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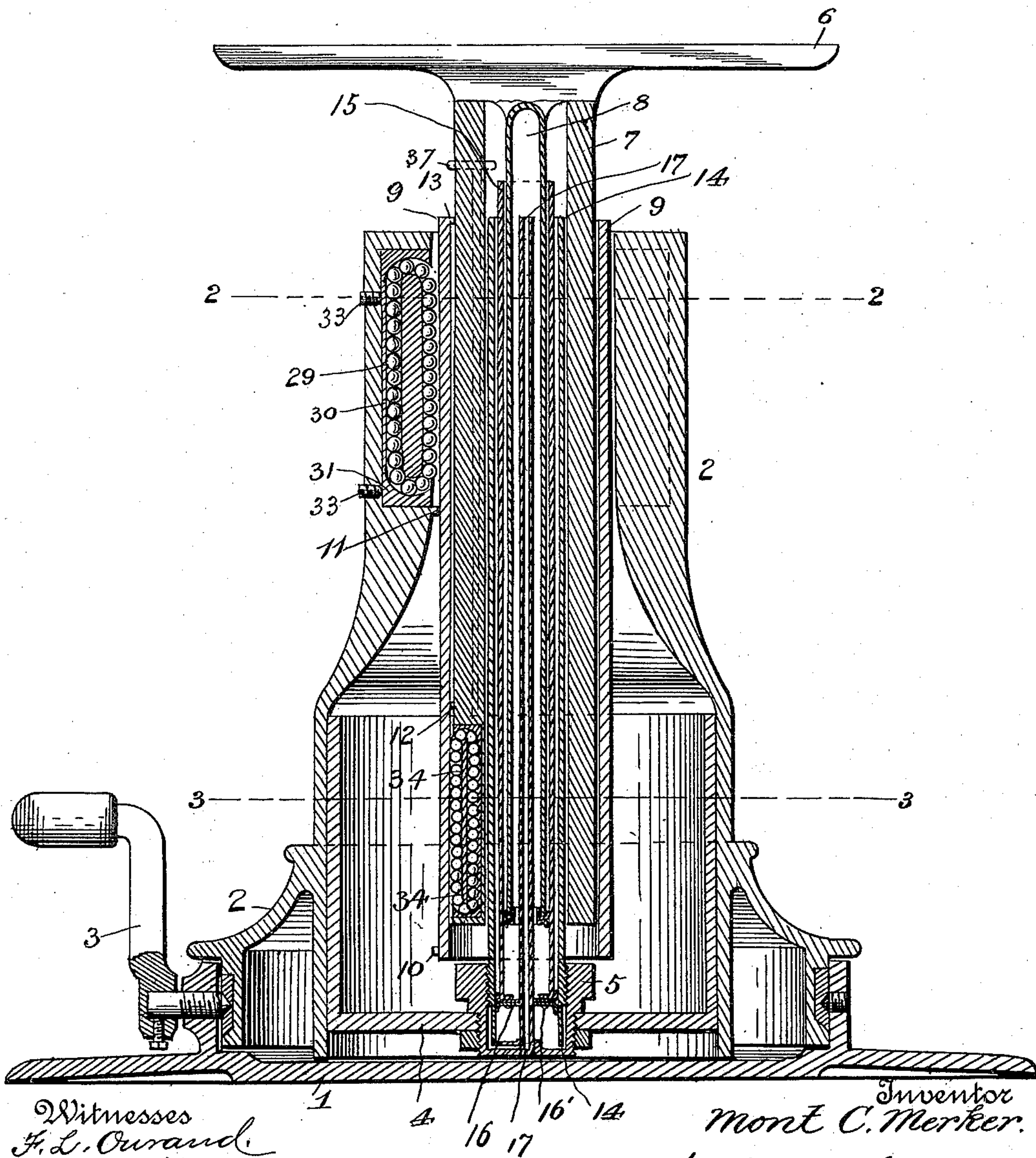
M. C. MERKER.  
DENTAL CHAIR.

6 Sheets—Sheet 1.

No. 579,094.

Patented Mar. 16, 1897.

*Fig. 1.*



Witnesses  
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(No Model.)

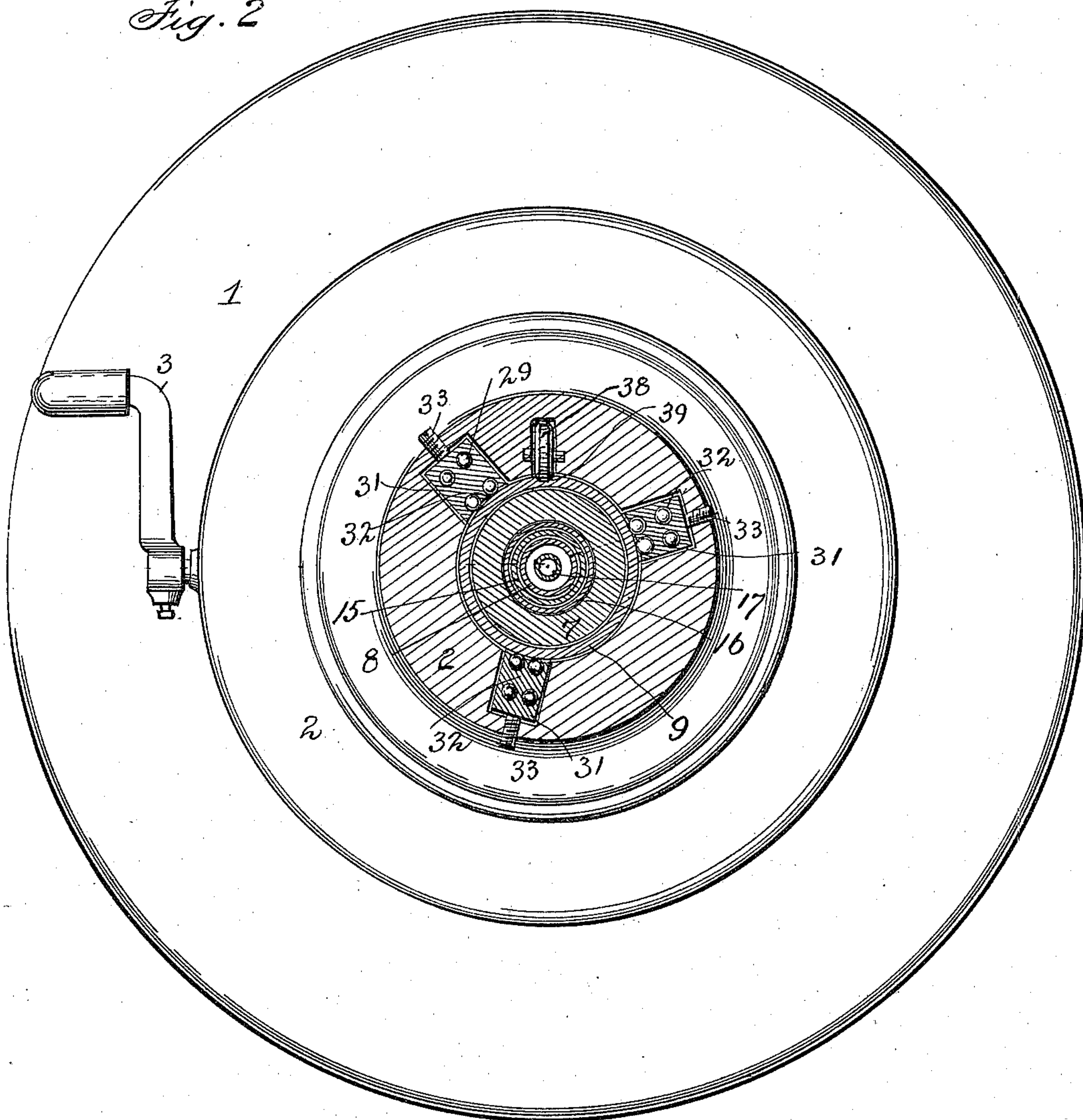
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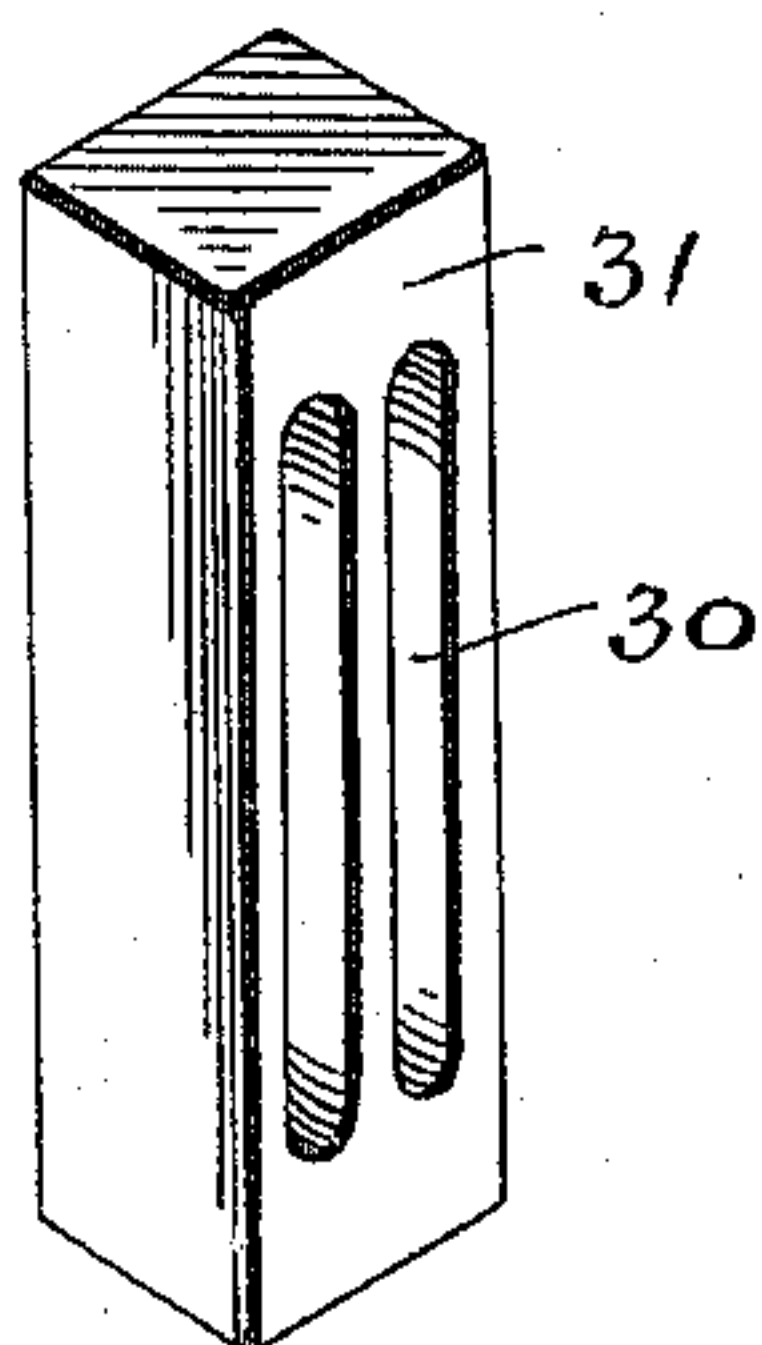
No. 579,094.

Patented Mar. 16, 1897.

*Fig. 2*



*Fig. 9.*



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DENTAL CHAIR.

6 Sheets—Sheet 3.

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Fig. 3.

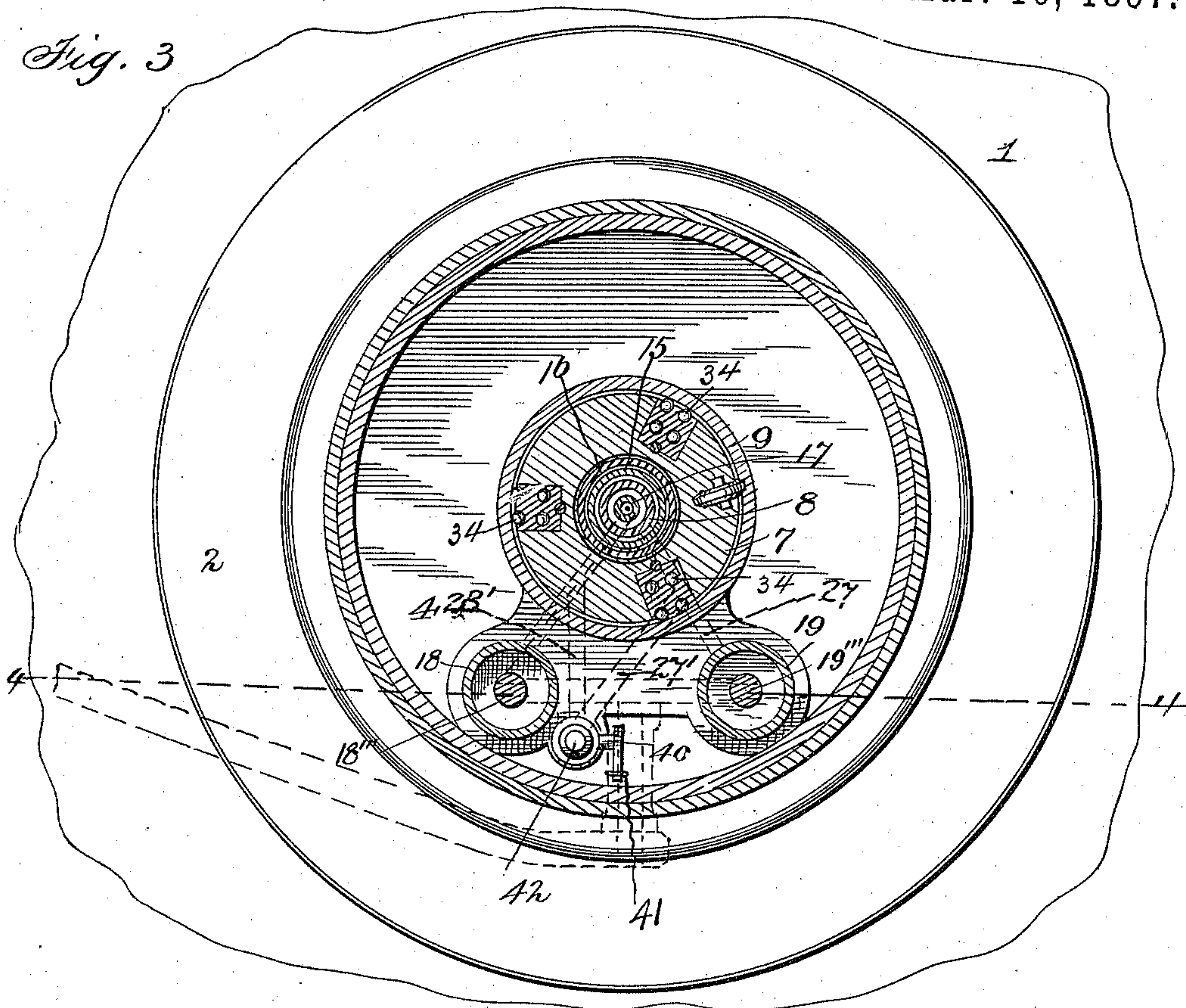
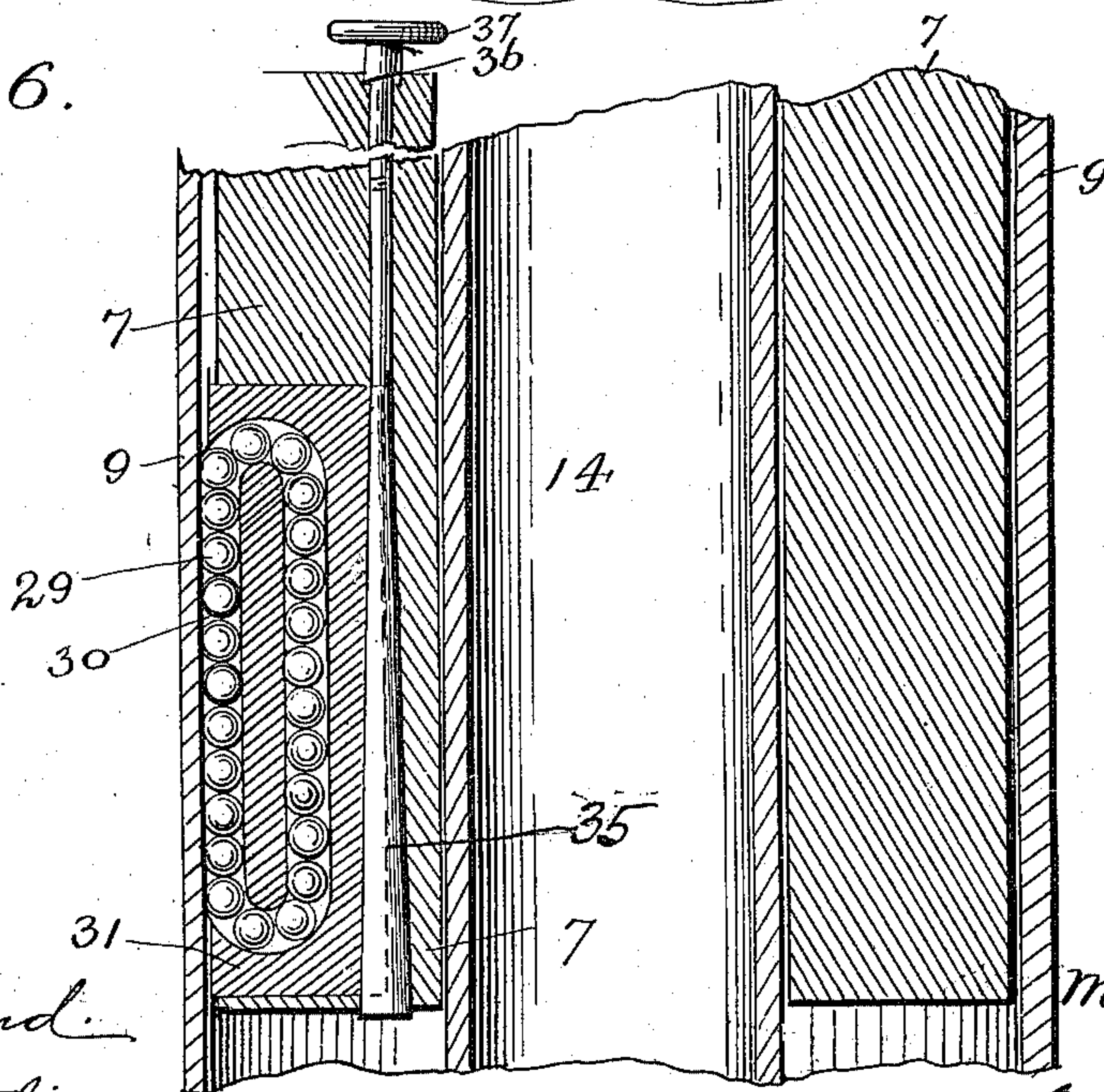


Fig. 6.



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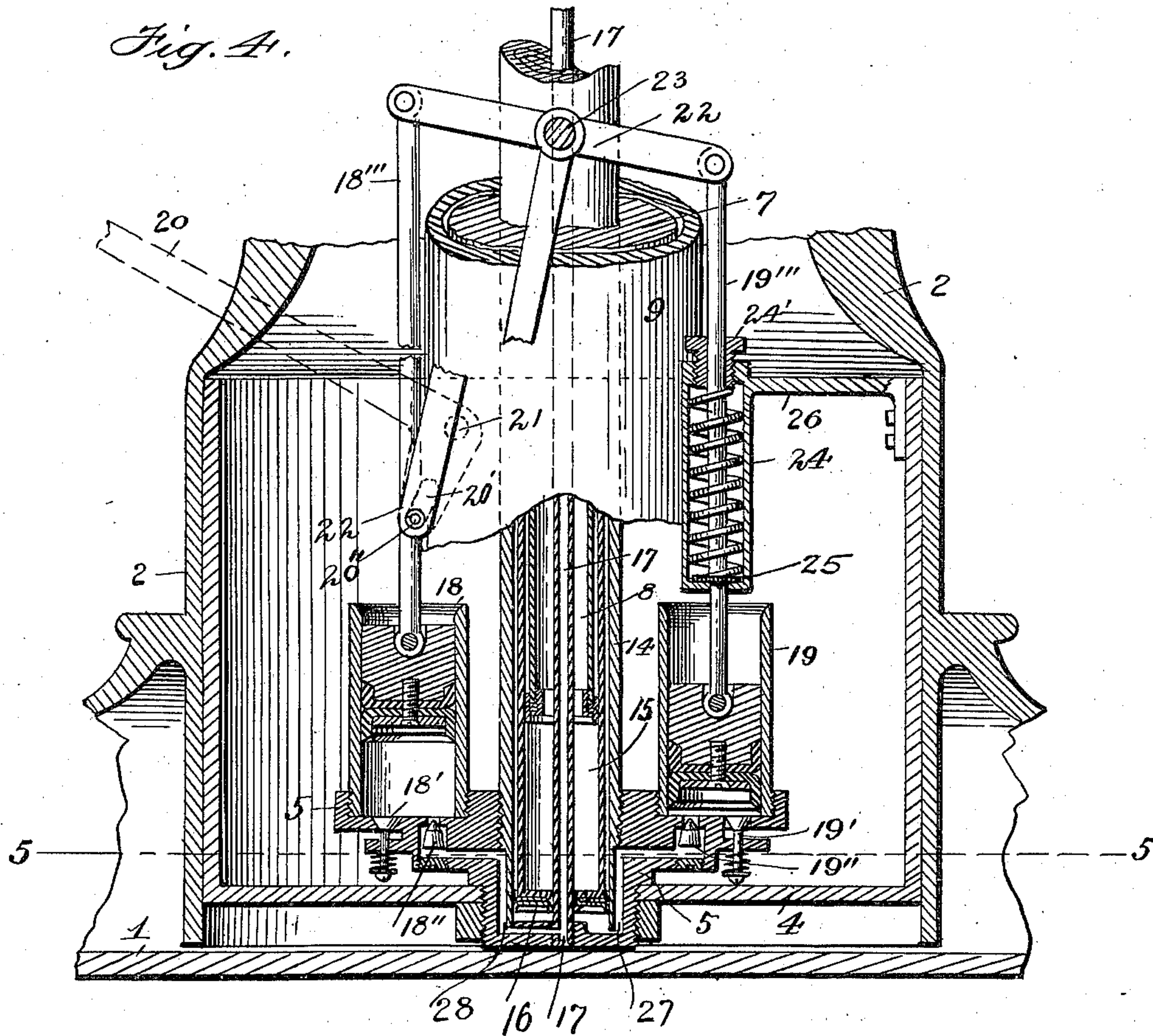
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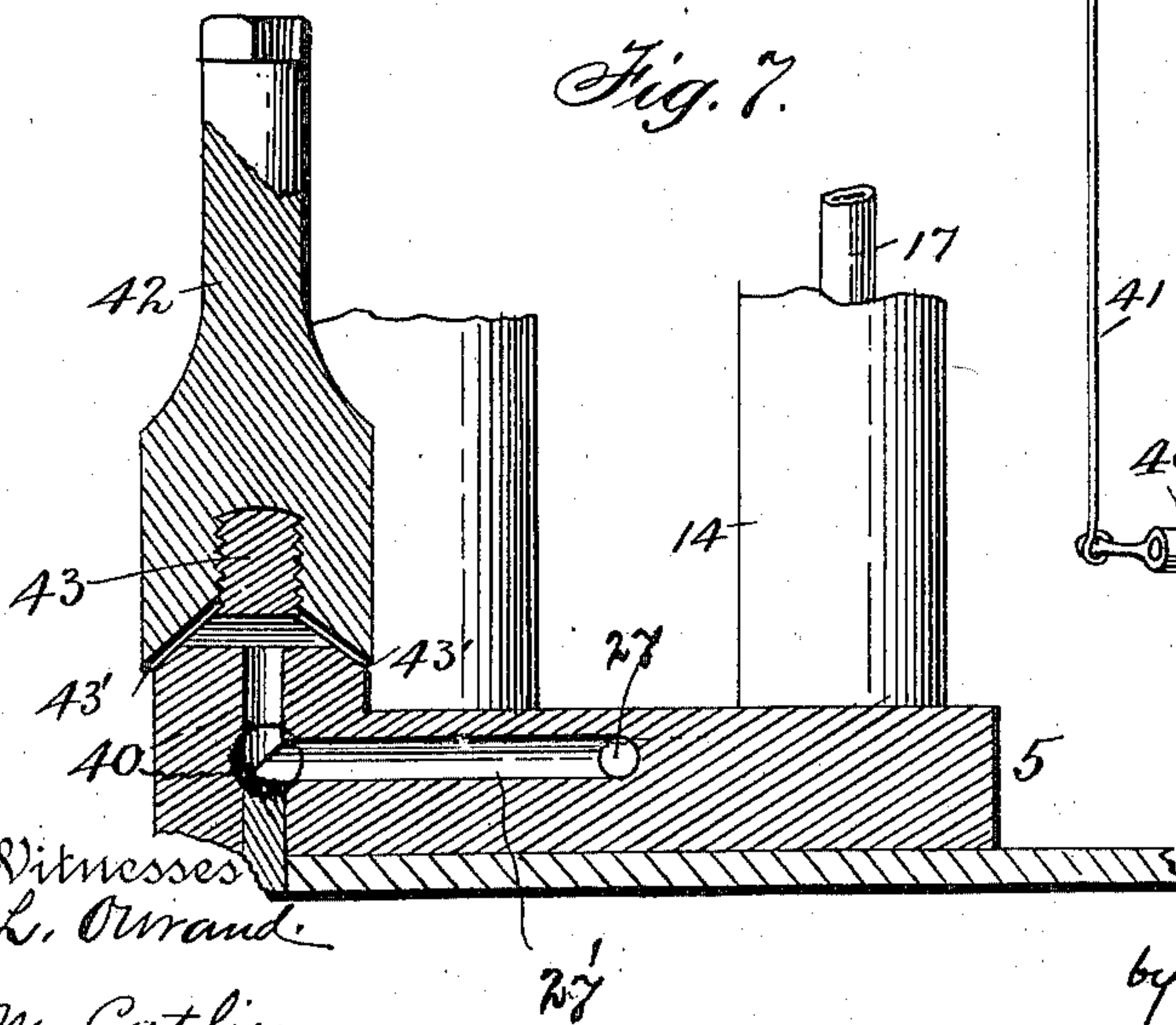
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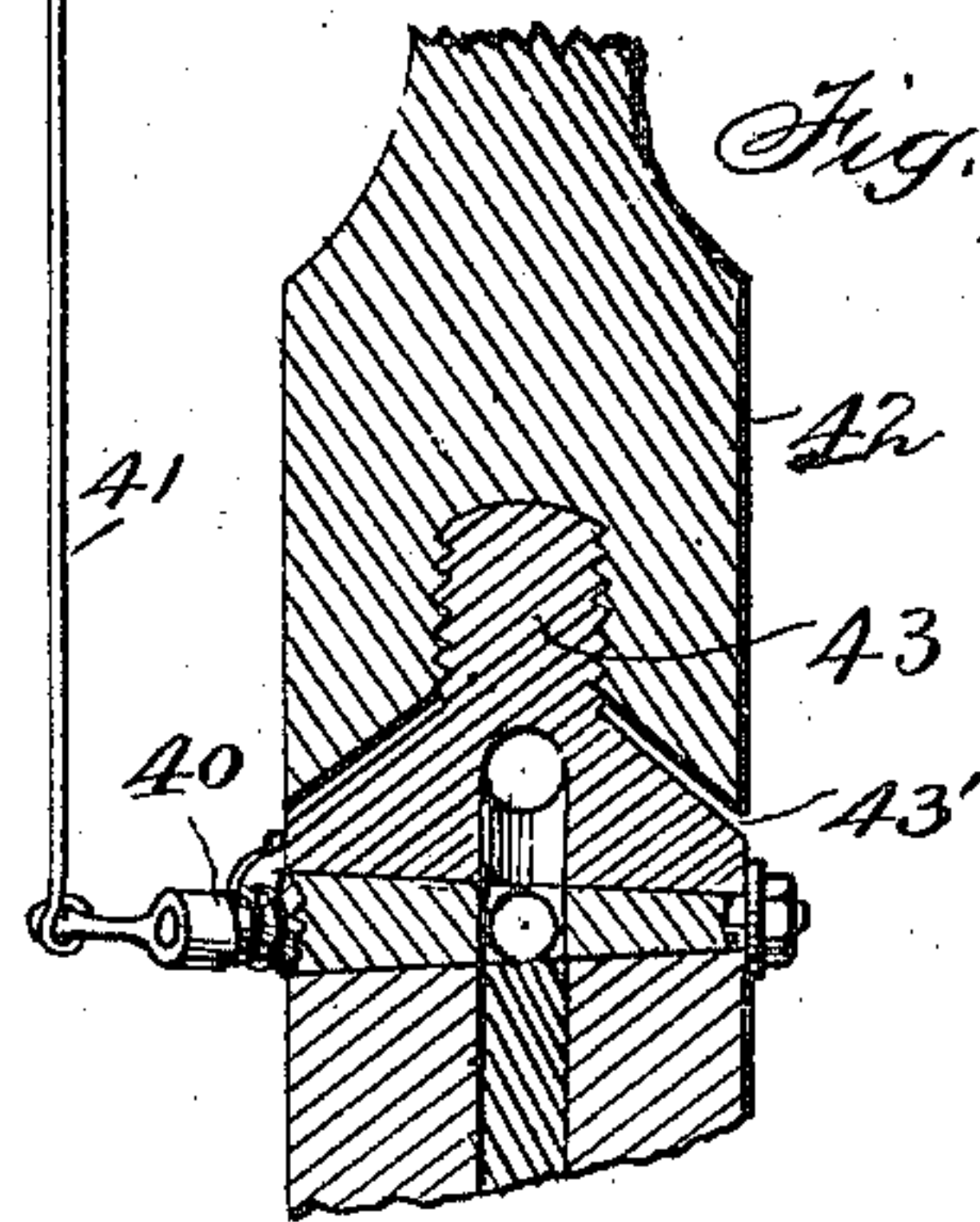
*Fig. 4.*



*Fig. 7.*



*Fig. 8.*



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(No Model.)

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DENTAL CHAIR.

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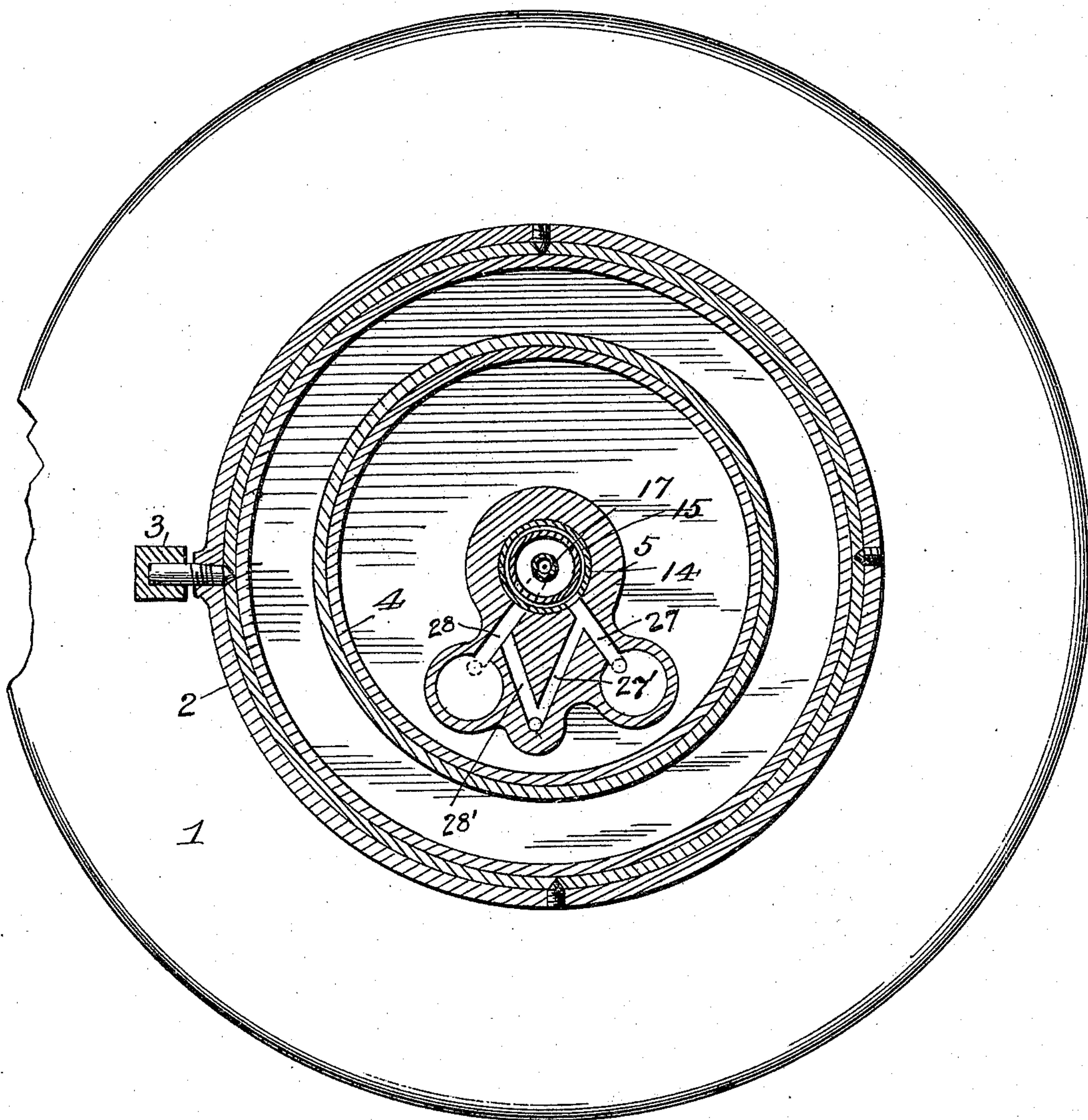


Fig. 5.

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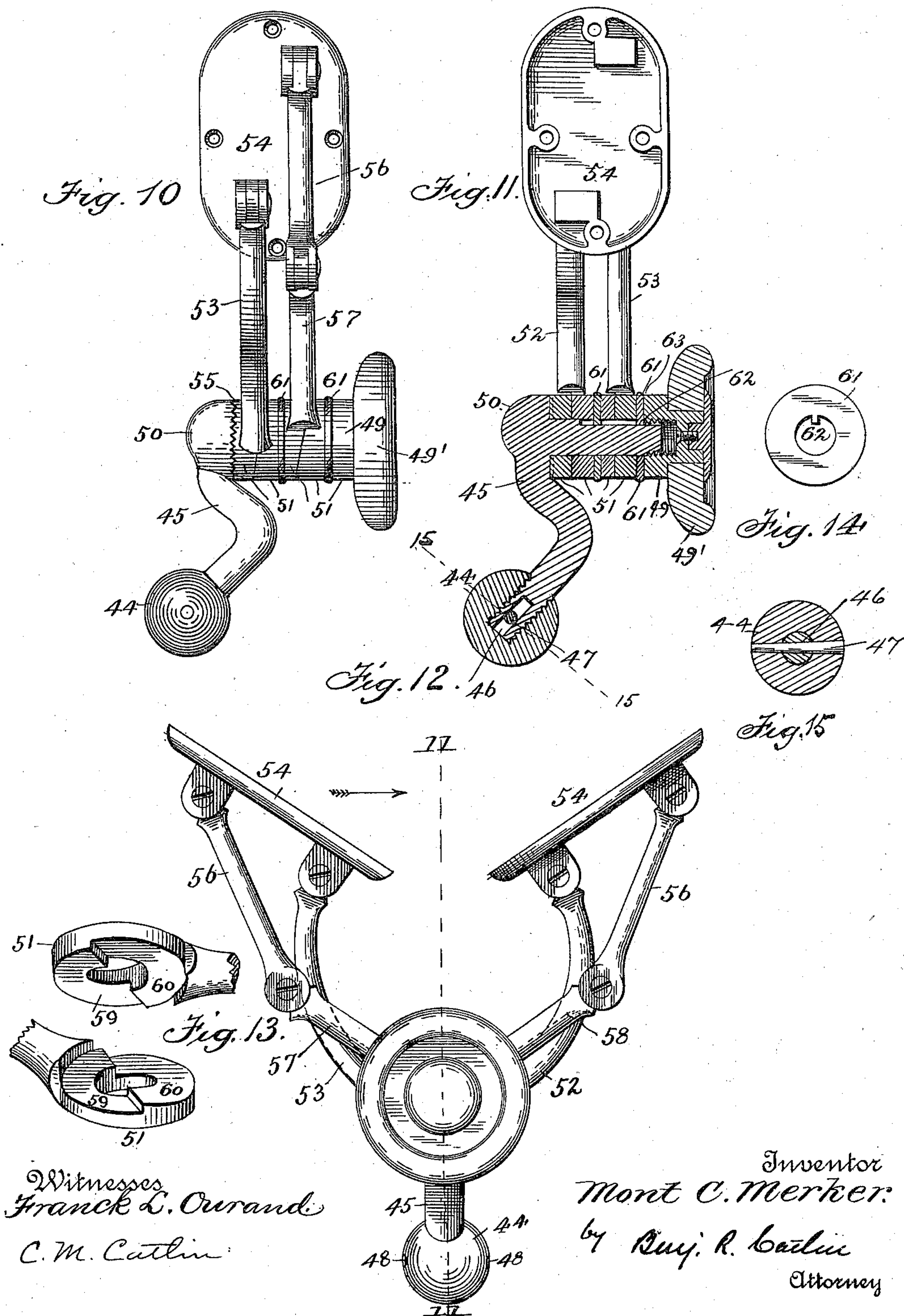
(No Model.)

6 Sheets—Sheet 6.

M. C. MERKER.  
DENTAL CHAIR.

No. 579,094.

Patented Mar. 16, 1897.





# UNITED STATES PATENT OFFICE.

MONT C. MERKER, OF PHILADELPHIA, PENNSYLVANIA.

## DENTAL CHAIR.

SPECIFICATION forming part of Letters Patent No. 579,094, dated March 16, 1897.

Application filed October 26, 1896. Serial No. 610,140. (No model.)

*To all whom it may concern:*

Be it known that I, MONT C. MERKER, a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, 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 pertains to make and use the same.

The invention relates to dental chairs provided with seat raising and lowering mechanism, and has for its object to render the operation of certain parts more easy, certain, and efficient; and the invention consists in the construction hereinafter described and particularly pointed out.

In the accompanying drawings, Figure 1 is a vertical section of the base of a chair and of seat raising and lowering tubes. Fig. 2 is a section on line 2 2 of Fig. 1. Fig. 3 is a section of Fig. 1 on line 3 3. Fig. 4 is a partial vertical section on line 4 4 of Fig. 3. Fig. 5 is a section on line 5 5 of Fig. 4. Fig. 6 is an enlarged section of a device for forcing a receptacle of the balls of a bearing outwardly. Figs. 7 and 8 are enlarged sections of devices for controlling and regulating the escape of oil of the hydrostatic column that supports the seat. Fig. 9 is an isometric view of a receptacle for ball-bearings. Fig. 10 is a side elevation of a head-rest. Fig. 11 is a vertical central section of the same on line 11 11. Fig. 12 is a rear elevation. Fig. 13 contains isometric views of pad supporting and clamping rings. Fig. 14 is a plan of a washer. Fig. 15 is a section on line 15 15 of Fig. 11.

Numerals 1 indicates the base of a chair, 2 a rotatable pedestal, and 3 a lever for locking or clamping said base and pedestal together.

4 denotes an oil-reservoir fixed to and rotatable with the pedestal.

5 is a casting secured in the bottom of the reservoir and directly supporting the main part of the seat-elevating devices.

6 denotes a part of the seat-frame or seat, which may be of any usual or desired construction. To this frame are connected seat-supporting or plunger tubes 7 and 8, the former being preferably fixed to the cross-bar and the latter bearing loosely against its under side, as shown.

9 denotes a tube fitted to slide in the upper part of the pedestal and provided with a projection 10, adapted to engage a stop 11, fixed to the pedestal and thus limit the ascent of said tube 9.

12 is a similar projection on tube 7, and 13 is its stop fixed to the inside of tube 9.

14 is a tube fixed in casting 5.

15 is an extension or telescoping tube situated between tubes 14 and 8. Tubes 15 and 8 are each provided at its foot with a packing and the former with a flexible diaphragm 16, which serves as the packing for the joint between the tube to which it is attached and its inclosing tube and also acts as a piston.

17 denotes an oil-inlet tube fixed in the casting 5.

The tube 9 is a sliding extension of tube 7, fixed to the seat-frame, and tube 15 a similar extension of tube 14, mediate fixed in the base. The general purpose and operation of similar tubes in dental chairs are well known. The several tubes are concentric and preferably situated centrally with respect to the base and pedestal, though such situation is not essential.

The movable tubes are raised or lowered to raise or lower the chair-seat by means of a suitable liquid, preferably oil, through the medium of devices next to be described.

18 and 19 denote pumps provided with valves 18' and 19', respectively, to admit oil from the reservoir to the pump-cylinders, and also with outlet-valves 18'' and 19''.

20 is a pump-operating lever (shown in dotted lines in Figs. 3 and 4) having a fulcrum at 21. It is loosely connected to the foot of a T-shaped lever 22. 20' denotes a slot in the lever, and 20'' an antifriction-roller supported by said T-shaped lever. Said lever is adapted to oscillate about a stud 23, fixed to the pedestal.

18''' and 19''' denote piston-rods pivoted to the head or cross-bar of the lever 22 and to the pistons of the respective pumps. The construction is such that when one piston is forced down the other is raised, both operations being effected by the lever 20. The lever and pistons are returned to normal positions by the aid of a spring 24.

24 is a spring held between a ring or flange 25, fixed on the piston-rod 19''', and a bracket



26, fixed to the pedestal. This spring is compressed by the ascent of the rod caused by lever 20, and being thus put under tension it subsequently acts to force down its piston and simultaneously lifts rod 18''' and its piston.

24' is a screw working in the bracket 26 to vary the tension of the spring. By these means one of the pumps opens the valve 19'' and forces oil through a passage 27 and under the piston 16, with the effect to raise tube 15. The other pump forces oil through passage 28 into the small central tube 17 and thence into the tube 8, which is thereby raised with the effect to elevate the chair-seat. The tube 17 provides that liquid may be delivered in tube 8 above the diaphragm 16, at the foot of tube 15, whatever be the elevation of the latter. The liquid forced into the tubes from each pump does not mingle with that from the other until it is returned to the reservoir. By the combination of the two pumps, their operating-levers, and the spring the lifting of the seat is made even and continuous and is more quickly effected.

Since spring 24 not only forces down the piston of the pump with which it is connected, but lifts the other piston and also returns the lever to its normal position, it needs to be much stronger than an ordinary returning-spring, which would be entirely inoperative for the purpose. To reduce as far as practicable this requirement of a spring of exceptional power, the pump to which it pertains is connected with the space below the largest tube to be elevated, which is tube 15 in the present instance, whereby it is provided that pump 19 does less work than pump 18 and the spring is so far relieved.

29 indicates balls arranged continuously in suitable endless channels 30. These are in the present instance situated in adjustable boxes or receptacles 31, placed in or connected to the wall of the pedestal, being so arranged that the balls in one part of each endless groove or channel bear on the exterior of the vertically-movable extension-tube 9. There are preferably three pairs of these ball-bearings in the pedestal, as indicated in the drawings, each box containing a pair and two parallel channels therefor. These channels and each series of balls contained therein are made endless to avoid the binding of the balls in their seats or against each other. The individual series of each pair are separated by a rib 32 to prevent lateral interference.

One or more of the boxes 31 can be adjusted to hold the balls more or less closely against tube 9 by means of screws 33. It is not necessary that more than one be thus adjusted directly, since the adjustment of one necessarily affects the other in equal and substantially the same manner.

34 denotes similar antifriction devices situated in the wall of the tube 7, the exterior balls bearing on the interior of extension-tube 9.

35 (see Fig. 6) indicates a wedge operated

by a screw-rod 36, having a handle 37, whereby the ball-receptacle can be crowded outwardly to cause the balls to suitably bear on the tube 9. The receptacle or the contiguous tube has a similarly-inclined face coöperating with the incline of the rod. As indicated in Fig. 3, there are three pairs of these last-described ball-bearings. The particular number is not essential; neither is the vertical arrangement of the series of balls essential, though preferred. Obviously they might be obliquely arranged.

The pedestal is rotatable, and with it is rotated the entire chair except the base, as is usual. To prevent the separate rotation of the tubes, a rolling-key (one or more) 38, (see Fig. 2,) supported by a suitable axis in the pedestal, is arranged to move in a groove 39 in the exterior of tube 9, and a similar key-wheel, one or more, is journaled in the wall of tube 7, and adapted to run in a groove formed in the interior of said tube 9. (See Fig. 3.)

Oil is allowed to escape through branches 27' and 28' from the tubes to lower the chair-seat by opening the cock 40, which simultaneously opens or closes said branches. (See Figs. 3, 7, and 8.) 41 is a rod attached to a crank-arm fixed to the cock-plug. Said arm extends above the reservoir and outside the pedestal to any convenient point for its suitable manipulation, and may be made to close the cock by gravity or in any convenient manner. The rate of the discharge, as described of the hydrostatic seat-supporting columns, can be regulated by adjusting the female screw 42 upon its counter part 43 to vary the width of the discharging-passage 43'.

The purpose of the above-described device is to regulate the rate of the escape of a liquid such as oil independently of any regulation by the cock.

The device is claimed in my application, Serial No. 623,231, filed February 13, 1897.

In Figs. 10 to 14 is illustrated an improved head-rest for a dental chair. 44 denotes the ball of a universal joint, such as commonly used to support head-rests. Said ball is made detachable and interchangeable for convenience in applying the rest to different chairs using balls of different sizes. Said ball has a screw-thread connection with the S-shaped piece 45. The male part of this joint may be made slightly frusto-conical. It is slotted at 46 to receive a securing or tapered pin 47. The purpose of the slot is to insure that the pin-hole 48 of any-sized ball may be readily made to register therewith and thus facilitate any desired change of balls. The pin is tapered to insure its operation in various balls. The upper end of the piece 45 is of frusto-conical form and screw-threaded to receive a clamping-nut 49. To this nut is fixed a hand-wheel 49', preferably of wood, by which the nut is manipulated. Between this nut and the head 50 of the piece 45 are held four arms having rings 51 integral therewith rotatably



supported on an unthreaded portion of the piece 45. Two of these arms (denoted by 52 and 53) are pivotally connected, each to the inner end of a pad or pad-support 54. The ring 51 of the arm 53 is provided with teeth 55 or the like adapted to engage with similar teeth on head 50 to securely lock these parts together when they are properly engaged for the purpose by suitably turning the nut 49.

Whenever it is desired to adjust the arms about their support the nut 49 should be unscrewed sufficiently to permit the several rings to have a small movement lengthwise of the supporting-post 45, whereby they are loosened or unlocked to permit their rotation and the consequent operation of their contiguous inclined surfaces. If it is desired to adjust the arm 53, the nut should be loosened sufficiently, so that the teeth at 55 may be disengaged. These teeth are made fine to facilitate the turning of the ring pertaining to arm 53 when said nut is but slightly loosened.

The construction provides for several adjustments of each pad. For example, the arm 53 being held by the hand against rotation, the arm 57 can be rotated about 45 to change the inclination of the pad by moving its upper part. The arm 57 being held in like manner, the arm 53 can be rotated and the pad tilted by a suitable movement of its lower part, the upper part remaining nearly stationary. Thus, if it be desired to change the inclination of the pad without materially changing the elevation of its upper end, then an arm, as 53, for example, can be manipulated and the arm 57 left undisturbed or held by the hand, if necessary; or if 57 be held and 53 suitably manipulated the inclination of the pad can be changed without materially changing the elevation of its lower end. If, in any case, the arms do not bind together sufficiently to maintain their position by the operation of the inclined surfaces, then the parts can be tightened by the nut. The four arms may be simultaneously rotated about 45 to change the distance between the pads. The two arms on one side can be similarly moved without any movement of the other two. All the arms may be moved to one side to hold the head of a patient sidewise, and the pads can be variously inclined contemporaneously with such movement or with any other desired movement of all the arms.

The outer end of each pad has a pivotal connection with a connecting-rod 56, which joins it to an arm 57 or 58 by a pivotal connection therewith.

The rings 51 of the arms 57 and 58 and of arms 52 and 53 have their proximate faces formed each with two corresponding inclines 59 and 60, opposing similar inclines of its contiguous ring, the construction being such that each pad can be separately adjusted to any desired angle by its independent manipulation and such that both pads are immediately clamped and held in fixed relation by simul-

taneously pressing them apart, as by the action of the head pressed between them, the clamping being effected by the close engagement of the opposite inclines of the rings.

61 (see Figs. 14 and 11) denotes washers which are provided each with a key or projection 62, extending into a groove 63 to prevent the washer from being rotated, its object being to prevent the contiguous ring being rotated by the clamping-nut in one case or by the adjacent ring in the other.

The washers being interposed between the rings and held by the keys are not rotated by the friction of a ring or of rings, so that each of the latter with its arm can be rotated without disturbing any other.

It is obvious that several of the improvements herein claimed are applicable to other than dental chairs and that some of them are not necessarily limited to their principles of operation and mechanical construction to chairs, and such parts are described and claimed in relation to dental chairs for convenience only.

Having described my invention, what I claim is—

1. In a dental chair the combination of the telescoping tubes medially connected to the seat, two pumps, and separate passages one from each pump leading to a distinct tube whereby both pumps may be used to raise the chair, substantially as described.

2. In a dental chair the combination of the telescoping tubes medially connected to the seat, two pumps, and separate passages one from each pump leading to a distinct tube whereby both pumps may be used to raise the chair, the operating-levers, and the spring connected to the piston-rod of one of the pumps and adapted to be compressed by the operation of the levers and then to operate the pump to which it is connected, by its expansion, substantially as described.

3. The combination of pumps 18 and 19, a plunger-tube 8 bearing on the seat-frame, the oil-inlet tube 28 communicating with one of the pumps and with the said plunger-tube, the extension-tube 15 having at its foot a piston-packing, and the fixed tube 14 the space within said latter tube below the piston-packing of tube 15 communicating with a passage 27 leading to the other pump, all substantially as set forth whereby tubes 8 and 15 can be simultaneously and continuously raised by the pumps, substantially as described.

4. The combination in a dental chair of two pumps, mechanism to simultaneously move the pump-pistons in opposite directions, a spring connected with one of the pump-pistons and adapted to be compressed by said mechanism to empty one pump and fill the other, and an adjustable tension device to vary the initial tension of the said spring, substantially as described.

5. In seat raising and lowering mechanism the combination of a vertically-movable tube



with a fixed part and an interposed endless series of balls arranged in an endless channel a part of said balls bearing upon the movable tube, said channel being formed in an adjustable receptacle, and devices for adjusting said receptacle to vary the friction on the balls.

6. In seat raising and lowering mechanism the combination of the pedestal, a tube fixed therein, a vertically-movable extension-tube and several series of balls bearing upon the extension-tube at distinct points in its circumference, and a device for varying directly the friction of one series of balls and indirectly varying that of the other series, substantially as described.

7. In seat raising and lowering mechanism the combination of the pedestal, a tube fixed therein, a vertically-movable extension-tube, several series of balls bearing upon the extension-tube at distinct points in its circumference, and a device for varying directly the friction of one series of balls and indirectly varying that of the other series, said device consisting of a rod or bar having an inclined face, and an adjustable ball-receptacle having a similar incline, substantially as described.

8. The combination of the pedestal 2, the vertically-movable tube 9 provided with lengthwise grooves both on its interior and exterior, a plunger-tube, guide-wheels journaled one in the pedestal and one in the plunger-tube and running in said exterior and interior grooves respectively, said wheels acting as antifriction devices for the several parts and also preventing the rotation both of tube 9 and of the plunger-tube, substantially as described.

9. In a dental chair a head-rest comprising two pads adapted to be separately manipulated to vary the inclination of either, and devices for clamping the pads in fixed relation to each other by simultaneous pressure on the face of the pads, as by suitably resting the head between them, substantially as described.

10. In a dental chair a head-rest comprising two pads adapted to be separately manipulated to vary the inclination of either, and devices for clamping the pads in fixed relation to each other by simultaneous pressure on the face of the pads, as by suitably resting the head between them, said devices consisting of inclined planes formed on the pad-supports and adapted to be forced together and thus locked by such pressure.

11. In a head-rest the pad-supports comprising the arms provided with supporting-rings having their contiguous faces formed with similar opposing inclines, a support for the rings, a handle, screw-threaded to one end of said support, and a supporting-piece

45 fixed to said ring-support at its end opposite the handle, substantially as described.

12. In a head-rest the pad-supports comprising the arms provided with supporting-rings having their contiguous faces formed with similar opposing inclines and a support for the rings, and a washer or annulus provided with a projection, said ring-support having a groove to receive the projection and prevent the rotation of the washers, substantially as described.

13. In a head-rest the pad-support having a slotted screw-threaded end in combination with a ball suitable for a ball-and-socket joint, said ball having a screw-threaded opening to receive the pad-support and a transverse opening to receive a securing-pin, and the pin, substantially as described.

14. In a head-rest the pad-support having a slotted screw-threaded end in combination with a ball suitable for a ball-and-socket joint, said ball having a screw-threaded opening to receive the pad-support and a transverse opening to receive a securing-pin, and the pin, said pin being tapered, substantially as described.

15. In combination a chair-pedestal, two pumps, a T-shaped lever pivoted to the pedestal the ends of the cross-piece of said lever being pivotally connected by intermediate parts with the pump-piston, whereby the pump can be worked by causing said lever to oscillate about its pivot, tubes containing a hydrostatic column, and a bent lever having a fulcrum 21 and loosely connected within the pedestal to the foot of the said T-shaped lever and extended to the outside of said pedestal, whereby the bent lever oscillates said T-lever, substantially as described.

16. The combination in a dental chair of a plunger-tube 8 bearing against the seat-frame, a liquid-holding tank or reservoir, a pump situated in said reservoir, a central tube 17 situated within the plunger-tube and having free communication above with said latter tube throughout its entire length in every situation and communicating below with the pump, and a tube surrounding the plunger-tube, said latter tubes having at the foot of each a liquid-tight closure between it and said central tube, whereby the latter guides both of the former and whereby liquid can be forced through said central tube into the plunger to raise the seat, and means for raising the tube that surrounds the plunger, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

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