

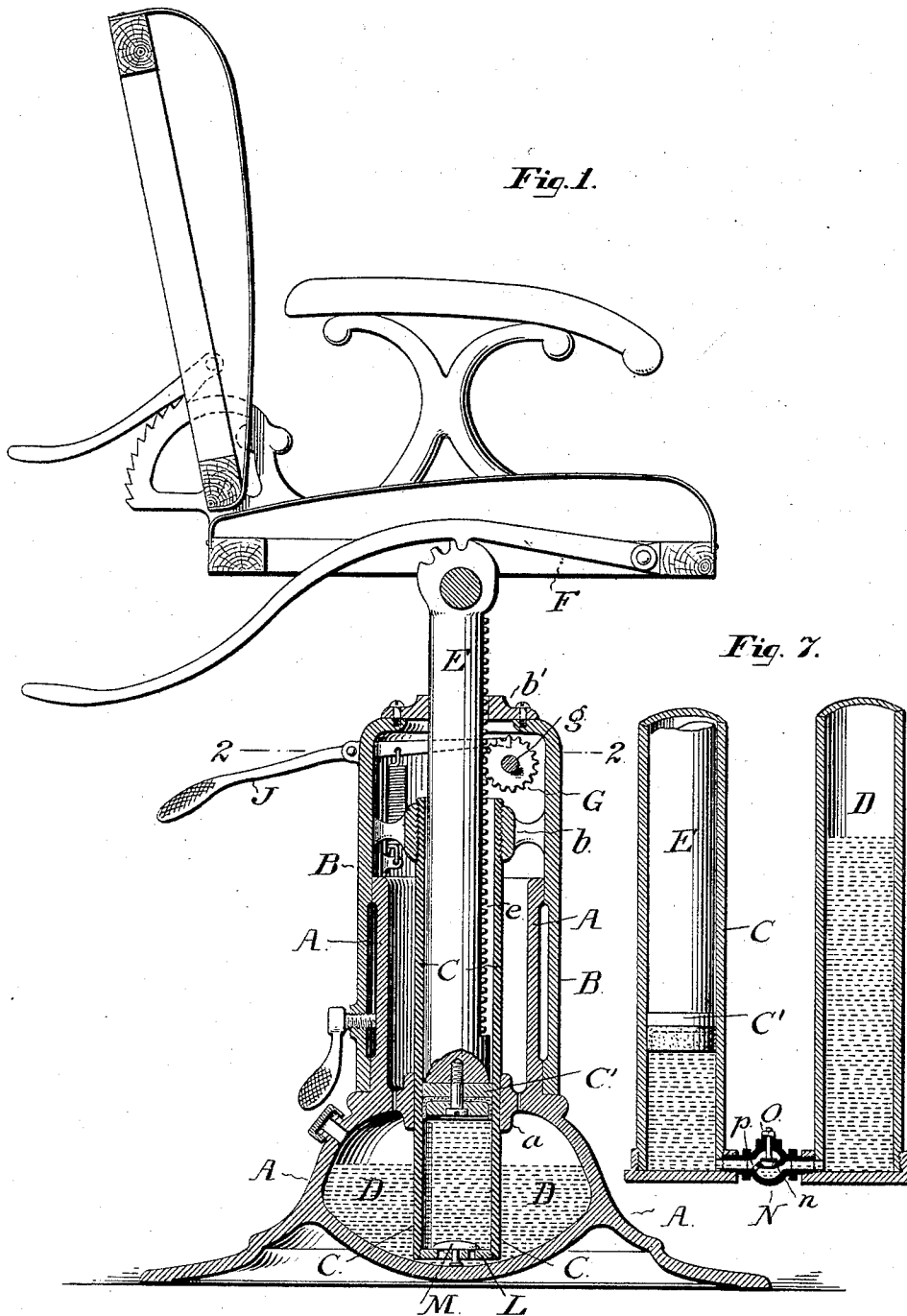
(No Model.)

2 Sheets—Sheet 1.

E. T. STARR.
DENTAL CHAIR.

No. 443,152.

Patented Dec. 23, 1890.



WITNESSES:

Edw. F. Simpson, Jr.
Arthur C. Clarke.

INVENTOR:

Eli T. Starr
BY J. D. Peyton,
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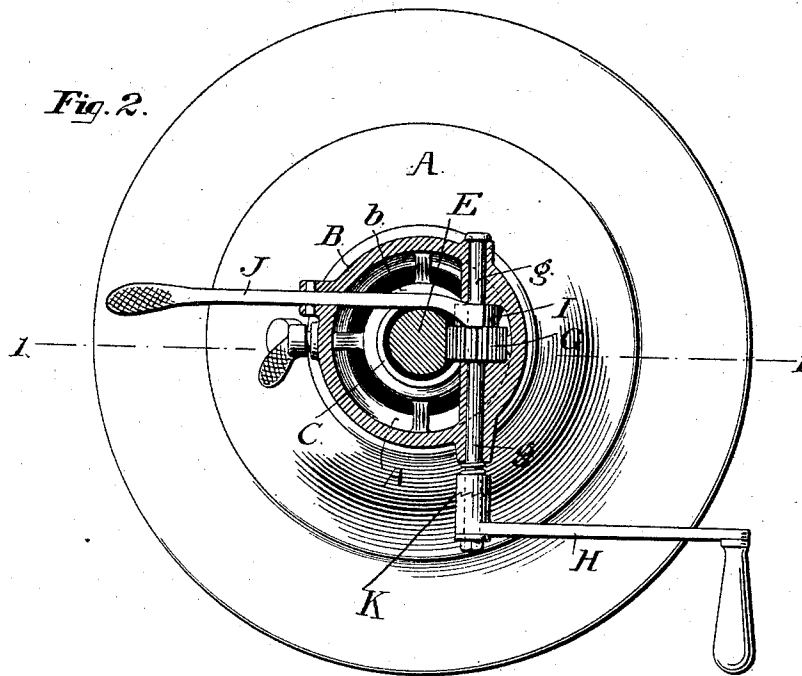
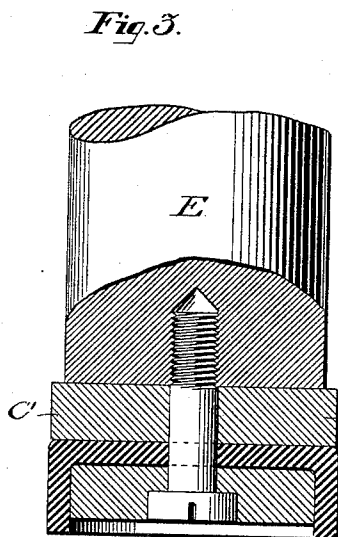
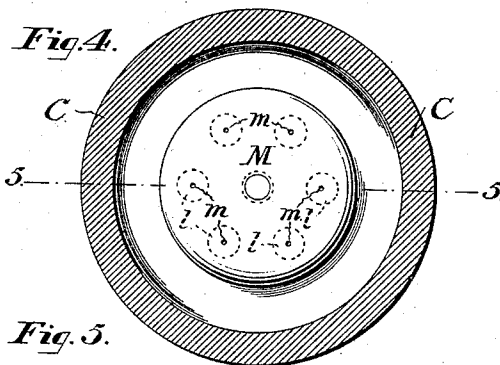
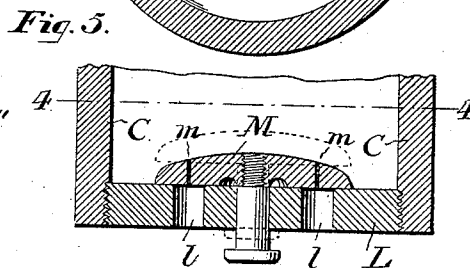
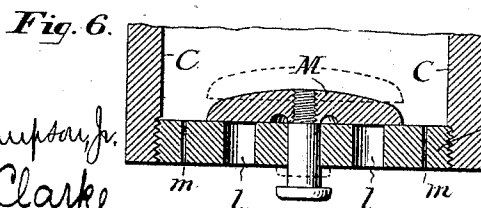
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UNITED STATES PATENT OFFICE

ELI T. STARR, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE S. S. WHITE DENTAL MANUFACTURING COMPANY, OF SAME PLACE.

DENTAL CHAIR.

SPECIFICATION forming part of Letters Patent No. 443,152, dated December 23, 1890.

Application filed February 7, 1890. Serial No. 339,594. (No model.)

To all whom it may concern:

Be it known that I, ELI T. STARR, of the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Dental Chairs, of which the following is a specification.

My invention relates to an improvement applicable to that class of chairs the frames or bodies of which are capable of being adjusted vertically and revolved horizontally; and my object is to improve that particular type of this class of chairs embodying a vertically-movable plunger carrying the chair frame or body, a mechanical lift for elevating the plunger to raise the chair frame or body, means for upholding said plunger at any point to which it is raised by the elevating mechanism, and means which permit it, when desired, to pass gradually and without shock from that elevated point to a lower one.

In the accompanying drawings, which illustrate a suitable embodiment of my improvement, Figure 1 is a view, partly in side elevation and partly in vertical section, on the line 1 1 of Fig. 2. Fig. 2 is a view, partly in plan and partly in horizontal section, on the line 2 2 of Fig. 1. Fig. 3 is a view showing, partly in section, the plunger-head and its packing. Fig. 4 shows a horizontal section on the line 4 4 of Fig. 5 of the plunger-carrying cylinder and its valve, and Fig. 5 shows a vertical section of the same on the line 5 5 of Fig. 4. Fig. 6 is a view similar to Fig. 5 with a slight modification. Fig. 7 is a vertical central section of a modification of the fluid-carrying chamber and means for retarding the descent of the plunger.

A non-rotating pedestal or base A sustains the rotary cylinder or main support B, within which is detachably secured a hollow plunger-carrying cylinder C. This cylinder C is maintained in position by a surrounding support α near its lower end, within and forming part of the base A and by being screwed at its upper end into a threaded collar b , rigid with the main support or cylinder B and best formed by casting it with this cylinder. The pedestal or base is hollow and forms a chamber D, carrying liquid, preferably oil. Openings in the support α admit air to the space above the oil

in this chamber. The upper end of the main support B is closed by a detachable cover-plate b' , through a bearing-opening in which a plunger E passes. This plunger is vertically adjustable, carries the chair frame or body F, adjustably attached thereto, and moves up and down in the hollow cylinder C, which has no vertical movement.

The plunger-head C' is packed in suitable way to cause it to fit fluid-tight in its carrying-cylinder. The plunger may be elevated by any suitable devices. As shown, the plunger is provided with a rack e , engaged by a pinion G, fixed on a shaft g , mounted in bearings in the main support B. The pinion-shaft is rotated by means of a crank H. A ratchet-wheel I, fast on the shaft g , is engaged by a pivoted detent-lever J to hold the shaft against rotation in one direction, when desired, and thus uphold the plunger. The crank H may either be fast on the pinion-shaft or, as shown and preferred, be connected thereto by means of a clutch-coupling K of well-known construction. By this construction the shaft may be rotated intermittently or continuously.

At its lower end the hollow cylinder C in which the plunger works terminates close to the bottom of the liquid-chamber D, and is provided with a head L, perforated to allow of the passage of liquid in the chamber D into the plunger-carrying cylinder and its return from the cylinder to the chamber. The cylinder-head is provided with a valve M, and the construction is such that when the plunger is being elevated the liquid can enter sufficiently freely to the cylinder to guard against retarding the rapid elevation of the plunger, and so that when the plunger is being lowered the flow of liquid from the cylinder C into the chamber D as displaced by the plunger is considerably retarded, thus letting the chair frame down gradually and without shock.

In the construction shown in Figs. 1, 4, and 5 the cylinder-head L has a series of openings l , and the loose valve M opens inwardly and is provided with holes m much smaller than the holes l in the cylinder-head and over or in line with them.

It will be seen that when the parts are in the position in which they are represented in

Fig. 1 and the plunger is to be elevated the crank is turned to the right or worked up and down as desired, turning the pinion, which engages the plunger-rack, thus starting the plunger upward and lifting the valve by suction. The area of the communicating way between the cylinder and liquid-chamber formed by the series of openings in the cylinder-head is ample to insure the flow of the liquid into the cylinder fast enough to permit the plunger to rise freely. When the plunger is raised high enough to elevate the chair to the desired extent, the detent-lever maintains the parts in their adjusted positions. To gradually lower the plunger it is only necessary to trip the detent-lever and leave the ratchet-wheel, pinion, and shaft free to turn. The pressure of the plunger and weight sustained by it upon the liquid in the plunger-carrying cylinder closes the valve, thus allowing the liquid in this cylinder to be displaced only by the now greatly-reduced communicating way, amounting only to the combined areas of the holes *m* in the valve.

The number of openings constituting the communicating way between the liquid-chamber and the plunger-carrying cylinder may be varied as desired, and instead of perforating the valve the constantly-unobstructed openings *m* of the communicating way between the cylinder and liquid-chamber may be formed in the cylinder-head, as shown in Fig. 6.

Among the various modifications which may be made in my improvements is that illustrated in Fig. 7, where the liquid-chamber and the plunger-carrying cylinder are arranged side by side and connected by a pipe *N*, provided with a diaphragm *n*, constituting a seat for a loose valve *O*, opening toward the plunger-carrying cylinder. An opening *p* in the dia-

phragm considerably smaller than the valve-seat opening serves to maintain constant communication between the liquid-chamber and the plunger-carrying cylinder. With this modification, instead of the before-described liquid-chamber and valve arrangement, it will readily be understood that ascent of the plunger opens the valve and allows a sufficient flow of the liquid from the chamber to the cylinder, while downward movement of the plunger causes the valve to close and restricts the communicating way between the chamber and cylinder to the opening *p*, thus preventing too rapid descent of the plunger.

I claim as my invention—

The combination, substantially as set forth, of the liquid-carrying chamber, the plunger-carrying cylinder, between which and the liquid-carrying chamber there is constant communication, the plunger movable up and down in its cylinder with its head closely fitting in the cylinder above the liquid therein, the plunger-elevating devices, the plunger-upholding devices, and the valve for varying the flow of the liquid between the liquid-carrying chamber and the plunger-carrying cylinder beneath the plunger-head, whereby movement of the plunger when released by its upholding mechanism is automatically retarded throughout its descent by gradual displacement of the liquid beneath the plunger-head and its passage into the liquid-carrying chamber.

In testimony whereof I have hereunto subscribed my name.

ELI T. STARR.

Witnesses:

CHARLES F. ZIEGLER,
J. I. PEYTON.