

(No Model.)

5 Sheets—Sheet 1.

E. T. STARR.  
ADJUSTABLE CHAIR.

No. 348,173.

Patented Aug. 24, 1886.

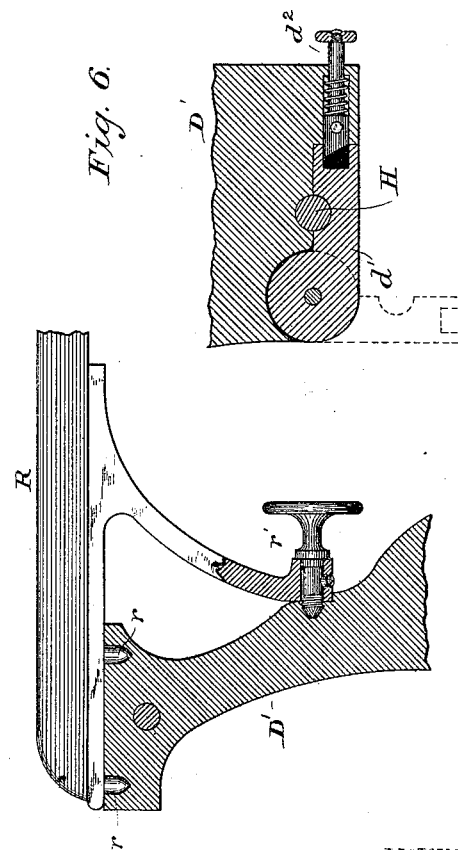
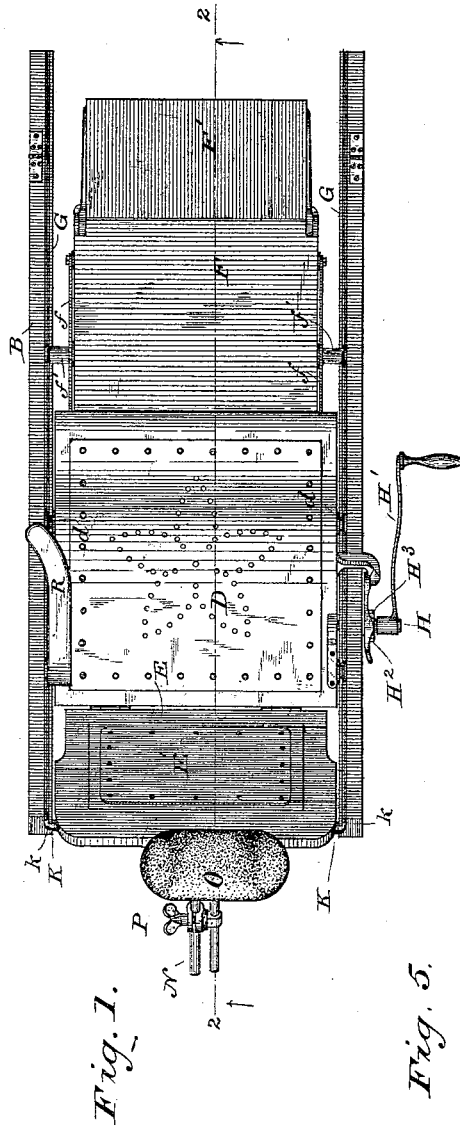


Fig. 6.

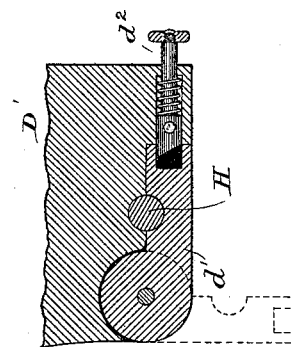
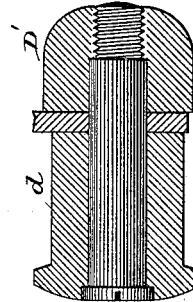


Fig. 7.



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(No Model.)

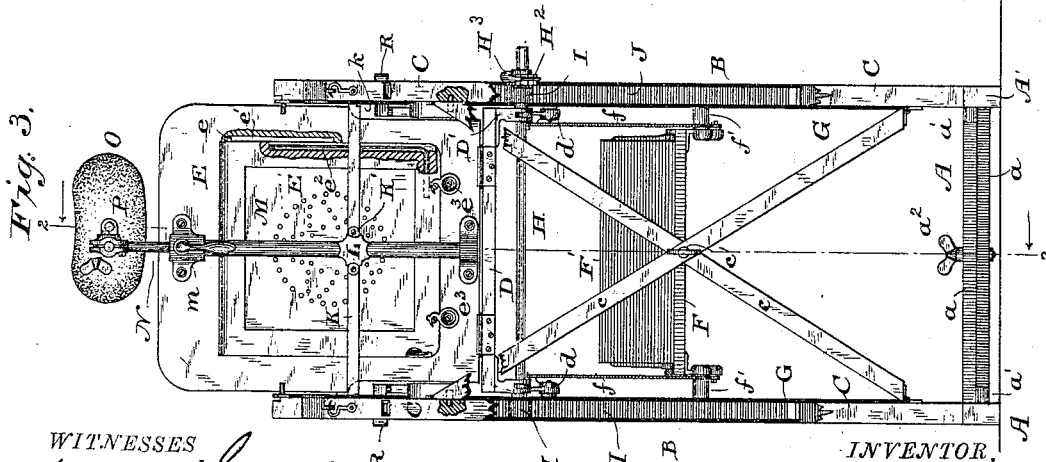
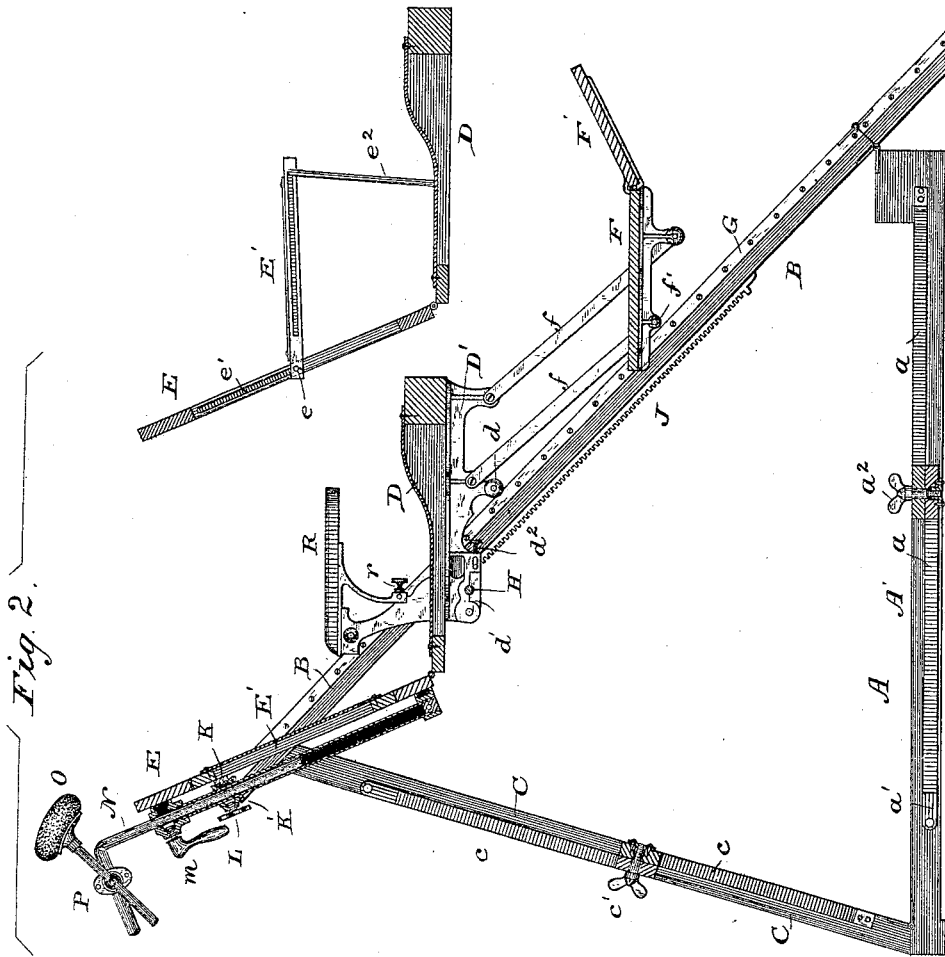
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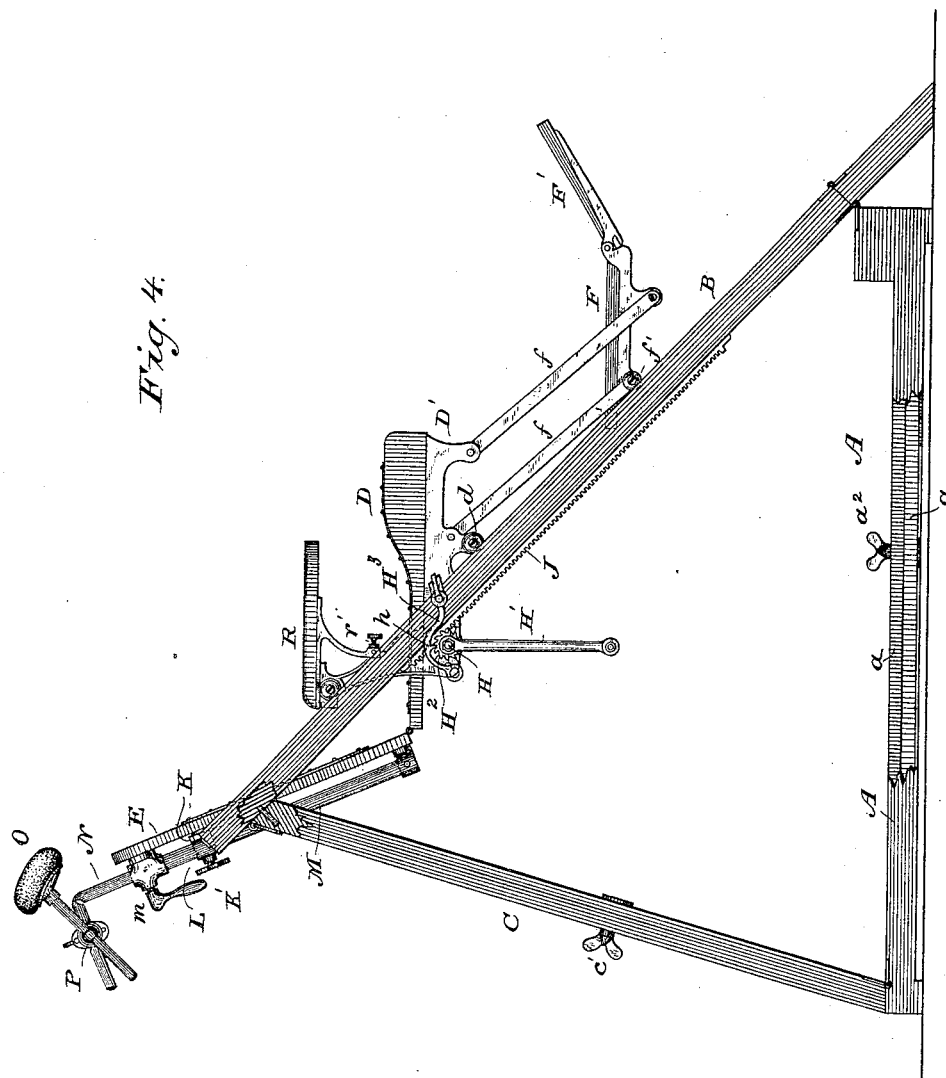
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Fig. 8.

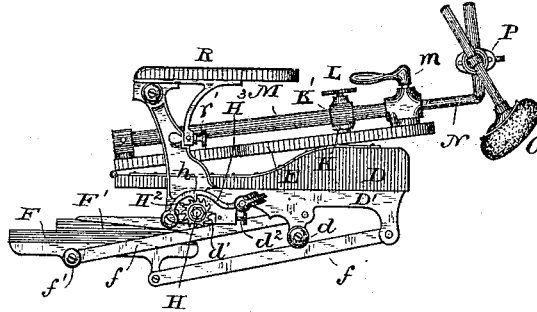


Fig. 9.

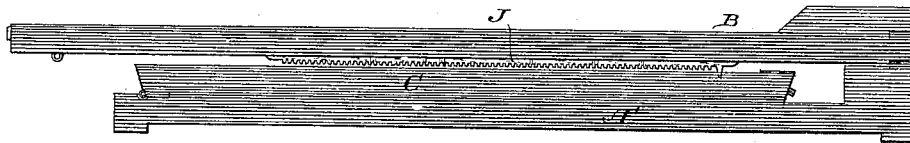
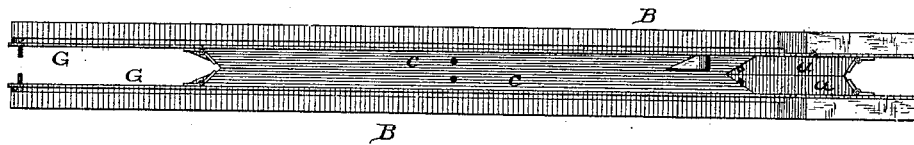


Fig. 10.



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(No Model.)

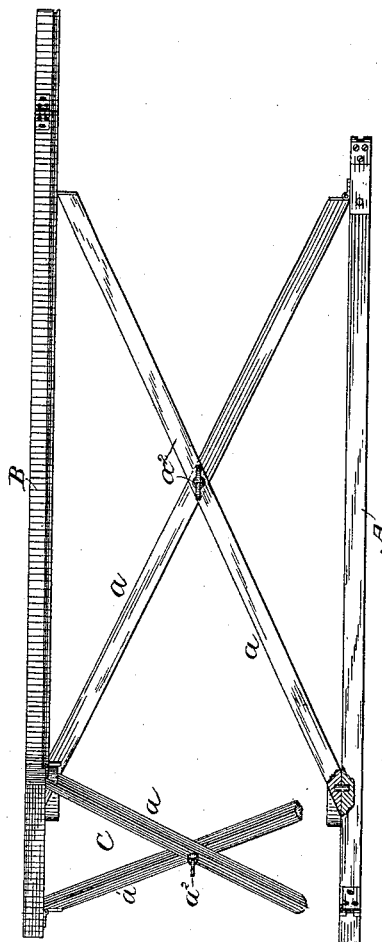
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Fig. 11.



WITNESSES

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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.

## ADJUSTABLE CHAIR.

SPECIFICATION forming part of Letters Patent No. 348,173, dated August 24, 1886.

Application filed July 27, 1883. Serial No. 102,088. (No model.)

*To all whom it may concern:*

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

My invention relates more particularly to a portable folding operating-chair; and its objects are to provide a comparatively cheap and substantial chair capable of being compactly folded for handling and transportation, and of being readily put together or set up in its operative condition.

My invention may be said to constitute an improvement upon the Ross operating-chair patented July 19, 1881.

The subject-matter claimed is particularly pointed out at the close of the specification.

The accompanying drawings illustrate my improvements as embodied in the best way now known to me. It will be understood, however, that the details may be varied unless otherwise indicated as essential, and that some of my improvements may be used without the others and in chairs of different kinds.

In said drawings, Figure 1 is a plan or top view of my improved chair in its operative condition. Fig. 2 is a longitudinal section through the chair on the line 2 2 of Figs. 1 and 3. Fig. 3 is a rear view of the improved chair, parts of which are broken away to more clearly illustrate or exhibit its construction. Fig. 4 is a view in elevation, parts of the chair being broken away for better illustration. Fig. 5 is a view of the detachable arm-rest, the support of which is in section to show the manner of attaching the arm to the chair. Fig. 6 is a sectional view through a portion of the seat-frame, showing the method of mounting the elevating shaft in said frame, so as to be capable of ready detachment. Fig. 7 is a sectional view through one of the foot-rest rollers or supports, one of its links, and a portion of said foot-rest. Fig. 8 is a view in elevation of the back, seat, and foot-rest folded together for transportation. Fig. 9 is a view in elevation of the stationary parts or base of the chair folded for transportation, and Fig. 10 is a plan or top view thereof. Fig. 11 is a

plan of the foundation-frame partly broken away.

The foundation-frame A is composed of two parallel bars, A' A', fastened together by cross-braces *a a*, hinged (in this instance) at their forward ends to the opposing faces of said bars near the front ends thereof, and provided at their rear ends with dowel-pins to fit suitable holes in said bars near their rear ends, suitable turn-buttons, *a' a'*, being provided on the said bars A' A' to secure or lock the dowel ends of said cross-braces in their bracing position, as shown in Figs. 2 and 3. A clamp-screw, *a''*, is passed through the cross-braces *a a*, where they pass each other, so as to lock or clamp them together.

Pivoted to the front end of the parallel bars A' A' of the foundation-frame are the front or lower ends of inclined bars B B, the rear ends of said latter bars being supported in their elevated or inclined position by means of supporting bars C C, hinged at their lower ends to the rear ends of the parallel bars A' A', and connected at their upper ends with the bars B B by means of a dowel-pin connection (see Fig. 4) and a hook and eye, or any suitable bolting or locking arrangement which will permit of securely fastening the parts together with the capability of ready separation. Said supporting-bars C C are connected together by cross-braces *c c*, hinged at one end, and capable of being locked to said bars at the other by suitable buttons or fastenings and dowel-pins and sockets like those described for fastening the free ends of the cross-braces *a a*. A clamp screw, *c'*, is passed through the cross-braces *c c*, so that when tightened the braces will be rigidly clamped together.

The inclined bars B B constitute a frame or guideway, upon which the movable or adjustable part of the chair is mounted. This movable part of the chair consists of a seat-frame, D, a back-frame, E, and a foot-rest frame, F. The seat-frame D is preferably made of wood, the seat of which is raised or enlarged at its front end, as shown in Figs. 1, 2, 4, and 8, to prevent the occupant of the chair from slipping or sliding forward during painful or violent operations. The seat-frame, on its under surface, at each side, is provided with suitable

castings, D' D', rigidly secured to the seat-frame and constituting part thereof. Said castings are provided with flanged rollers  $d$   $d$ , (two at each side of the seat-frame, preferably,) fitted to travel upon rails G G, firmly fastened on the inner faces of the inclined bars B B at their upper edges. (See Figs. 1, 2, and 10.) These rollers  $d$   $d$  support the seat-frame and the occupant, and permit the seat-frame to be readily raised and lowered upon the inclined bars B B, to secure the desired elevation of the patient to suit the particular operation to be performed. This raising and lowering of the seat-frame and occupant of the chair I prefer to accomplish by means of a pinion or elevating shaft, H, fitted to turn in bearings in the castings D' D' of said seat-frame, pinions I I, at or near the opposite ends of said shaft, meshing with the teeth of rack-bars J J, secured upon the under or lower edge of the side bars, B B, as clearly shown in Figs. 2, 3, 4, and 9. By the rotation of the elevating or pinion shaft by a suitable crank or handle, H', it is obvious that the seat-frame will be raised or lowered upon the inclined bars B B.

In order to lock the seat-frame in its vertically-adjusted position upon the said bars B B, I provide said traveling pinion or elevating shaft H with a ratchet-wheel, H', rigidly keyed or fastened thereon, and pivot on an extended portion of one of the castings D' of the seat-frame a hook or pawl, H<sup>2</sup>, the point or tooth  $h$  of which is adapted to engage the teeth of said ratchet-wheel, whereby it will be obvious that when said pawl or hook is in engagement with said ratchet-wheel the pinion or elevating shaft cannot be revolved in its bearings in the adjustable seat-frame in a direction to permit the seat to descend, and consequently, as the pinions are in engagement with the teeth of the fixed racks J J, the seat-frame is positively locked in its adjusted position as against descending movement. The pawl and ratchet are normally engaged. When the seat is to be lowered, the pawl is disengaged by its handle and the seat lowered by the crank if there be an occupant in the seat. As soon as released the pawl immediately engages the ratchet and locks the seat from descending. It will be observed that the racks J J upon the bars B B are on the under edge or side thereof, while the extension of the casting D', to which the locking-pawl H<sup>2</sup> is pivoted, extends over the upper edge or in front of one of said bars B B. I therefore mount the pinion or elevating shaft H so as to be capable of being readily separated from its bearings in the seat-frame and disconnected in order to permit of the removal of said seat-frame and parts connected therewith from the guide or inclined bars B B when the chair is to be packed or folded for transportation. To this end the bearings of the pinion-shaft H are formed in hinged pieces  $d'$   $d'$  of the castings D' D'. Said hinged pieces are capable of being locked in their closed position to constitute firm bearings for

the pinion-shaft, preferably by means of spring-bolts  $d''$   $d''$ , as clearly shown in Figs. 2, 3, and 6. The pinion-shaft H is thus rendered readily detachable from the seat-frame and rack-bars by the opening of the hinged bearing-pieces  $d'$   $d'$ , while when in place in its operative position it affords a firm and positive elevating device or mechanism. The shaft is readily inserted in its bearings for operation, as will be obvious.

The back-frame E is hinged at its lower end to the rear side of the seat-frame D, so as to be capable of being folded down upon the upper surface of said seat-frame for transportation, and so as to be capable of adjustment relatively to said seat-frame in operating to afford a comfortable rest for the occupant. This adjustment of the back relatively to the seat in operating is accomplished by means of a supporting-bar, K, mounted by means of a sliding connection, L, upon a rod, M, firmly fastened to the chair-back—for instance, by suitable brackets. The supporting-bar K is fastened in position upon the fixed rod M, on which it is capable of being adjusted up and down by means of a set-screw, K', which also constitutes a handle for adjusting said bar K upon the rod M. The ends of the supporting-bar K project beyond the sides of the back-frame, are preferably notched, as at  $k$ , to fit the guide-rails G G and rest upon said guide-rails G G of the bars B B, whereby it will be obvious that the back-frame is supported in a backward direction, and that as the bar K is adjusted up and down the back-frame will be supported at an inclination greater or less relatively to the seat of the chair, and so held by reason of the engagement of the ends of said bar K with the said guide-rails of the bars B B, as above described. The fixed rod M is tubular, and is fitted to receive a vertically-adjustable bent head-rest rod, N, carrying the head-rest O by means of a suitable clamp-connection, P, which permits a wide range of adjustment to be given to the head-rest. A suitable clamp-screw,  $m$ , serves to lock the head-rest rod N in the tubular rod M at any point desired.

No claim is made herein to the head-rest or its adjusting connections, as the one shown in the drawings is already patented, and may be readily superseded by other forms of clamp-connections which permit a wide range of movement to be given to the head-rest.

The foot-rest frame F is connected with the seat-frame D by jointed or link connections  $f$   $f$ , which permit the foot-rest to be readily folded under the seat-frame for transportation, as shown in Fig. 8, and said foot-rest frame is also provided with flanged supporting-rollers  $f'$   $f'$ , traveling on the guide-rails G G of the bars B B, so as to support said foot-rest frame and render its adjustment upon said bars B B smooth and easy. It will thus be seen that the seat-frame, back-frame, and foot-rest frame are all jointed together, so as to be capable of being folded in compact form, as

shown in Fig. 8, while when in their operative position ample room and a firm support for the occupant are afforded.

I prefer the foot-rest to be constructed in sections, or rather to be provided with a portion,  $F'$ , hinged, as shown in Figs. 1, 2, 3, 4, and 5, so as to be capable of being compactly folded, while when extended the front part,  $F'$ , of the foot-rest will lie at an angle to the main portion thereof, to afford a better rest for the feet of the occupant.

The arms  $R R$  of the chair are connected with the seat-frame  $D$  or an extension of the castings thereof by a detachable connection, preferably consisting of dowel-pins  $r$ , fitting holes or sockets in the upper edge of said castings, and a screw-bolt,  $r'$ , fitted to enter a screw-threaded socket, also formed in the extension of said castings. By this means the arms of the chair are capable of being almost instantly connected or disconnected, (the unscrewing of the bolts  $r'$  permitting the arms to be lifted off the seat-frame,) while when connected to the seat-frame they are rigidly fastened thereto.

In order to afford a supplemental or child's seat, I mount the chair-back proper,  $E'$ , in the back-frame  $E$ , so as to be capable of being swung out over the seat and supported, as shown in Fig. 2. The side edges of the back  $E'$ , near its upper end, are provided with dowels or trunnions  $e e$ , fitted to work in longitudinal grooves  $e' e'$  in the inner sides of the back-frame  $E$ , (see Figs. 2 and 3,) whereby the lower end of the back may be moved out over the main seat of the chair to a horizontal position, as shown in said Fig. 2, the trunnions sliding down in the grooves in the back-frame.

To support the outer or free end of the back when adjusted for use as a child's seat, I prefer to employ supporting-rods  $e'' e''$ , having bent ends, and fitted to recesses in the side edges of the back. When the back is not in use as a supplemental seat, the rods  $e'' e''$  are folded into their seats or recesses in the back, as shown in Fig. 3, and the back moved to its place in the back-frame. When, however, the back is adjusted to form a supplemental seat, the rods  $e'' e''$  are drawn out, so as to permit them to be turned down to rest at their lower ends on the main seat, so as to support the supplemental seat in a horizontal position, as shown in Fig. 2. The back, when in its normal position in its frame  $E$ , is locked therein by suitable hooks,  $e^3 e^3$ , engaging headed pins on the rear side of the back, as shown in Fig. 3.

To fold the chair for transportation, the pinion or elevating shaft  $H$  is first disconnected from the seat-frame. The movable parts of the chair are then removed from the stationary parts, (which latter consist of the foundation-frame, inclined bars, and their supports,) and are folded together, as shown in Fig. 8. The other parts of the chair are then readily folded together by disconnecting the upper ends of the supports  $C C$  from the bars

$B B$ , which operation permits said supports  $C C$  to be folded down upon the parallel bars  $A' A'$ , and the bars  $B B$  to be folded down upon said supports  $C C$ , as shown in Fig. 9. The thumb or clamp screws connecting the brace-bars  $a a$  and  $c c$  are then loosened, the free ends of said brace-bars are released from their fastening-buttons, and the side bars are then folded over against each other, as shown in Fig. 10. The chair is now in a compact form for transportation by the dentist in a buggy or otherwise, while when it is desired to set it up the operation consumes but a few minutes, as will be obvious from what has been said.

The chair, when in its operating condition, is very secure, while its wide range of adjustments permit the patient to be placed in the most advantageous positions for the performance of delicate operations.

The chair is especially designed for the use of traveling dentists.

In respect to the following seventh clause of the claim herein made, I desire to enter my disclaimer to separable spring-lock bearings, broadly considered. Said claim is for a novel combination of parts in a dental chair, and is not, broadly, to such bearings.

What I claim as my invention is—

1. The combination, with the inclined bars and their supports, of the foundation-frame of the folding chair, consisting of the parallel side bars connected together by cross-braces, one of which is jointed at one end to one of said bars, and the other of which is likewise jointed to the other of said bars, the locking-connections for the opposite ends of said braces, and the securing device for said braces at the point where they cross each other intermediate of their ends, substantially as described.

2. The combination of the foundation-frame, the inclined bars on which the movable parts of the chair are mounted, and the supporting-bars of said inclined bars, said foundation-frame consisting of parallel bars connected together by folding cross-braces united at their centers by a clamping device, and said supporting-bars being likewise connected together by similar braces also united at their points of intersection by a clamping device, substantially as described, whereby said frame, inclined bars, and supports may be compactly folded together, while in their operative position they are firmly braced and securely clamped.

3. The combination of the foundation-frame, the inclined bars provided with racks or teeth, and the folding supports of said bars, with a seat-frame mounted on said inclined bars provided with an elevating-shaft and pinion to adjust said seat-frame vertically on said bars, substantially as described.

4. The combination, with the foundation-frame and supports for the inclined bars of a folding chair, of said inclined bars, fitted with rack-teeth on one side and guide-rails on the opposite side, a seat-frame fitted to travel on said guide-rails in front thereof and be sup-



ported and adjusted thereon, and a shaft and pinion carried by said seat-frame to gear with said rack-teeth, substantially as described.

5 The combination of the inclined bars provided with guide rails with the adjustable seat-frame provided with rollers fitted to travel on said rails, and with an elevating-shaft to raise and lower said seat-frame, and with a foundation-frame and supports for said inclined bars, substantially as described, whereby the weight is sustained by said rollers and said shaft relieved therefrom to a large degree.

6. The combination, with a foundation-frame, inclined bars, and supports for said bars, of a traveling seat-frame mounted on said inclined bars and fitted to travel on the upper side thereof, an elevating-shaft carrying a pinion and mounted in separable bearings in said traveling frame, rack-teeth on the under side of said inclined bars, with which said pinion meshes, and a locking device for the elevating-shaft, substantially as described.

7. The combination of the traveling seat-frame of the chair and the bars upon which it is mounted, of the elevating-shaft of said seat-frame, the separable bearings for said shaft, and the spring-locking device of said bearings, substantially as described, whereby said shaft may be readily detached from and connected with said seat-frame to permit of the ready separation or connection of the parts.

8. The combination of the inclined bars, the seat-frame mounted on said bars, the back-frame jointed to said seat-frame between said bars, and the adjustable bar K, fitted to said back-frame by sliding clamp-connection, and extending so as to rest on said inclined bars to support said back-frame and enable its inclina-

tion relatively to said seat-frame to be varied, substantially as set forth.

9. The combination, with the back-frame, of the back jointed to said frame by means of lateral trunnions or dowels of the back fitting longitudinal grooves in said back-frame, and said back being provided with folding supporting-rods, substantially as described, whereby the back may be adjusted over the main seat and be supported in its adjusted position, as set forth.

10. In combination with the seat-frame of the chair, the detachable arm fitted to said seat-frame by a pin-and-socket connection, and by an additional adjustable screw-bolt fitting a screw-socket in said frame at an angle to said pin-and-socket connection, substantially as described, whereby a rigid connection of the arm with the seat-frame is secured, while said arm is readily and rapidly detached and attached by the operator in using the chair.

11. The combination, with the inclined bars and their foundation-frame and supports, of a seat-frame and foot-rest frame fitted to travel on said inclined bars, and the jointed connection between said seat and foot-rest frames, substantially as described, whereby the foot-rest frame is firmly connected with the seat-frame so as to travel therewith, while it is independently supported on the inclined bars below said frame.

In testimony whereof I have hereunto subscribed my name this 8th day of September, A. D. 1882.

ELI T. STARR.

Witnesses:

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E. V. BROWN.