

(No Model.)

4 Sheets—Sheet 1.

J. W. COOPER.

DENTAL CHAIR.

No. 378,433.

Patented Feb. 28, 1888.

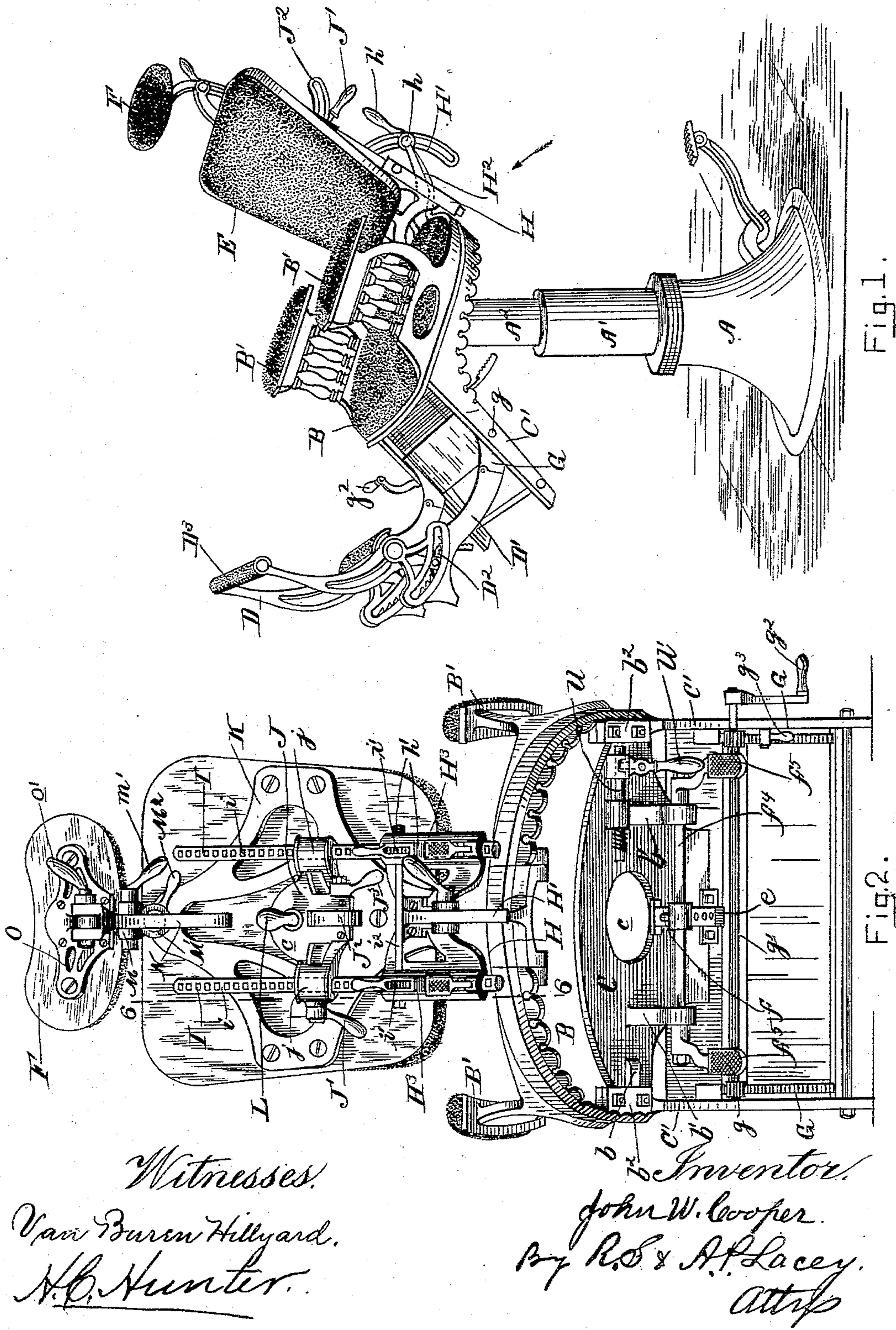


Fig. 1.

Fig. 2.

Witnesses.

Van Buren Hillyard.  
H. C. Hunter.

Inventor.  
John W. Cooper.  
By R. O. & A. P. Lacey.  
Attys



(No Model.)

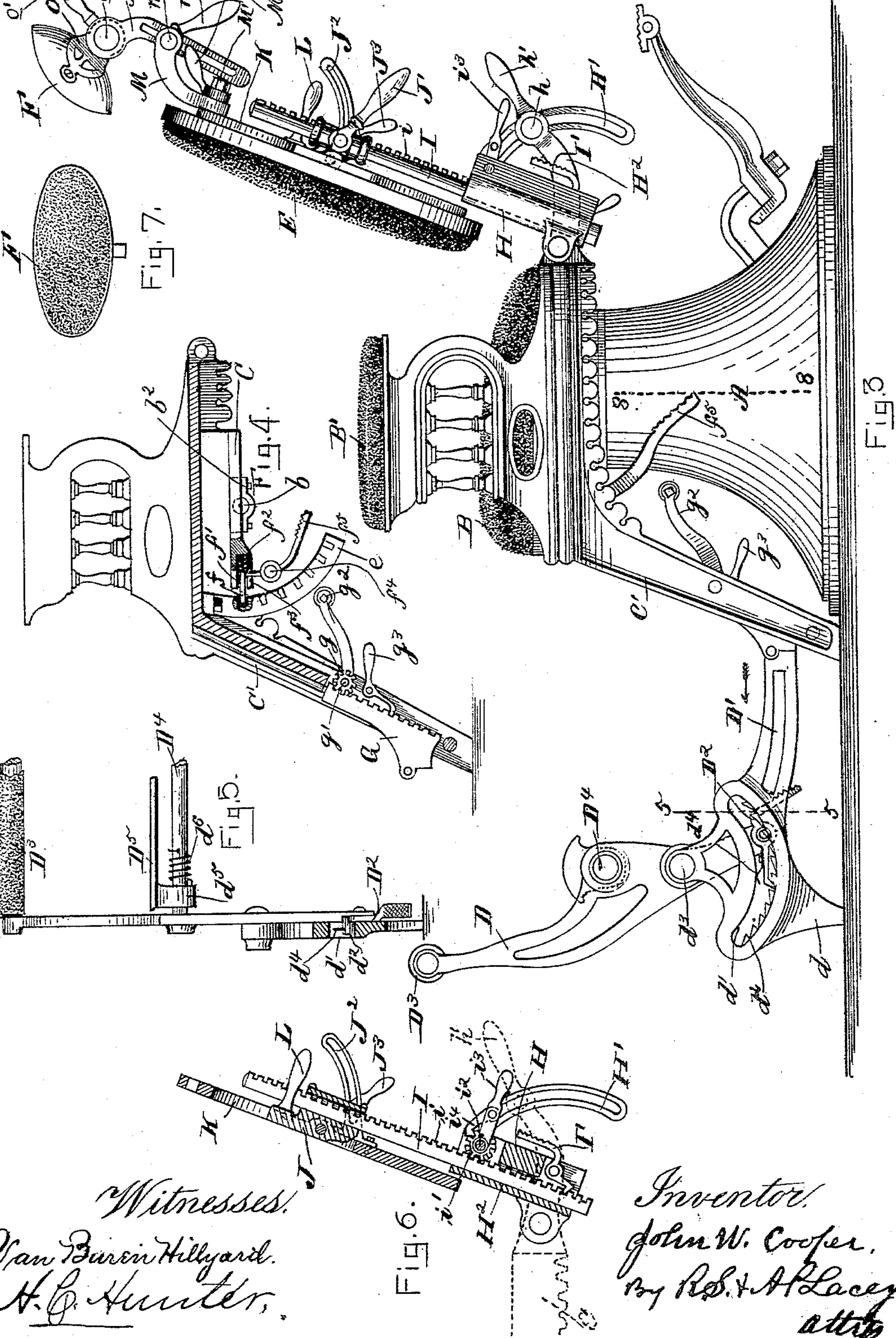
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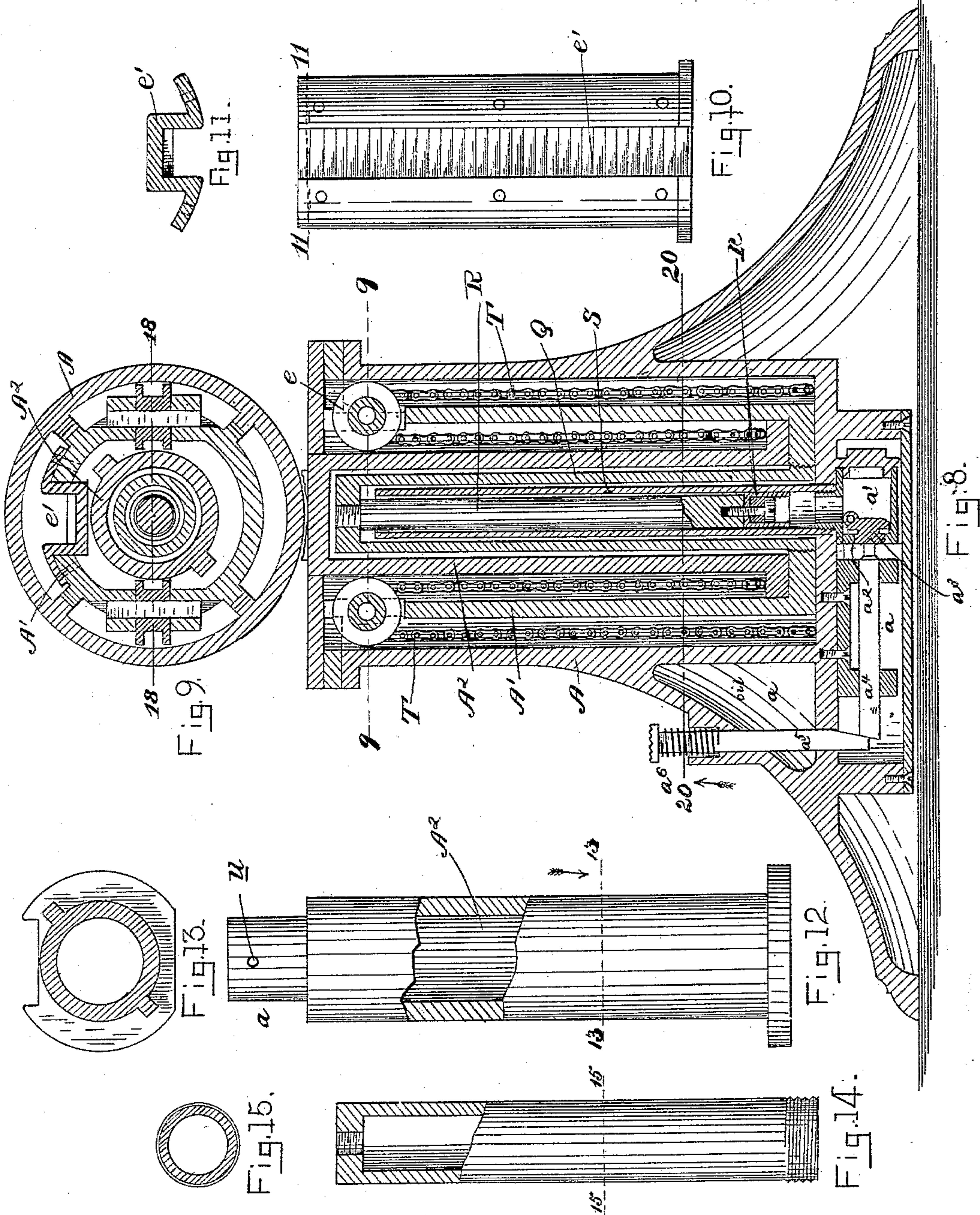
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4 Sheets—Sheet 4.

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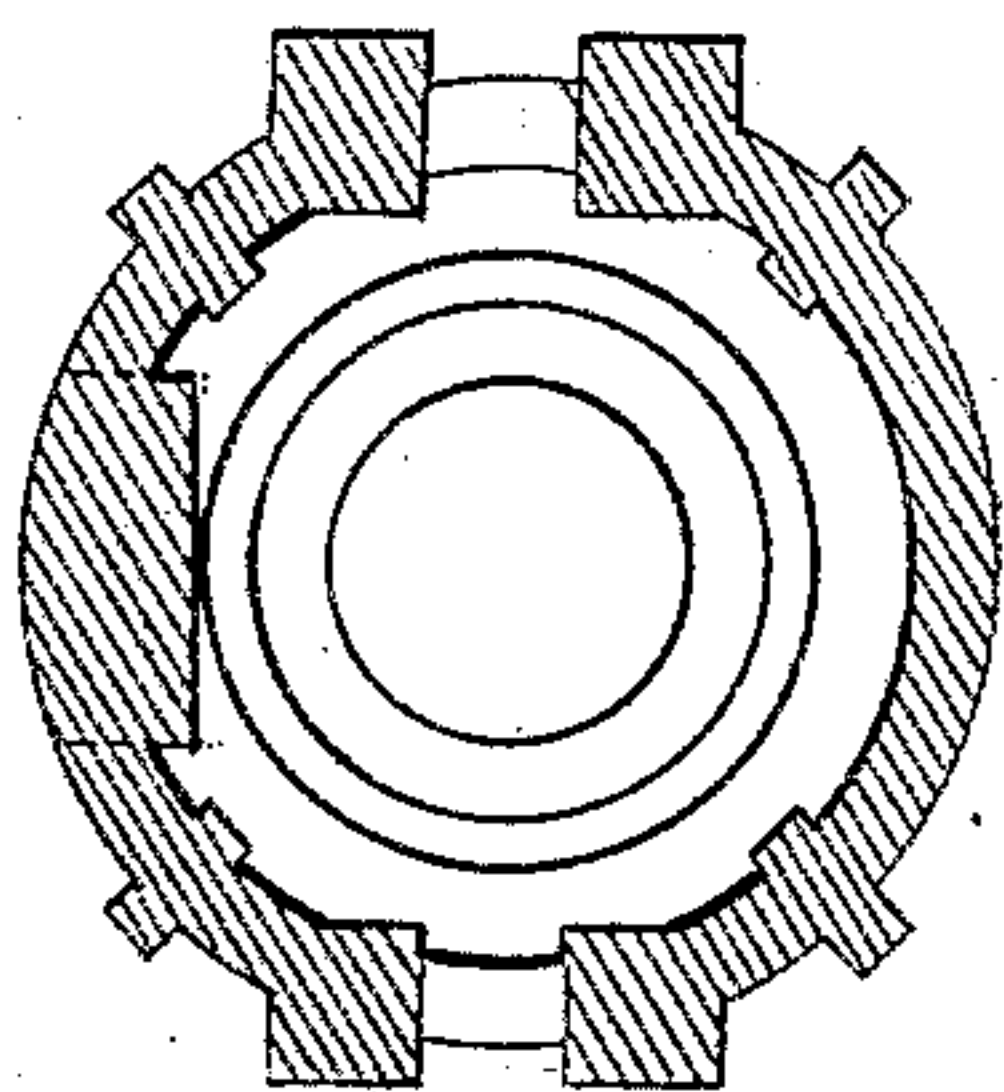


Fig. 19.

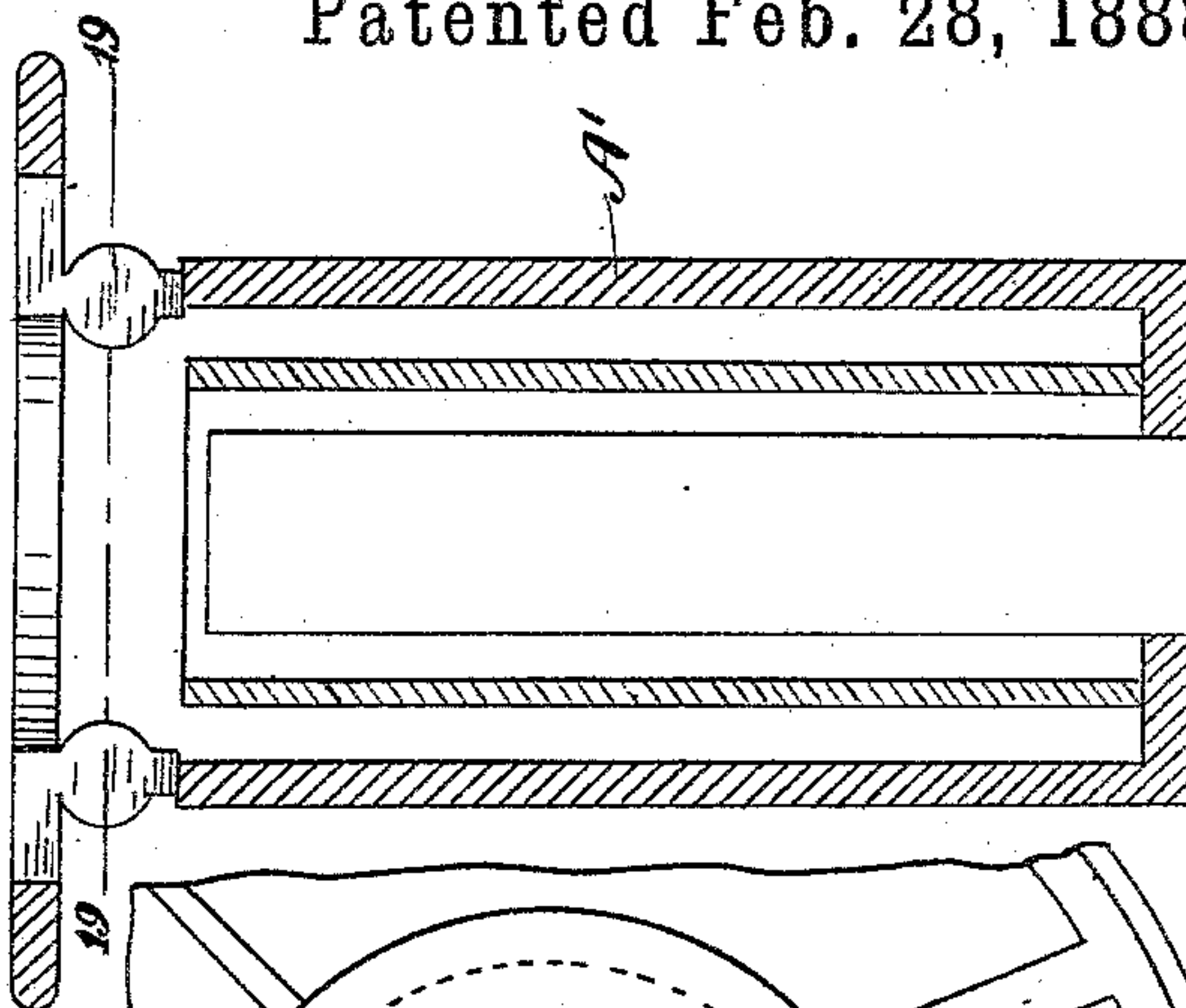


Fig. 18.

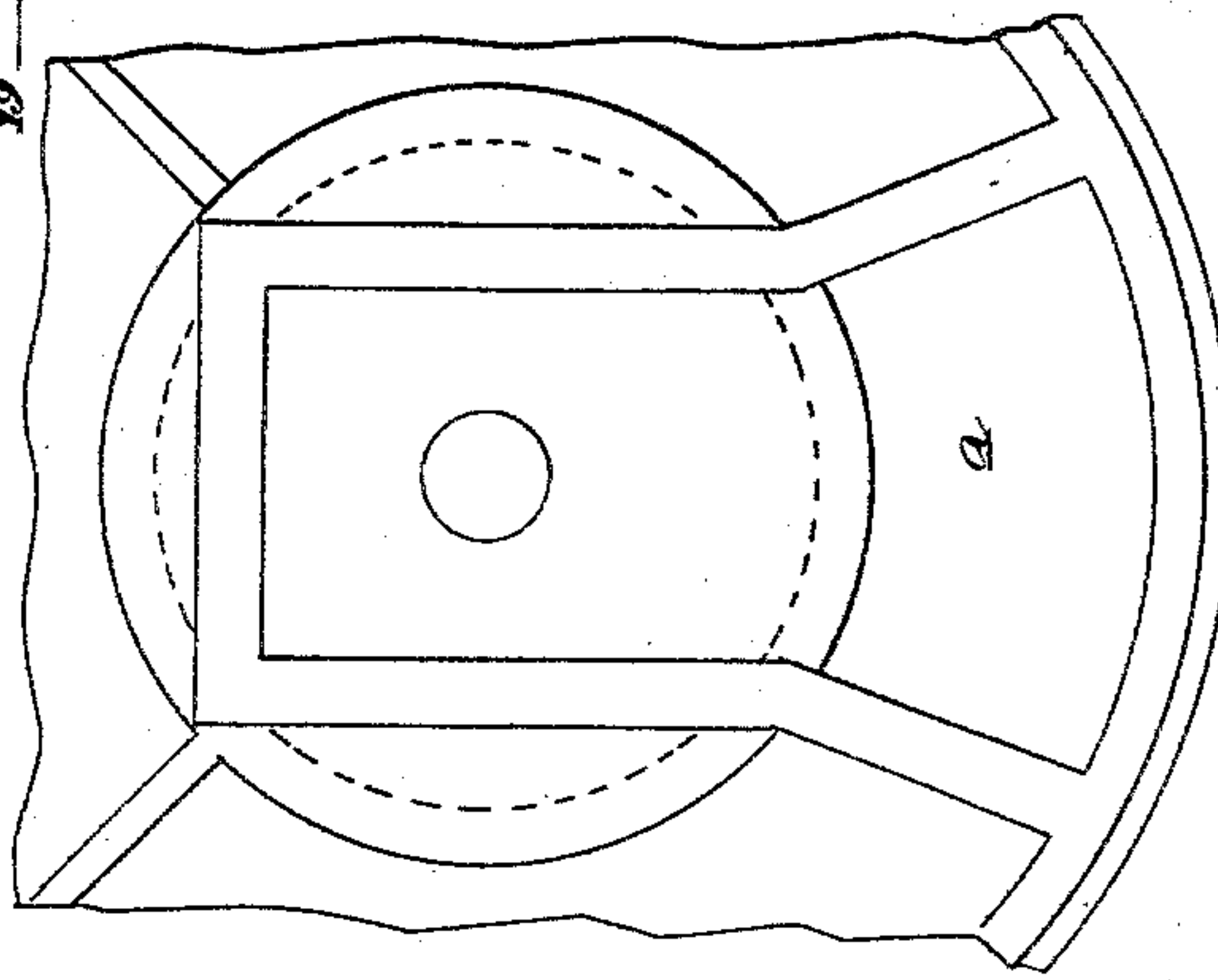


Fig. 17.

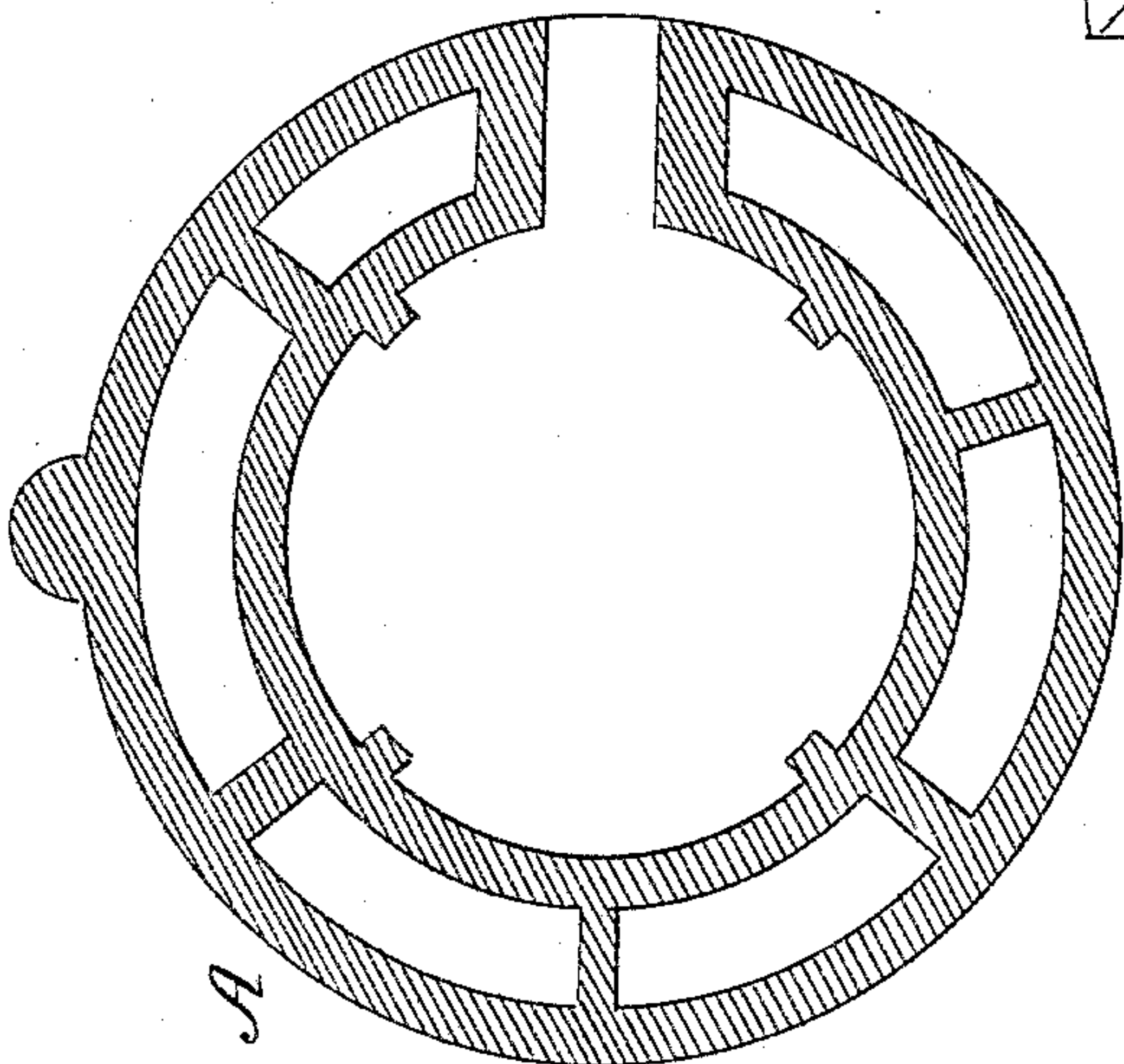


Fig. 20.

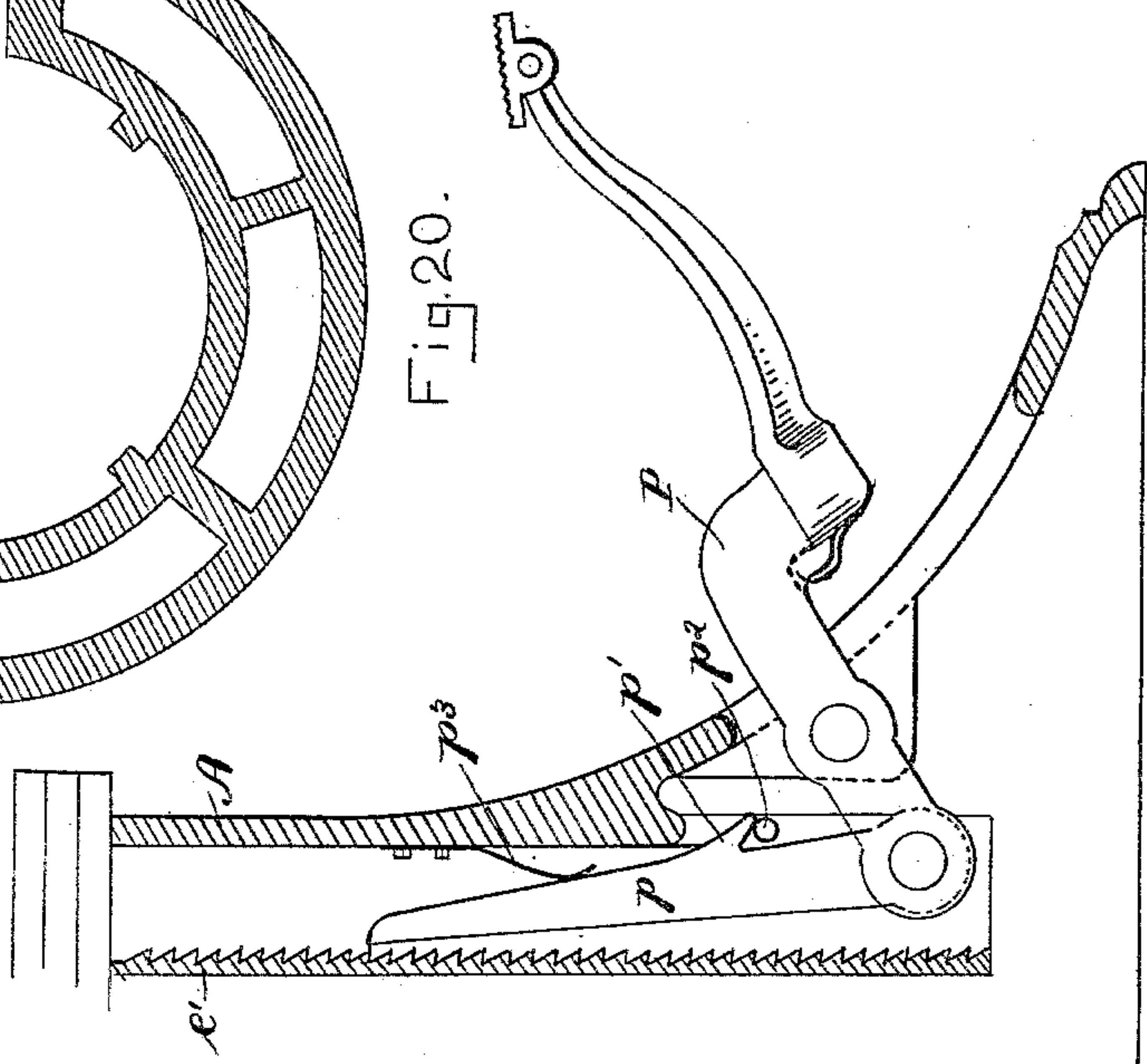


Fig. 16.

Witnesses:  
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# UNITED STATES PATENT OFFICE.

JOHN W. COOPER, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF  
TO ROBERT A. HOLLIDAY, OF ATLANTA, GEORGIA.

## DENTAL CHAIR.

SPECIFICATION forming part of Letters Patent No. 378,433, dated February 28, 1888.

Application filed March 15, 1887. Serial No. 230,969. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN W. COOPER, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful  
5 Improvements in Dental Chairs; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable  
10 others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to an improved dental  
15 chair, and has for its object the production of a chair which can be adjusted to any height or level and in which the seat, the foot-rest, and the back are independently adjustable.

The improvement consists in the novel features by which the foregoing results are accomplished in a simple, convenient, and efficient manner, which will be more fully hereinafter described, claimed, and shown in the annexed drawings, in which—

25 Figure 1 is a perspective view of a chair embodying my invention; Fig. 2, a rear view looking in the direction of the arrow, Fig. 1; Fig. 3, a side view on an enlarged scale; Fig. 4, a detail view, partly in section, of the seat and leg; Fig. 5, a detail view, partly in section, of the foot-rest on the line 5 5 of Fig. 3; Fig. 6, a sectional view of the back on the line 6 6 of Fig. 2; Fig. 7, a front view of the head-rest; Fig. 8, a vertical central sectional view  
35 on the line 8 8 of Fig. 3, on an enlarged scale; Fig. 9, a sectional view of the standard on the line 9 9 of Fig. 8. Fig. 10 is an isolated view in elevation of the rack that is attached to the positively-actuated section of the standard; Fig. 11, a section of the rack on the line 11 11 of said Fig. 10; Fig. 12, an isolated view, with parts broken away, of the section of the standard on which the seat is directly supported; Fig. 13, a transverse section on the line 13 13 of Fig. 12; Fig.  
45 14, an isolated view, parts being broken away, of the section of the standard that has the plunger affixed thereto; Fig. 15, a transverse section on the line 15 15 of Fig. 14. Fig. 16 is a detail view, partly in section, of the standard, showing the positively-actuated part of  
50 the standard, the operating-pawl, and the foot-

lever; Fig. 17, a bottom view, parts being broken away, of the standard; Fig. 18, a vertical central sectional view of the positively-actuated section of the standard on the line 55 18 18 of Fig. 9. Fig. 19 is a transverse sectional view on the line 19 19 of Fig. 18; and Fig. 20, a section of the standard or outside casing on the line 20 20 of Fig. 8.

The chair is composed of the standard consisting of the casing A and the telescoping sections A' and A<sup>2</sup>, the seat B, having the arms B' B', mounted upon the reduced end a of the section A<sup>2</sup>, which reduced end a of the section A<sup>2</sup> fits in the opening c of the seat-casting C, secured to the bottom of the seat, the foot-rest consisting of the folding parts D and D', the back E, and the head-rest F. The foot-rest, seat, back, arms, and head-rest are upholstered in a manner to suit the divers  
60 tastes and requirements of purchasers.

The foot-rest is pivotally connected at its inner end to the adjustable plates G, mounted upon the legs C'. The rear edges of these plates are toothed and the teeth mesh with  
75 pinions g g on the shaft g', journaled between the legs C', which shaft g' is rotated by any suitable means for adjusting the plates and foot-rest up and down, preferably by the crank g<sup>2</sup>, secured to the end projected on one side  
80 beyond the leg C'. The plates G are held in an adjusted position by the pawl g<sup>3</sup>.

The part D' of the foot-rest has its forward portions extended downward, forming supports d, and provided with curved slots d', the  
85 lower sides of which are formed with teeth d<sup>2</sup>. The part D is pivotally connected with the part D' at d<sup>3</sup>, and is extended in opposite directions on each side of the pivotal point. The lower end is provided with the pawl D<sup>2</sup>, the front  
90 end of this pawl being adapted to engage with any one of the teeth d<sup>2</sup> for holding the part D at any angle relative to the part D'. The rear end is downward and is serrated, and is adapted to be pressed upon by the foot, so as to disengage the front end of the pawl from the teeth  
95 when it is desired to adjust the part D. The spring d<sup>4</sup>, secured to the top of the pawl and bearing on the upper side of the slot d', holds the pawl in engagement with the teeth d<sup>2</sup> 100 against accidental displacement. The part D is composed of two side pieces constructed ex-



actly alike and united at their upper ends by the foot-supporting cross-bar  $D^3$  and midway their ends by the cross-bar  $D^4$ , upon which is mounted the foot-support  $D^5$  by the brackets  $d^5$ , depending therefrom and journaled upon the cross-bar  $D^4$ . The foot-support  $D^5$  is yieldingly held above the cross-bar  $D^4$  by the spring  $d^6$ , coiled about the cross-bar and secured thereto at one end and fastened at its opposite end to the bracket  $d^5$ .

The back-supporting casting H is pivotally connected at its lower end with the seat-casting, and from its upper end projects rearwardly and downwardly the slotted bar  $H'$ , which rests against the side of the arm  $H^2$ , projected from the seat-casting. The bolt  $h$ , passed through the slot in the bar  $H'$  and through the arm  $H^2$ , is provided with the hand-nut  $h'$  on its outer end, for clamping the arm and bar together and holding them at any desired adjustment, whereby the inclination of the back relative to the seat can be readily regulated. The back-supporting casting is provided with two sockets,  $H^3$ , through which pass the back supports or bars I. These bars have teeth  $i$  on their rear sides, which mesh with pinions  $i'$  on the shaft  $i^2$ . The hand-levers  $i^3$ , bifurcated at their inner ends and mounted upon the shaft  $i^2$ , so as to embrace the pinions between their bifurcated ends, have pawls  $i^4$  pivoted between the bifurcated ends, which are adapted to engage with the teeth of the pinions when the hand-levers are depressed, for rotating them for adjusting the back or bars, and ride over said teeth when the levers are elevated. The bars are held in an adjusted position by the foot-pawls  $I'$ , located at the lower ends of the sockets  $H^3$ . The upper ends of the bars I extend through sockets  $j$ , which form a part of the casting J, pivotally connected with the casting K, which is secured to the rear of the back. The casting J is bodily adjustable upon the bars I, and is secured in its adjusted position by the hand nut or bolt  $J'$ , extended through one of the sockets  $j$ . The slotted arm  $J^2$ , projected from the casting K, is adjustably connected with the casting J by the hand nut or bolt  $J^3$ . By this means the back can be adjusted to any desired inclination relative to and independently of the bars or supports I. A hand-hold, L, is provided, which facilitates the adjustment of the back, as it affords a convenient projection for grasping by the hand. The bracket M, secured to the top of the casting K by the bolt  $M'$  and hand-nut  $M^2$ , can be adjusted from side to side about the bolt as an axis, and is held in an adjusted position by the hand-nut  $M^2$ . The upper end of the bracket is bifurcated and receives the slotted casting N, which is held thereto by the bolt  $m$  and the hand-nut  $m'$ . The casting O, having the head-rest on its outer end, is connected with the slotted casting N by a bent hinge-joint, of which the bolt  $o$  is the pintle, and has the hand-nut  $o'$  on one end to stiffen the joint when the casting O and N are adjusted relative to each other.

The section A has an oil-reservoir,  $a$ , formed

in its base, which communicates with a centrally-located oil-chamber,  $a'$ , through the opening  $a^2$ , which is closed by the hinged valve  $a^3$ , which is opened by the horizontal bar  $a^4$  and the vertical bar  $a^5$ . The horizontal bar is mounted in brackets, so as to slide longitudinally. The inner end thereof bears against the valve  $a^3$ , and the outer end is inclined and bears against a corresponding inclined side of the vertical bar, which is held normally elevated by the spring  $a^6$ . The section  $A'$  fits within the section A, and has the pulleys  $e$  journaled at its upper end upon diametrically-opposite sides. One side is provided with the rack  $e'$ , bolted thereto, which rack is adapted to be engaged by the pawl  $p$ , carried by and mounted upon the inner end of the foot-lever P, supported by the section A near to its base. The pawl  $p$  is provided with a rearwardly and downwardly extended projection,  $p'$ , which is adapted to ride over a pin,  $p^2$ , and disengage the pawl from the rack. The spring  $p^3$  holds the pawl in engagement with the rack when the lever P is depressed and the projection  $p'$  is released from the stop  $p^2$ . The lower end of the section  $A'$  is closed, except a central opening, in which is secured the lower end of the tube Q, which is closed at its upper end, and carries the plunger R, that fits and works within the tube S, secured to and projected upward from the base of the section A. The lower end of the plunger is provided with a packing,  $r$ , forming a tight joint between the plunger and the interior of the tube S.

The section  $A^2$  is closed at its upper end, which end is projected and reduced, and carries the seat which is mounted thereon. It fits over the tube Q within the space between said tube and the section  $A'$ . The chains or cables T are passed over the pulleys  $e$ , and have their ends connected with the lower ends of the sections A and  $A^2$ , respectively.

The several sections are distended or projected by moving the foot-lever P, which, through the pawl  $p$  and rack  $e'$ , moves the section  $A'$  upward and causes a tension to come upon the cables or chains T, which are fixedly secured at their outer ends to the section A. The inner ends of the chains or cables being secured to the movable section  $A^2$ , the latter is forced to move upward and carries the seat with it. During the upward movement of the section  $A'$  the tube Q and plunger R are simultaneously elevated, which latter draws the oil or other fluid from the reservoir up to the tube S. As the oil is drawn into the chamber  $a'$  and up into the tube S the valve  $a^3$  opens; but when the sections are sufficiently projected and begin to settle down the valve  $a^3$  closes and confines the oil in the tube beneath the plunger R, which is thereby prevented from moving down, and holds the sections distended. To lower or contract the sections, pressure is applied to the top of the bar  $a^5$ , which, through the bar  $a^4$ , opens the valve  $a^3$  and permits the confined fluid to again escape into the reservoir  $a$ . The pressure being removed from the



bar  $a^5$ , the valve will close and hold the seat at any desired point of adjustment, as will be readily comprehended.

The seat-casting C has gudgeons  $b$  at each end, which are journaled in the boxes  $b^2$ , secured to and depending from the seat, which tilts about said gudgeons as an axis. The curved bar  $e$ , secured to the seat and projected downward in front of or through an opening in the seat-casting, is provided with a series of notches on its rear side, any one of which is adapted to be engaged by the pawl  $f$  and hold the seat in the desired adjusted position. The pawl  $f$  is seated in the socket  $f'$  in the seat-casting, and is held projected by the spring  $f^2$  fitting in the socket and bearing upon the rear end of the pawl. The socket is slotted, and an arm,  $f^3$ , projected through the slot, engages with the pawl for disengaging the same from the curved notch-bar  $e$ . The arm  $f^3$  extends from the shaft  $f^4$ , journaled in bearings  $b'$ , pending from the seat-casting. The ends of the shaft project beyond the bearings and have foot-levers  $f^5$  secured thereto. To adjust the seat, one of the levers  $f^5$  is pressed upon and through the shaft  $f^4$ , and the arm  $f^3$  disengages the pawl  $f'$  from the notch-bar. The seat, being thus free to turn about its gudgeons, is adjusted, and, pressure being removed from the foot-lever, the pawl enters one of the notches in the curved bar and holds the seat in its adjusted position.

The seat-casting is secured to the top of the section  $A^2$  by the sliding bolt U, projected in the opening  $u$  in the reduced end  $a$  of said section. The sliding bolt is operated by the pivoted lever  $U'$ .

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, with the seat-casting, the legs, and the adjustable plates, of the foot-rest composed of two parts pivotally connected together, secured to said plates by a pivotal connection, substantially as and for the purpose described.

2. The combination, with the seat and the part  $D'$  of the foot-rest, having a curved slot,  $d'$ , at its forward end and the teeth  $d^2$  at one side of the slot, of the part D, pivotally connected with the part  $D'$  and extending in opposite directions from the pivotal connection, and the pawl carried by the part D and adapted to engage with the teeth and hold the parts relatively adjusted.

3. The combination, with the part  $D'$ , having the curved slot  $d'$ , provided with the teeth  $d^2$  on its under side, of the part D, pivotally connected with the part  $D'$ , and having its lower end extended, the pawl mounted upon the end of the part D and adapted to engage with the teeth  $d^2$ , and the spring  $d^4$ , bearing upon the upper side of the curved slot for holding the pawl in engagement with the teeth, substantially as set forth.

4. The combination, with the foot-rest composed of two side pieces, the foot-supporting

cross-bar uniting the side pieces at their upper ends, and the cross-bar  $D^4$ , uniting them midway of their ends, of the foot-support  $D^5$ , having brackets depending therefrom, which are mounted upon and adapted to tilt about the cross-bar  $D^4$ , and the springs  $d^6$ , coiled about the cross-bar  $D^4$  and fastened at one end to the brackets and at the other ends to the cross-bar, substantially as set forth.

5. The combination, with the seat and the arm  $H^2$ , projected rearwardly and upwardly therefrom, of the back-supporting casting pivotally connected at its lower end with the seat, the slotted bar  $H'$ , extended rearwardly and downwardly from the upper end of the back-supporting casting, the bolt  $h$ , and the hand-nut  $h'$ , for coupling the bar against the arm  $H^2$ , substantially as and for the purpose described.

6. The combination, with the back-supporting casting having a socket, and the back-support or toothed bar passed through said socket, of the pinion journaled upon a horizontal shaft and meshing with the rod, the hand-lever bifurcated and embracing the pinion, the pawl carried by said lever and adapted to engage with the teeth of the pinion, and the pawl carried by said casting for holding the bar in an adjusted position, substantially as set forth.

7. The combination, with the seat, the casting J, and means, substantially as described, for adjustably connecting the casting J with the seat, of the casting K, secured to the back and pivotally connected with the casting J, the slotted arm  $J^2$ , projected rearwardly and upwardly from the casting K, and the hand-nut  $J^3$ , substantially as and for the purpose specified.

8. The combination, with the seat, the casting J, means, substantially as set forth, for adjustably connecting the casting with the seat, and the hand-hold L, forming a part of the casting J, of the casting K, pivotally connected with the casting J, and means, as the slotted arm  $J^2$  and the hand-nut  $J^3$ , for holding the casting K in an adjusted position, substantially as described.

9. The combination, with the back-casting K, the bolt  $M'$ , extended therefrom, the bracket M, bifurcated at its upper end and mounted upon the bolt and adapted to tilt about it as an axis, and the hand-nut  $M^2$ , placed upon the bolt for clamping the bracket between the casting K and the hand-nut, of the slotted casting N, fitted in the bifurcated end of bracket M, the bolt  $m$ , the hand-nut  $m'$ , the casting O, carrying the head-rest, the bolt  $o$ , and the hand-nut  $o'$ , for connecting casting O with casting N, substantially as set forth.

10. The combination of the section A, the telescoping section  $A'$ , the oil-reservoir  $a$ , the oil-chamber  $a'$ , the valve  $a^3$ , the tube Q, the plunger R, and the tube S, substantially as set forth.

11. The combination, with the section A, having the oil-reservoir  $a$  and the communicating oil-chamber  $a'$ , the telescoping section  $A'$ , the plunger connected with and carried



by the section A', and the tube surrounding the plunger and communicating with the oil-chamber  $a'$ , of the valve  $a^3$ , the horizontal rod  $a^4$ , and the rod  $a^5$ , mounted to work in the vertical bearings, substantially as specified.

12. The combination of the section A, having an oil-reservoir  $a$ , and the oil-chamber  $a'$ , the valve  $a^3$ , means, substantially as described, for operating the valve, the tube S, communicating with the oil-chamber  $a'$  and connected with the section A, the telescoping section A', the tube Q, connected at its lower end with the section A', the plunger secured to and depending from the tube Q, and means, substantially as described, for moving said section A', for the purpose specified.

13. The combination of the section A, the telescoping section A', the rack  $e$ , and the pawl  $p$ , the projection  $p'$ , the stop  $p^2$ , and the foot-lever P, substantially as described.

14. The combination of the section A, the telescoping section A', means, substantially as specified, for moving the section A', the rollers  $e$ , the section A<sup>2</sup>, and the chains passed over the rollers  $e$  and connected at their ends with the sections A and A<sup>2</sup>, substantially as set forth.

15. The combination of the section A, having the oil-reservoir  $a$  and the oil-chamber  $a'$ , the hinged valve  $a^3$ , the horizontally-sliding rod  $a^4$ , having its inner end bearing against the valve, the vertically-moving rod  $a^5$ , the tube S, the telescoping section A', the tube Q, fitted over the tube S and secured at its lower end to the section A', the plunger carried by

the tube Q, the section A<sup>2</sup>, the chains passed over the section A' and secured at their ends to the sections A and A<sup>2</sup>, respectively, the rack, the pawl provided with the projection  $p'$ , the pin  $p^2$ , for disengaging the pawl from the rack on the back-stroke of the pawl, and the front lever, substantially as set forth.

16. The combination, with the section A, the telescoping section A', and the operating-lever P, of the rack, the pawl having the projection  $p'$ , and the pin  $p^2$ , for engaging with the projection and disengaging the pawl from the rack, substantially as and for the purpose specified.

17. The combination, with the seat and the seat-casting, pivotally connected with the seat and provided in its front edge with a socket, and the slot extending into the socket, of the curved notched bar  $e$ , secured to and depending from the seat, the pawl  $f$  and the spring  $f^2$ , seated in said socket in the seat-casting, the shaft  $f^4$ , journaled in bearings depending from the seat-casting, the arm  $f^3$ , extended from the shaft and having its outer end projecting through said slot and engaging with pawl  $f$ , and the foot-lever  $f^5$ , substantially as and for the purpose specified.

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

JOHN W. COOPER.

Witnesses:

WM. H. MILLER,  
WM. S. MILLER.