(No Model.) 2 Sheets—Sheet 1.

A. W. BROWNE.

DENTAL CHAIR.

No. 521,257. Patented June 12, 1894.

FIG. 3.

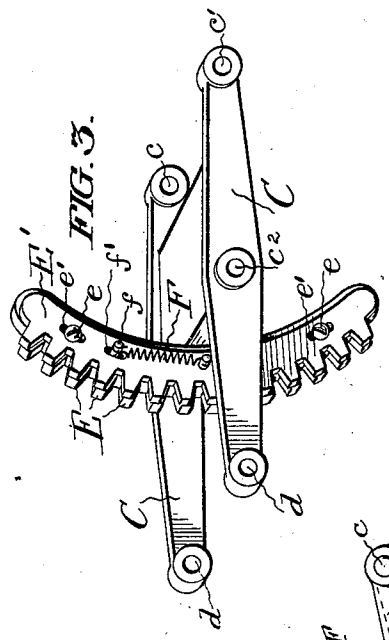

FIG. 1.

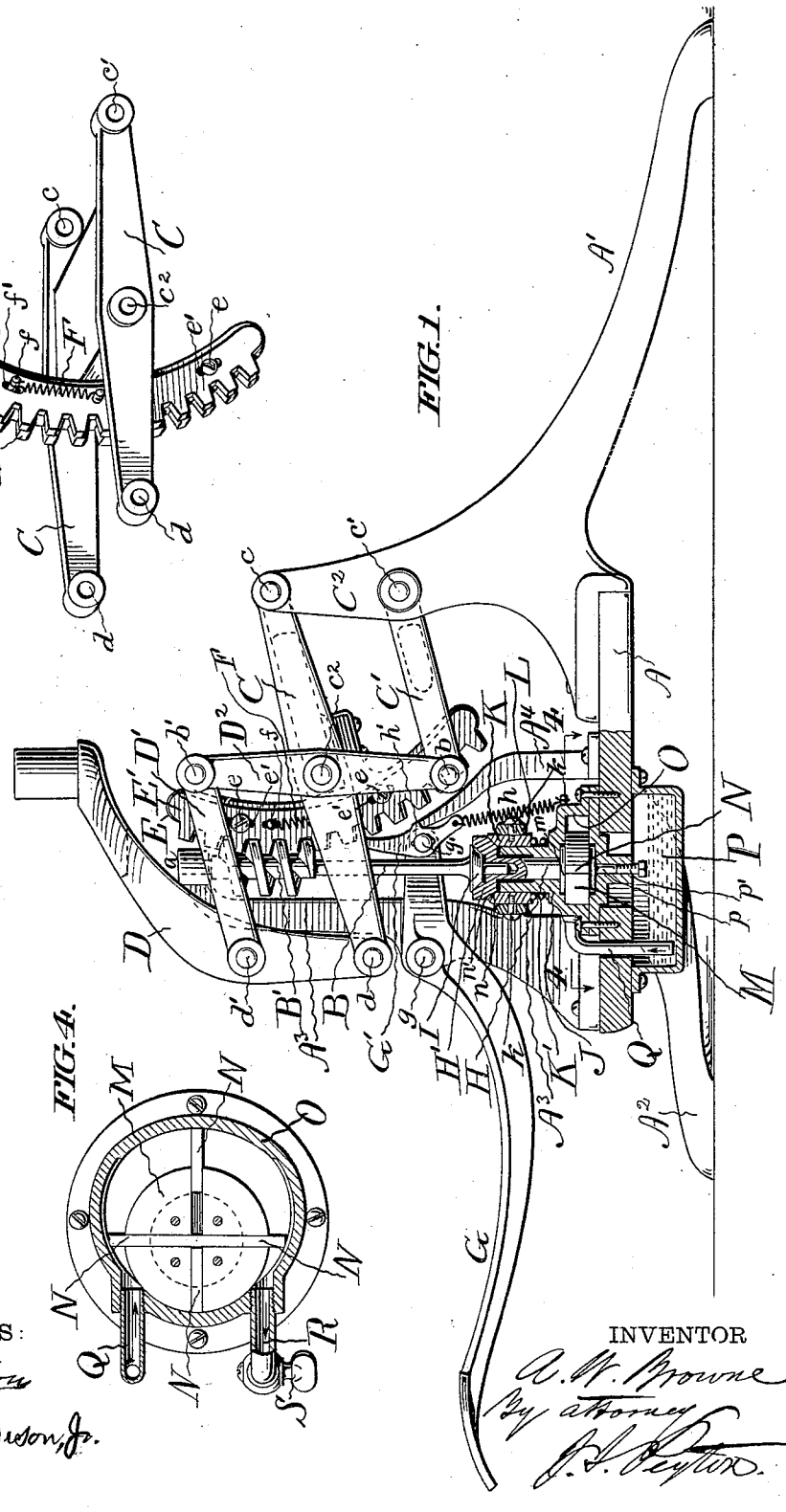

FIG. 4.

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(No Model.)

2 Sheets—Sheet 2.

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DENTAL CHAIR.

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FIG. 2.

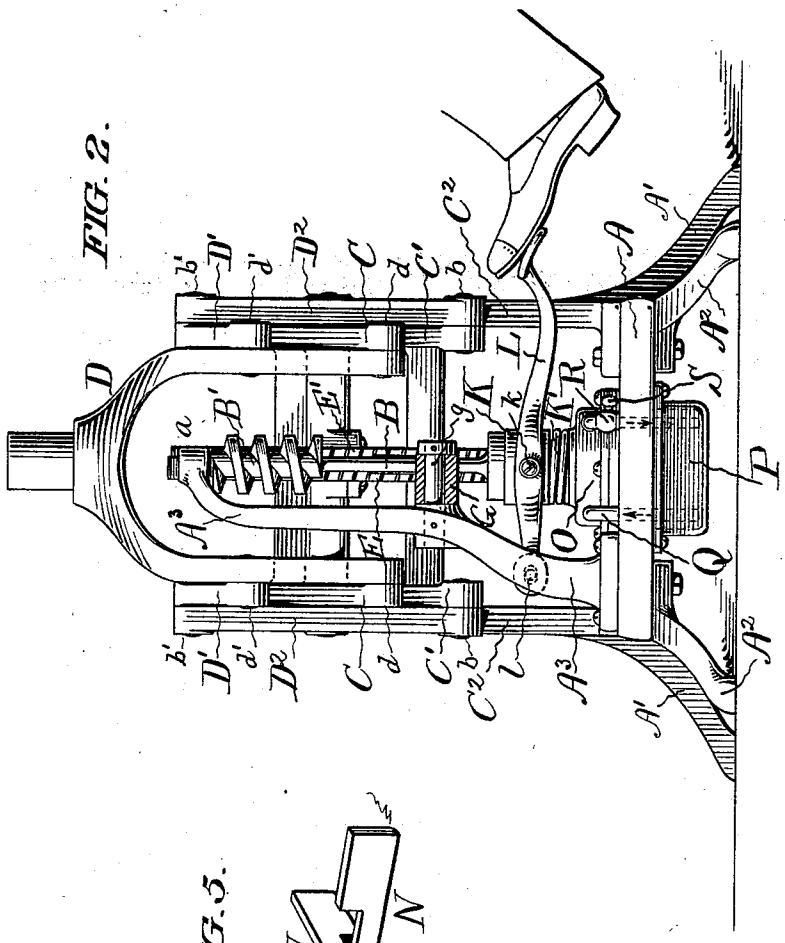
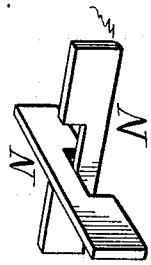


FIG. 5.



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UNITED STATES PATENT OFFICE.

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DENTAL CHAIR.

SPECIFICATION forming part of Letters Patent No. 521,257, dated June 12, 1894.

Application filed February 12, 1894. Serial No. 499,890. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR W. BROWNE, a citizen of the United States, residing at Prince's Bay, in the county of Richmond and State of New York, have invented certain new and useful Improvements in Dental Chairs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain improvements as hereinafter claimed, in means for supporting and raising and lowering the bodies of dental chairs.

In the accompanying drawings, showing a suitable embodiment of my improvements, with the chair body omitted, Figure 1 is a view mainly in side elevation, some parts being in vertical section. Fig. 2 is a rear elevation, with the elevating lever in section. Fig. 3 is a view in perspective of a portion of the raising and lowering mechanism, particularly showing details of construction of the curved rack thereof. Fig. 4 is a view on an enlarged scale partly in plan, and partly in section on the line 4 of Fig. 1, showing features of the mechanism for retarding descent of the chair body support; and Fig. 5 a view in perspective of the detached rotary arms of the retarding mechanism.

A suitable pedestal or base, shown as composed of a plate A and four legs A′ A′ A^2 A^2 screwed or bolted thereto, has secured to it a curved standard A^3 and a curved arm A^4. The upper end of the vertical shaft B of a worm B′ is mounted to turn in a bearing *a* at the upper end of the base standard A^3, and this worm shaft is supported at its lower end as in turn to be explained.

Vertically adjustable parallel arms C C and C′ C′ are jointed at their front ends by pivots at *c c′* to uprights C^2 C^2 of the base which are shown as formed with the front legs A′ A′ of the base. The arms C C are shown as formed together or rigidly connected with each other (see Fig. 3) and the arms C′ C′ except that they are shorter are constructed similarly to the arms C C. These arms C C are jointed by pivots at *d d* at their rear ends to a chair body carrier D. An additional pair of short parallel arms D′ D′ are jointed by pivots at *d′ d′* to the chair body carrier at their rear ends, and have pivotal connection at their opposite or front ends with the arms C C and C′ C′ by way of links D^2 D^2. Pivots *b b* connect the links at their lower ends with the arms C′ C′, and pivots *b′ b′* connect the upper ends of the links with the arms D′ D′, while midway the length of the links they are jointed by pivots c^2 c^2 to the arms C C midway the length of these arms. It will be seen that a suitably constructed parallel-armed frame is thus provided adapted to rock vertically about its pivotal connection at front with the base, and that the chair body carrier at the rear of said frame is maintained in an upright position throughout all adjustments which may be imparted to this frame. A curved rack E rigidly connected with the arms C C gears with the worm B′. Adjustably connected with the rack E is a similarly toothed and curved auxiliary rack E′ shown as lighter or thinner than the main rack. The connection between these rack sections is such that the auxiliary rack may slide slightly lengthwise upon the main rack. Screws or headed pins *e e* secured to the main rack section engage slots *e′ e′* in the auxiliary rack section, and a pin *f* on the main section engages a slot *f′* in the auxiliary section and is connected by a spring F with a pin on the auxiliary section. It will be seen that the tendency of the spring is to move the auxiliary rack section upward and thus cause the worm to be snugly engaged by the rack sections, thus preventing rattling or loose motion between the parts.

As will be understood, a suitable chair body is to be mounted upon the upper end of its carrier D, and adapted to be vertically tilted and horizontally turned, in well known ways.

A foot-actuated elevating lever G pivoted at *g* to the base standard A^3 carries a pawl G′ which is pivoted at *g′* to the inner end of the lever and is adapted to engage the rack and rock upward the parallel arms of the elevating mechanism when the outer end of the lever is depressed by pressure of the foot upon the foot rest thereof. A spring *h* acts

upon the lever pawl to throw it into engagement with the rack upon downward movement of the outer arm of the lever, and serves also to elevate this arm of the lever when released from pressure of the foot. The upward movement of the long arm of the lever is limited by contact of the shoulder h' on the pawl with the upper end of the base arm A^4, and the pawl is at the same time rocked out of engagement with the rack, the operation of the lever and pawl being substantially the same as set forth in United States Letters Patent No. 197,441, dated November 20, 1877.

To uphold the parallel arms and sustain the chair body in any position of adjustment, mechanism is provided as next to be explained.

The rotary worm shaft is mounted at its lower end in a bearing provided in an upright shaft H, and a flaring socket H′ thereof, hereinafter termed the cone socket or seat. The worm shaft is provided with a disk or circular projection I with inclined periphery, its form being that of an inverted frustum of a cone, and it is hereinafter called a cone as a bearing connection such as that between the worm shaft and socket is usually termed a cone and socket bearing. This cone I is adapted to be frictionally locked with the cone socket to prevent rotation of the worm. The shaft H of the cone socket is mounted in a bearing shown as formed in an upright J having supporting connection with the base and surrounded by a vertically adjustable collar or sleeve K acted upon by a strong spring K′ the tendency of which is to move the sleeve upward if not occupying its normal or elevated position in which it is supported by the spring. A foot-actuated tripping lever L embraces the sleeve K, is pivoted thereto at $k k$, and is jointed to the base standard A^3. The screw or headed pin l by which the tripping lever is fulcrumed passes through a slot in the lever so as to allow it slight endwise movement when operated and so prevent cramping or binding of the sleeve K upon the bearing upright about which it is supported and adapted to slide up and down. Upward movement of the cone socket is prevented by a disk or collar m secured to its shaft beneath its bearing. A cone and socket connection between the sleeve K and cone socket H′ is provided by the inclined or flaring upper end n of the sleeve and the engaging inclined peripheral portion n' of the cone socket.

In the operation of the mechanism above described, actuation of the elevating lever rocks the rack and parallel arms to lift the chair body and causes the worm to rotate and the worm shaft at each actuation of the lever by downward movement of its outer end is lifted slightly so as to disengage the worm shaft cone from its socket to permit of free rotation of the shaft. Upon upward movement of the lever after each downward stroke the pawl is disengaged from the rack and the worm shaft descending slightly jams or wedges its cone in the socket H′, so as to prevent rotation of the worm shaft independently of the cone socket and its shaft, while rotation of the cone socket and shaft is prevented by the cone and socket connection at $n\ n'$ between the sleeve K and cone socket, the parts being forcibly jammed together by the spring K′. Thus, it will be seen, the elevating mechanism is upheld and the chair body maintained in the position to which it may be elevated. To allow the parallel arms to rock downward to lower the chair body, the tripping lever L is pressed downward at its outer end by the foot, thus compressing the sleeve-upholding spring K′ and relieving the sleeve K from its frictional connection with the cone socket H′ which is allowed to rotate with the worm shaft to lower the chair body to the extent desired. It will be obvious that when the tripping lever is actuated to lower the chair body the weight upon the parallel arms causes the rack bar to rotate the worm in the opposite direction to that in which it is rotated by the lifting lever, the worm being of suitable pitch to provide for its being so actuated by the rack.

Suitable mechanism for retarding or rendering gradual the descent of the chair body is provided; such mechanism, as in this instance shown, being as follows: The disk m of the cone-socket shaft H is secured to a rotary carrier M having arms or blades N adapted to slide endwise and revolve with their carrier in a pump chamber formed by a casing O eccentrically to which the carrier is mounted, substantially as in the United States Letters Patent No. 82,285, dated September 22, 1868. A journal p projects downwardly from the under side of the rotary carrier M with which it is rigidly connected, and into a bearing in the bottom of the pump casing in which it is stepped or supported by an adjusting screw p'. The pump casing O is rigidly secured to the base. It will readily be seen that the worm shaft is upheld by the base through the medium of the intervening mechanism. A reservoir P for oil or other suitable liquid is secured to the base beneath the plate A thereof. A pipe Q projecting into the reservoir from the pump chamber serves as an inlet through which liquid may be drawn or sucked into the chamber by the rotation of the pump blades, and a valved pipe R serves as an outlet from the chamber for the liquid.

It will be seen that by adjusting the valve S of the outlet pipe the escape of the liquid from the pump chamber back to the reservoir may be controlled so as to offer more or less resistance to the rotation of the pump blades.

In operation when it is desired to lower the chair body gradually or without shock, it will be seen that with the valve of the outlet pipe suitably adjusted, and with the weight of the elevating mechanism upon the rotary carrier of the pump blades the resistance offered by the liquid to the rotation of the blades will regulate the speed of lowering the chair body

by controlling the speed of rotation of the worm. During this operation it will of course be understood that the worm shaft is frictionally locked with the shaft H which is fixed to the rotary carrier of the pump blades.

It will be seen that by the employment of the short lower and upper parallel arms, and the longer intermediate arms, with the links connecting the arms ample space is provided for the worm, the base standard and other parts without interfering with the movements of the parallel arms in raising and lowering the chair body.

I claim as my invention—

1. The combination of the base, the chair body carrier, the short lower parallel arms having jointed connection with the base, the longer intermediate arms having jointed connection both with the base and the chair body carrier, the short upper parallel arms having jointed connection with the chair body carrier, the links connecting the upper, lower, and intermediate arms, and means for actuating and for upholding the parallel arm substantially as set forth.

2. The combination of the base, the rotary worm and its shaft provided with the cone, the curved rack engaging the worm, means for actuating the rack to raise it, the parallel arms carrying the rack and having jointed connection with the base, means for supporting a chair body by the parallel arms, and the cone socket and its shaft having supporting connection with the base and with which the worm shaft cone is adapted to be frictionally locked against rotation independently thereof, substantially as set forth.

3. The combination of the base, the rotary worm and its shaft having supporting connection with the base, the curved rack engaging the worm, means for actuating the rack to raise it, the parallel arms carrying the rack, and having jointed connection with the base means for supporting a chair body by the parallel arms, and means by which to control the speed of rotation of the worm shaft to gradually lower the elevating mechanism when it is permitted to descend, substantially as set forth.

4. The combination of the base, the rotary worm and its shaft provided with the cone, the curved rack engaging the worm, means for actuating the rack to raise it, the parallel arms carrying the rack, and having jointed connection with the base means for supporting a chair body by the parallel arms, the cone socket and its shaft, the bearing for the cone socket shaft, the sleeve on this bearing having the cone and socket connection with the cone socket shaft, the spring acting on said sleeve, and the tripping lever, substantially as set forth.

5. The combination, in a dental chair, of the base, the chair body elevating mechanism provided with the curved rack, the shaft provided with the worm engaging the rack of the elevating mechanism, means for actuating the rack, and the mechanism by which the rotation of the worm is controlled in lowering the elevating mechanism, consisting of the pump chamber, the pump blades, their rotary carrier with which the worm shaft has connection, the inlet and outlet pipes, and the liquid-carrying reservoir, substantially as set forth.

6. The combination, in a dental chair, of the base, the worm and its shaft having supporting connection with the base, parallel arms having jointed connection with the base, the chair body carrier having jointed connection with the parallel arms the sectional curved rack carried by said arms and comprising the main section, the auxiliary section adapted to slide thereon, and the spring connecting the rack sections, and means for actuating the rack, substantially as set forth.

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

ARTHUR W. BROWNE.

Witnesses:

ELI T. STARR,

EDW. F. SIMPSON, Jr.