2 Sheets—Sheet 1.

B. M. WILKERSON.

DENTAL CHAIR.

No. 413,156. Patented Oct. 15, 1889.

Fig. 1.

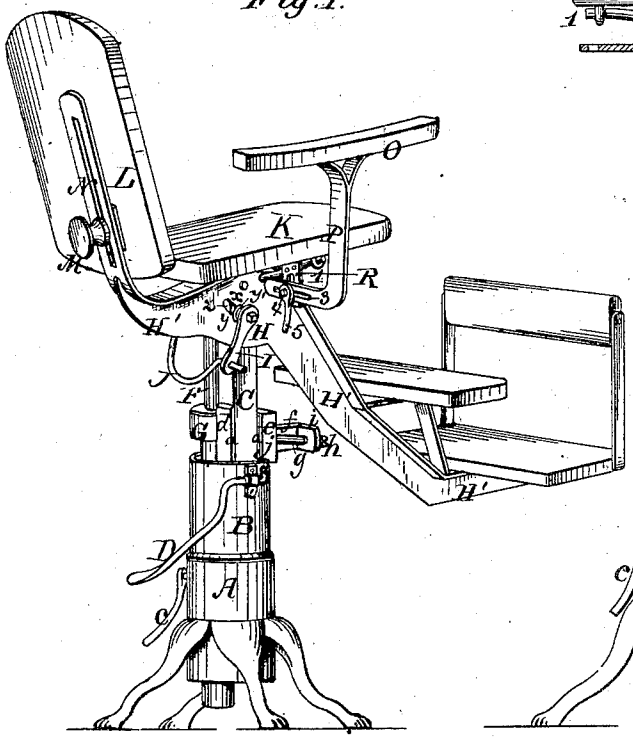


Fig. 2.

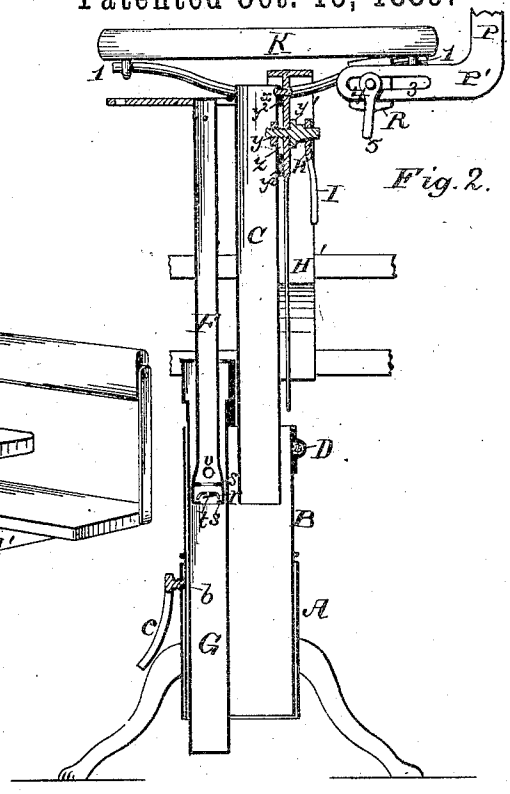


Fig. 3.

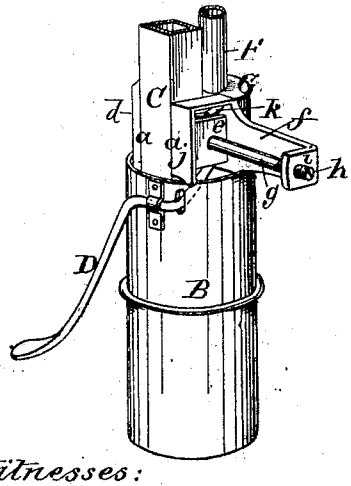


Fig. 4.

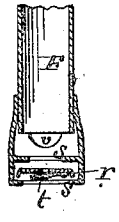
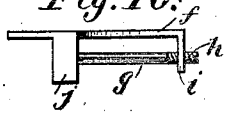


Fig. 10.



Witnesses:

Geo. H. Pennington.

Inventor:

Basil M. Wilkerson

by his attorney W. Baker

2 Sheets—Sheet 2.

B. M. WILKERSON.

DENTAL CHAIR.

No. 413,156. Patented Oct. 15, 1889.

Fig. 5

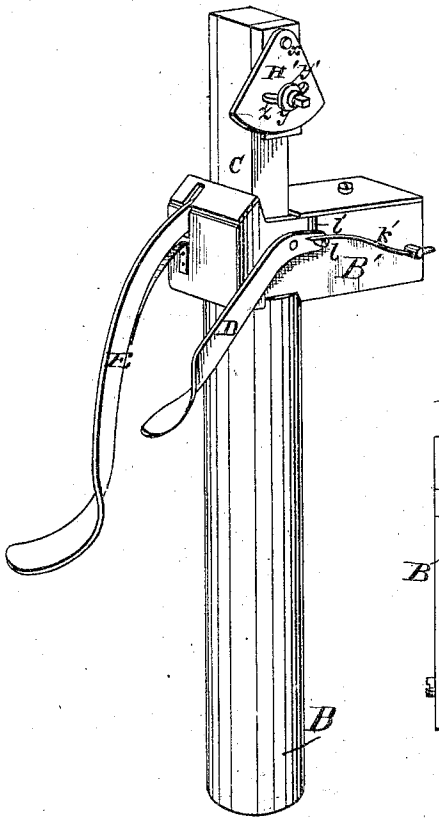


Fig. 6

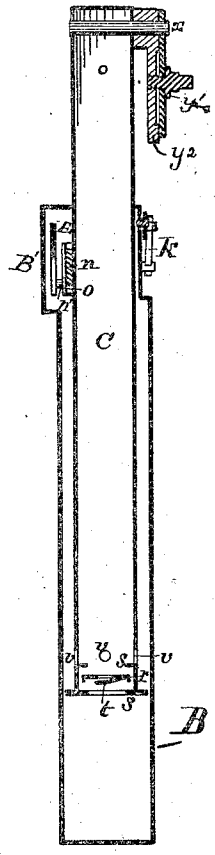


Fig. 7.

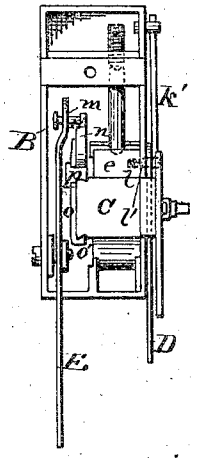


Fig. 8

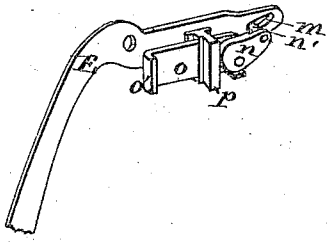
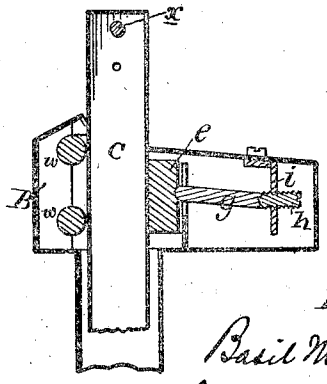


Fig. 9



Witnesses:

Geo. H. Pyington.

Inventor:

Basil M. Wilkerson

by his attorney

M Daiby

UNITED STATES PATENT OFFICE.

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

DENTAL CHAIR.

SPECIFICATION forming part of Letters Patent No. 413,156, dated October 15, 1889.

Application filed March 14, 1879. (No model.)

To all whom it may concern:

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

This invention relates to improvements applicable to that class of chairs the frames or bodies of which are capable of being adjusted vertically and revolved horizontally about supporting pedestals or bases; and my improvements consist in certain organizations of parts and novel combinations of devices, as hereinafter fully set forth.

In my Letters Patent No. 197,441, dated November 20, 1877, I have shown and described a dentist's chair of this class, in which a vertically-movable support for the chair frame or body and a mechanical lift for elevating the same are combined with means distinct from and independent of the elevating mechanism, and which have no lifting function, but simply serve to uphold said support at any point to which it is raised by the elevating mechanism and to permit it, when desired, to pass gradually and without shock from that elevated point to a lower one. Under that arrangement, however, the same instrumentality through the medium of which the chair-frame support was upheld was also the agent by whose yielding resistance under certain conditions the fall of the seat-support was retarded, with a view to causing its descent to be gradual and easy. In my present chair I retain as far as possible the same conditions of movement, so far as elevating and lowering are concerned, as in my said patented chair; but I make the retarding mechanism, or the means through whose agency the rate of movement of the descending support for the chair is regulated, distinct from and independent of the devices through whose instrumentality the chair-frame support is vertically lifted and upheld or locked in the position to which it may be brought.

I here remark that in the course of this specification whenever I use the term "retarding mechanism" I intend the instrumentality or combination of elements which acts simply to offer yielding resistance to the downward movement of the chair-frame and not to either elevate or uphold and lock in position the said frame.

The retarding or lowering mechanism which, in illustration of my invention, I have herein shown comprises a plunger (which may or may not be the plunger or support that carries the chair frame or body) adapted to work in a cylinder or shell containing a liquid, such as oil. There need be no tight fitting between the plunger and case in which it works, the intention being to permit the plunger to descend when the chair-support is unlocked and to displace the liquid in the case, the rate of displacement governing the speed of descent. In other words, the body of liquid under the plunger is never entirely confined, thus permitting the descending plunger to move without encountering other than a yielding resistance due to the displacement of the liquid. I have also devised other improvements directed to the locking or upholding mechanism, to the lifting mechanism, to the manner of connecting the chair-body with its support, and to the structure of the chair-body itself and attachments. These can best be explained and understood by reference to the accompanying drawings, in which—

Figure 1 is a perspective view of one form of chair embodying my invention, only so much of the chair being represented as needed in order to illustrate my improvements. Fig. 2 is a view, on an enlarged scale, partly in vertical central section and partly in elevation. Fig. 3 is a perspective view of the rotary cylinder which carries the seat-support and its adjuncts. Fig. 4 is a vertical central section, on an enlarged scale, of the lower end or head of the retarding-plunger. Figs. 5 to 9, inclusive, represent a modified arrangement of parts, to be hereinafter referred to. Fig. 10 is a plan view of the supporting-bracket of the upholding or locking mechanism, showing the guide-plate of said bracket for the chair-frame support or plunger.

Referring now to Figs. 1 to 4, A is the non-rotating pedestal or base sustaining the rotary cylinder or main support B, which car-

ries the vertically-adjustable chair-frame support, &c., and is locked in position by means of the set-screw *b* and lever *c*, substantially as described in my aforesaid Letters Patent. The cylinder B contains the chair-frame support C, which, in this instance, is a hollow rod or bar of square cross-section vertically movable in proper bearings in the cylinder. The support C obtains these bearings, in the present instance, by having its edges *a a* on one side in contact with the wall of the cylinder, and by being embraced on the other sides by the upholding or clamping mechanism, and by guides fixed to the cylinder and in contact with the respectively adjoining faces of the support. This arrangement is shown plainly in Figs. 1, 2, and 3, *d* being a guide-plate, against which the support is pressed by an adjustable upholding-block *e* on the opposite side, and *f* being a bracket secured to the cylinder B and provided with an inwardly-extending portion, forming a guide-plate opposite that side or face of the seat-support whose edges *a* are in contact with the wall of the cylinder. In these figures, in order to show more clearly the upholding or locking mechanism and also the retarding mechanism, I have omitted the elevating mechanism which acts upon the chair-frame support. It will be understood that elevating mechanism such as described in my aforesaid Letters Patent, or other suitable elevating mechanism—such, for instance, as that hereinafter described—can be used.

The upholding or locking mechanism, which in the present instance is used to lock the frame-support in any position vertically that may be desired, is automatic to the extent that it permits the support to be raised freely; but it locks it firmly against descent, and must be operated by some positive means in order to release the support and permit it to descend and bring the retarding mechanism into action.

The locking mechanism consists of a block *e*, whose plane face is held against the corresponding face or side of the support C by means of a rod *g*, provided at one end (see Figs. 1, 3, 9, and 10) with a rounded extremity that seats itself in a like socket or depression in the block and at the other end with a concavity or socket which is entered by the end of a screw *h*, which screws through a bearing-lug *i* of the bracket *f*, attached to the cylinder B. The rod *g* is slightly inclined, having its end which engages the block *e* a little higher than the other end, which engages the screw. This arrangement, so far as the parts *e g h* are concerned, is most plainly shown in section in Fig. 9. Under this arrangement it will be seen that the upholding or locking mechanism will readily and automatically yield to upward passage of the support C; but the moment the elevating mechanism ceases to act and the support C tends to descend, this will have the effect of tending to straighten out and bring into line the knee-jointed parts *g h*, with the result of forcing the clamp-block *e* tightly against the support, which will thus be firmly locked between the block *e* on the one side and the plate *d* on the other; and the greater the downward pressure on the seat-support the tighter will it be locked. The screw *h* is used to regulate the adjustment of the parts of the knee-jointed support. The block *e* is capable of slight vertical movement in a guideway at *j* in the bracket *f*, and is pressed down (so as to keep the parts in proper position) by means of a spring *k*. A lever D, pivoted to the cylinder B and working therethrough against the under side of the block, as indicated in Fig. 3, serves to lift the block against the stress of the spring whenever it is desired to unlock and release the support C. This lever, it will be seen, is supplemental to and independent of the locking or clamping devices in so far as their clamping action is concerned, the lever serving simply to trip the clamping devices to permit of the descent of the support.

In the modification of the locking or holding mechanism shown in Fig. 9, and also in perspective in Fig. 5 and in plan in Fig. 7, the lever or treadle D is provided with a pin *l*, which extends through a slot *l'* in a box-like housing B', fixed to the top of the cylinder B, and engages the block *e*. The block is raised to release the seat-support by means of the lever acting against the stress of a spring *k'*, which exerts downward force on the short end of the lever and serves to depress that end when pressure by the hand or foot is removed from the opposite end of the lever.

A convenient form of lifting mechanism is shown in Figs. 5, 6, 7, and 8. It has the general characteristics of the mechanism for the same purpose described in my aforesaid Letters Patent, in that it is a lifting mechanism operated by a treadle or foot-lever E, catching hold after hold and raising the chair step by step. It, however, differs in details from the patented mechanism. The lever E, which is operated by downward pressure upon its outer end to effect the raising of the seat-support by a step-by-step movement, is pivoted or has its fulcrum in the housing or box B'. Its inner end is provided with a slot *m*, which is entered by a pin *n'*, projecting laterally from a cam *n*, pivoted to one end of a bar *o*, which is provided at its opposite end with a flange or hook *o'* and forms one jaw of a clamp for engaging the support C. On the clamp-bar *o* is mounted the slide-block *p*, which is acted on by the cam *n* and constitutes the other jaw of the clamp. This arrangement is shown plainly in Fig. 8, which is a perspective view of the clamp and a portion of its actuating-lever. The clamp-jaws are adapted to engage the support C, as shown in Fig. 7. When the lever E is depressed it acts first to cause the cam *n* to force together the jaws of the clamp, and so close them tightly on the support and then to raise the

clamp bodily, and with it the seat-support which it grasps. The pressure of the foot is now released from the lever and the latter, through the instrumentality of a spring shown in Fig. 5 as secured to the housing B′ and acting on the lever, is returned to its normal position, this return movement first relaxing the jaws and then causing the clamp to drop down to its original place, where it will be in position to take a fresh hold on the support and to lift it another step, when the pedal end of the foot-lever is again depressed and the elevating operation continued to the extent desired. While the lifting devices release the support and return to position to take a fresh hold the upholding or locking mechanism before described acts to securely lock the support in the position to which it has already been lifted.

The mechanisms thus far described answer admirably the purposes for which they are intended; but it will be seen that were the plunger or chair-body support left entirely free to descend when it is unlocked its descent would be sudden and violent. Therefore means are provided to render that descent gradual and easy. To effect this is the office of the hereinbefore-mentioned retarding mechanism, one form of which I now proceed to describe.

In Figs. 1 to 4 the retarding mechanism comprises an auxiliary plunger F, which moves with the chair-support C and is connected therewith and fits in a cylinder or well G, fixed to and arranged in the rotary cylinder B. The cylinder G is closed at the bottom and is intended to contain oil or other liquid. The plunger is not required to fit its cylinder accurately and no packing between the two is needed. The plunger may be closed at the head or bottom, in which event the only escape for the liquid before the descending plunger is by leakage past or by the plunger-head into the space which exists between the plunger and the walls of its cylinder; or various other ways, which will readily suggest themselves, may be employed to provide for gradual displacement of the liquid as the plunger descends. A convenient arrangement for the purpose consists in making the auxiliary plunger hollow and in providing its lower end with a valve *r*, which has a slight play between two centrally-perforated diaphragms *s s*. When the valve drops, as shown in Fig. 4, its spaced bottom lugs or feet *r′* hold it up from the lower diaphragm and liquid is free to pass by way of the spaces between the feet from one side of the valve to the other through the central openings in the diaphragms. This is the position occupied by the valve when the plunger rises, the passage-way formed by the openings between the valve-feet being of sufficiently large area to permit liquid to pass from above below the valve with entire freedom. When, on the other hand, the valve is closed against the upper diaphragm, no liquid can pass through it from below, save when, as is the case here, the valve is provided itself with a small central opening, which, as shown, is covered by a partially-closing smaller valve *t*. This opening need not be covered at all; but the valve *t* is added, to show how the opening which it covers may be graduated in accordance with the weight carried by the chair. The supplemental valve *t*, which opens downward, normally stands fully open, but is made of spring metal, or is acted on by a spring, to render it self-adjusting, so that in case of the chair carrying more weight than ordinarily, as when it is occupied by a heavy person, the pressure induced by the weight will have the effect of partly closing the valve, and so reducing the size of the opening. In this way the rate of movement in descent can be made even and uniform, no matter what may be the weight of the person occupying the chair. Whenever the locking mechanism is released, the plunger moves down through the liquid, the latter oozing through the small central valve-opening and also up outside of the plunger between it and the wall of the cylinder, and gathering in the upper parts of the cylinder and the hollow plunger. A small vent-hole is provided in the top of the plunger for escape of confined air.

I make the head or lower end of the plunger of greater diameter than the plunger-body, and form above this enlarged end one or more openings *v* in the end of the plunger, so that the liquid may pass freely in and out of the plunger. I thus provide a mechanism which, while it does not act to lock or sustain the support in an elevated position, and does not consequently require that nice and accurate fitting and delicate adjustment which it would require were it used for that purpose, yet acts to retard the fall of the chair-frame support when the latter is released from the locking mechanism, and to make its descent gradual and easy.

In lieu of employing an auxiliary plunger, I can make the main plunger or chair-frame support C answer the two purposes of supporting the chair and retarding its descent. Such an arrangement is shown in Figs. 5 to 9. The rotary cylinder B in this instance is closed at the bottom, so as to contain liquid, and receives the hollow plunger C, which is provided at the bottom with a valve arrangement resembling that on the auxiliary plunger and similarly lettered. The housing or covered box B′, fixed on top of the cylinder and containing working parts of the lifting and locking mechanism, will receive, if need be, such of the displaced liquid as cannot be contained in the cylinder or plunger. The operation of this retarding mechanism is similar to that which has already been described. I, on the whole, prefer this last arrangement, as it is simpler and enables me to dispense with an auxiliary plunger.

In Fig. 9 I have represented the upper bear-

ings of the seat-supporting plunger as consisting of two friction-rollers *w w*, mounted some little distance apart from one another in the box B′. The block *e*, on the other side of the plunger, is arranged opposite the space between the roller-bearings, and in this way the plunger may be clamped very tightly, at the same time that it is in condition to move freely and without friction when the clamp-block *e* is tripped. The upper bearings for the plunger are so located that when the plunger is at its lowest position they are very near its top, the object being to obtain a vertical range of movement as extended as possible.

The chair frame or body proper H′ is fixed to or forms part of a plate H, pivoted at *x* to the side of the plunger or vertically-adjustable support C. The chair-frame which is thus carried by the support C can tilt back and forth on the point *x* as an axis. In order to secure the chair-frame at any desired angle of inclination, I make use of means which automatically clamp it, comprising a set-screw or clamping-screw *y*, which screws into the support C and passes loosely through a curved slot *z* in the plate H. The screw is provided with a bearing-flange *y′*, which rests against the chair-frame plate. By turning the screw in one direction its clamping face or flange *y′* will be drawn against the plate and so will clamp the latter against the seat-support. When the screw is turned in the other direction, its pressure will be relaxed and the chair-frame will be free to tilt. In order to better insure clamping action, I form on the support C two raised bearings y^2 y^2. The clamping-face of the screw is on the side of the plate opposite that next these bearings and in a position intermediate between said bearings, so that when it is screwed up the plate will be held between the points y^2 y^2 and *y′*. On the outer end of the screw *y* is fixed a lever I, and a spring J, of proper strength and suitably arranged, is provided, which acts on the lever to move it in the direction required to cause the screw to exercise clamping-pressure. That pressure, whenever it is desired to change the angle of inclination of the chair, is relieved by turning the lever against the stress of the spring. The moment the lever is released the spring returns it to its former position, again clamping the chair-frame.

The chair-seat K is pivoted to the chair-frame at 1 1, so as to be capable of slight oscillation.

The back L resembles the chair-back in my aforesaid Letters Patent, in that it is vertically movable, and is provided with a clamping or locking device M, which constitutes also a handle by which said back may also be raised. The back L, however, not only is vertically adjustable, but can tilt laterally on the clamping-screw M as an axis. This screw passes into the chair-back through a vertical slot in the supporting-standard N of the chair-frame.

I find it advantageous to make one or both arms of the chair adjustable laterally, and also vertically as well. I also find it of advantage, in order to furnish a seat or support or rest for the operator, under some circumstances to arrange the arm so that it may swing bodily outward and downward on a pivot. An arrangement permitting all these adjustments is shown in the drawings. The upholstered arm O is supported on a central vertical stem P, which at its lower end is provided with a horizontal part P′, extending under the chair and longitudinally slotted, as at 3. From the chair-frame extends a vertically-slotted plate R, to which the part P′ is attached by a set-screw 4, that passes through the slots at their intersection, and is provided with a handle 5, by which it may be loosened or tightened. The slotted bar P′ permits the chair arm and stem to be moved bodily to and from the chair-seat. The slotted supporting-plate R permits the arm to be vertically adjusted, and the set-screw 4 serves as a pivot on which the arm and its supporting-stem can move as an axis. The arm under this arrangement can be turned down, so as to be secured in a position where it may serve as a seat or rest for the operator. This pivoted arrangement can be used to advantage, whether one or both of the parts P′ R be slotted, or, indeed, if the slotted connection be dispensed with and the parts have simply a pivotal connection. The chair may have one or both of its arms made adjustable in this way.

I have described the manner in which I prefer to carry my improvements into effect. It will be understood, however, that the details of construction may be varied to a considerable extent without departure from the invention. I do not limit myself, therefore, to the particular details herein described in illustration of my invention; but

What I claim, and desire to secure by Letters Patent, is—

1. The combination, substantially as set forth, of a liquid-carrying cylinder, a plunger movable up and down in the liquid in the cylinder, the plunger-head by which the liquid above and below it communicates at all times, and the chair-frame connected with the plunger and partaking of its movements, whereby the descent of the chair-frame, when the plunger is free to move downward, may automatically be retarded by gradual displacement of the liquid beneath the plunger-head and its passage upward.

2. The combination, substantially as set forth, of a liquid-carrying cylinder, a hollow plunger movable up and down in the cylinder, the plunger-head, an automatically-acting valve seated in the plunger-head and by which communication is at all times maintained between liquid above and below said

head, and the chair-frame connected with and partaking of the movements of the plunger, whereby descent of the chair-frame, when the plunger is free to move downward, may automatically be retarded by gradual displacement of the liquid beneath the plunger-head and its passage upward.

3. The combination, substantially as set forth, of a liquid-carrying cylinder, a hollow plunger movable up and down in the liquid in the cylinder, the plunger-head by which the liquid above and below it in the cylinder communicates at all times, an automatically-acting valve seated in the plunger-head and by which communication is at all times maintained between liquid in the plunger and in the cylinder, and the chair-frame connected with and partaking of the movements of the plunger, whereby the descent of the chair-frame, when the plunger is allowed downward movement, may automatically be retarded by gradual displacement of the liquid beneath the plunger-head and its passage upward around and into the plunger.

4. The combination of the liquid-carrying cylinder, a hollow plunger movable up and down in the cylinder, the chair-frame connected with and partaking of the movements of the plunger, the plunger-head, an automatically-acting main valve seated in the plunger-head, and by which communication is at all times maintained between liquid above and below said head, and the automatically-acting supplemental valve for varying the area of the communicating way or passage afforded by the main valve, substantially as and for the purpose set forth.

5. The combination of a liquid-carrying cylinder, a chair-frame support or plunger movable up and down in the cylinder, having bearings at the upper end thereof and fitting loosely at its lower end or head therein below said bearings to allow of constant communication between the liquid above and below said head, the lifting devices, and the locking or upholding devices, substantially as and for the purpose set forth.

6. The combination of the pedestal or base, the chair-frame support or plunger carried thereby, the lifting devices, the automatic clamping devices sustained by connection with the pedestal or base, consisting of the clamp-block and the self-adjusting knee-jointed support therefor, said clamping devices yielding to allow the chair-frame support or plunger to ascend but preventing its descent, and the lever for tripping the clamping devices to release said plunger, substantially as set forth.

7. The combination, substantially as set forth, of the chair-frame support or plunger, the clamp-bar provided with the end flange for engaging the plunger at one side, the slide-block for engaging the plunger at the opposite side, the lever, and the cam by which the lever is connected with the clamp-bar and slide-block, whereby the clamp-bar flange and slide-block may be caused to grip the plunger for elevating it.

8. The combination, substantially as set forth, of the pedestal or base, the vertically-adjustable support or plunger carried thereby, the clamp-block acting on said plunger, and the adjustable thrusting jointed support of said block, said support yielding to allow upward movement of the plunger.

9. The combination, substantially as set forth, of the pedestal or base, the vertically-adjustable plunger carried thereby, the clamp-block acting on said plunger, the self-adjusting thrusting-support for the clamp-block, said support yielding to allow upward movement of the plunger and acting on said block to automatically lock the plunger against descent, and the lever acting on the clamp-block to release the plunger.

10. The combination of the seat, the arm, the supporting standard or stem of the arm, and the pivot extending parallel, or nearly so, with said arm, and passing through said stem to connect it with the seat, whereby the arm may be swung in a plane transverse to the seat and adjusted toward and from it, substantially as and for the purpose set forth.

11. The combination of the vertically and centrally slotted chair-frame-back standard, the vertically-adjustable and laterally-tilting chair-back, and the screw-clamp secured to and carrying or moving up and down with the chair-back, and engaging with and movable in the slot of said standard, whereby the chair-back may be moved up and down by and swung about said clamp, substantially as and for the purpose set forth.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

BASIL M. WILKERSON.

Witnesses:
ROBT. W. SMITH, Jr.,
J. W. SELBY.