clamp said pin and link together and to secure the supporting-bar in position, and the head-rest pad carried and clamped by the link, substantially as set forth.

6. The combination of the two-part link, the one part sliding relatively to the other, the stud of the head-rest pad provided with the ball mounted in a divided bearing in the link, the divided block in the link, the vertically-adjustable pin engaging said block, and means for clamping these parts in position, substantially as set forth.

7. The combination, in a head-rest, of the two-part link having a socket and with the one part sliding relatively to the other, the head-rest stud having the ball for engagement with said socket, the bar upon which the link is adjustably secured and relatively to which the link both slides and turns horizontally and which is vertically adjustable on the chair-back, and the locking devices by which to operate the sliding section of the link to clamp the ball of the head-rest stud, and also lock the link and bar in position, substantially as set forth.

8. The combination of the head-rest stud provided with the ball, the two-part link adjustably supported upon the top of and turning and sliding relatively to a vertically-adjustable support at the chair-back and having a socket, and with the one part of the link sliding transversely and longitudinally relatively to the other to clamp the ball carried by the head-rest stud in said link, and the clamping devices for locking the parts in their adjusted positions, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

BASIL M. WILKERSON.

Witnesses:
JNO. T. MADDOX,
SEPTIMUS BUNTING.