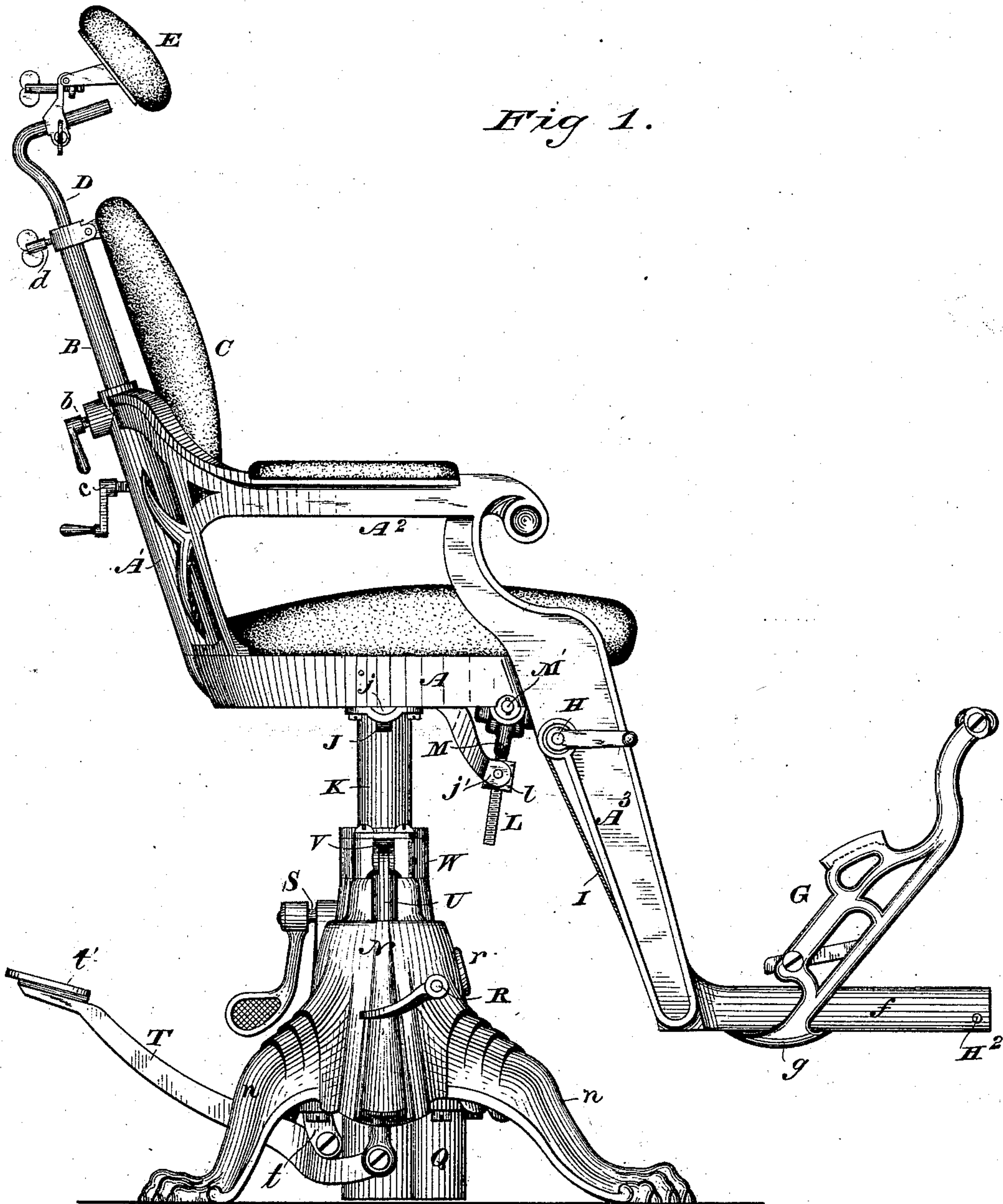


E. T. STARR.
Dentist's Chair.

No. 222,092.

Patented Nov. 25, 1879.



WITNESSES

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By his Attorneys

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Fig 3.

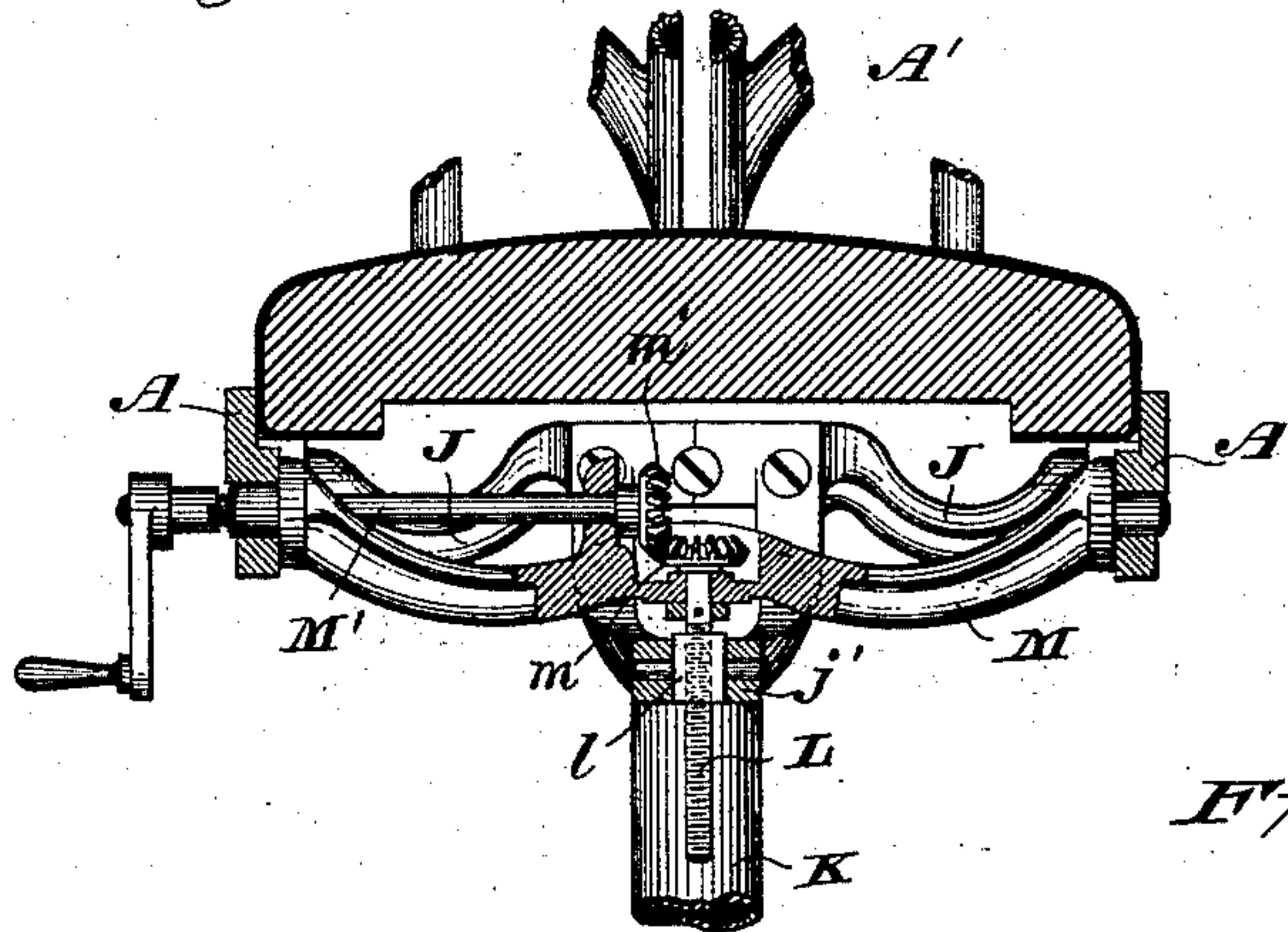
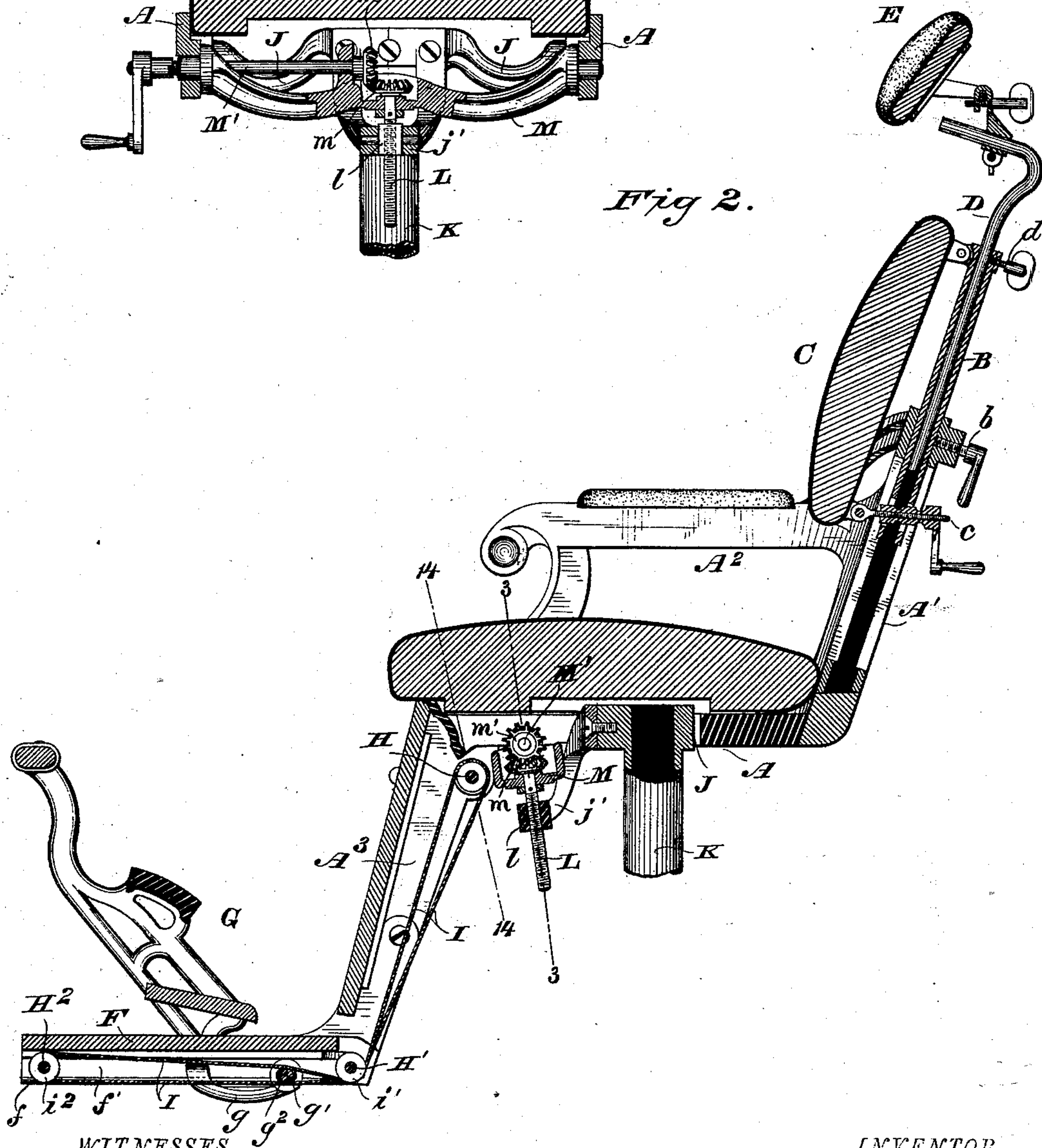


Fig 2.



WITNESSES

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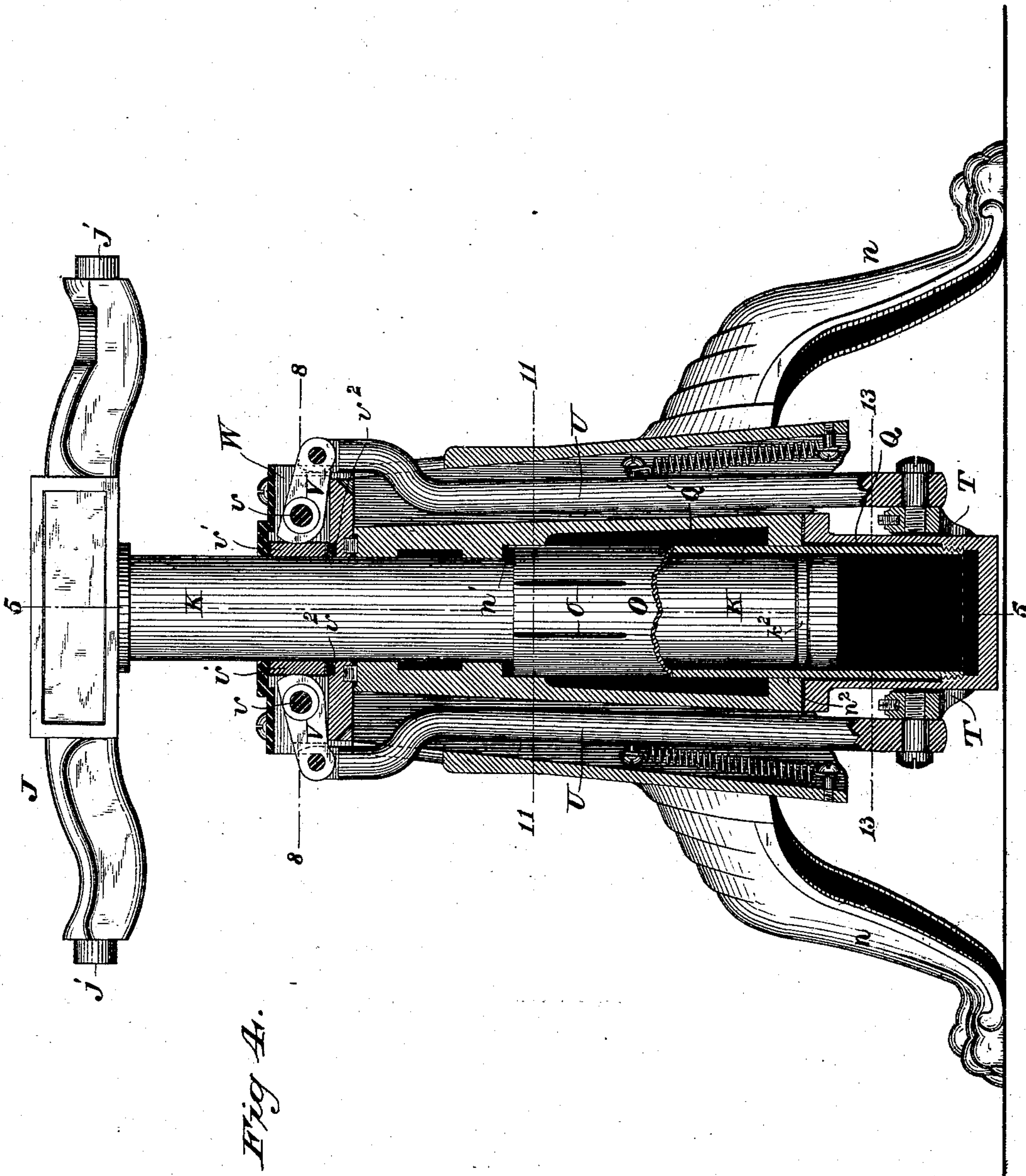


Fig. 4i.

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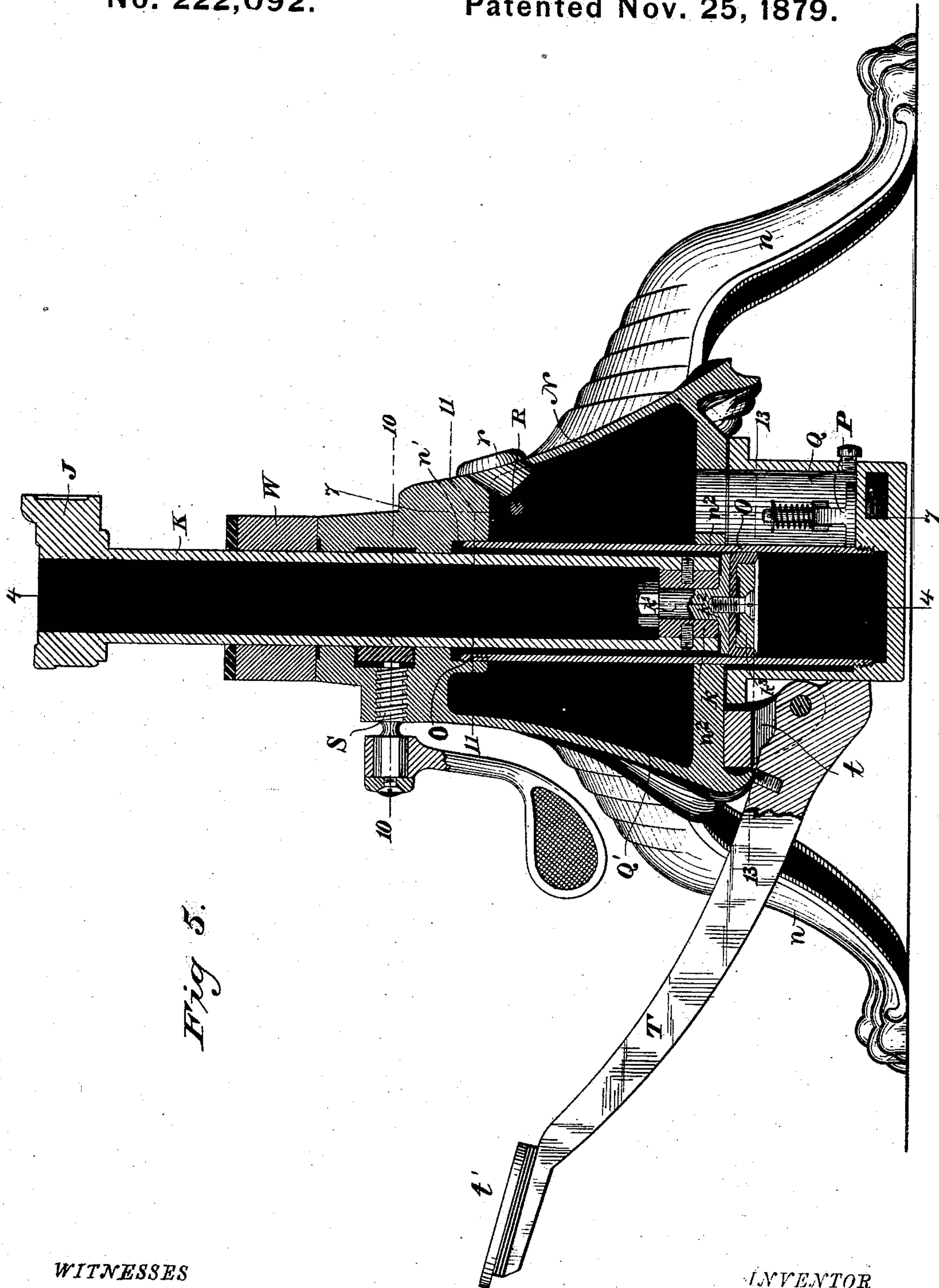


Fig. 5.

WITNESSES

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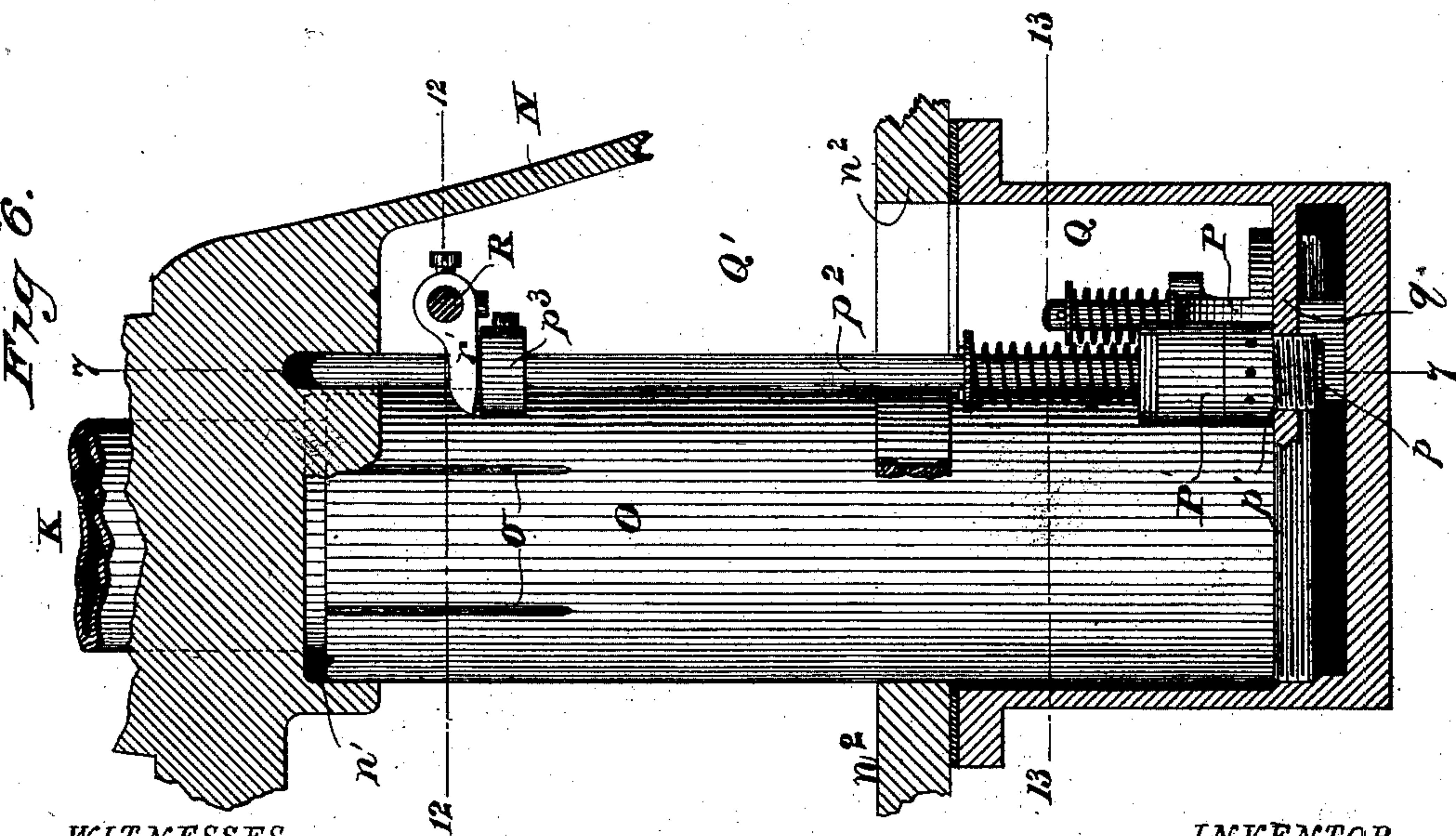
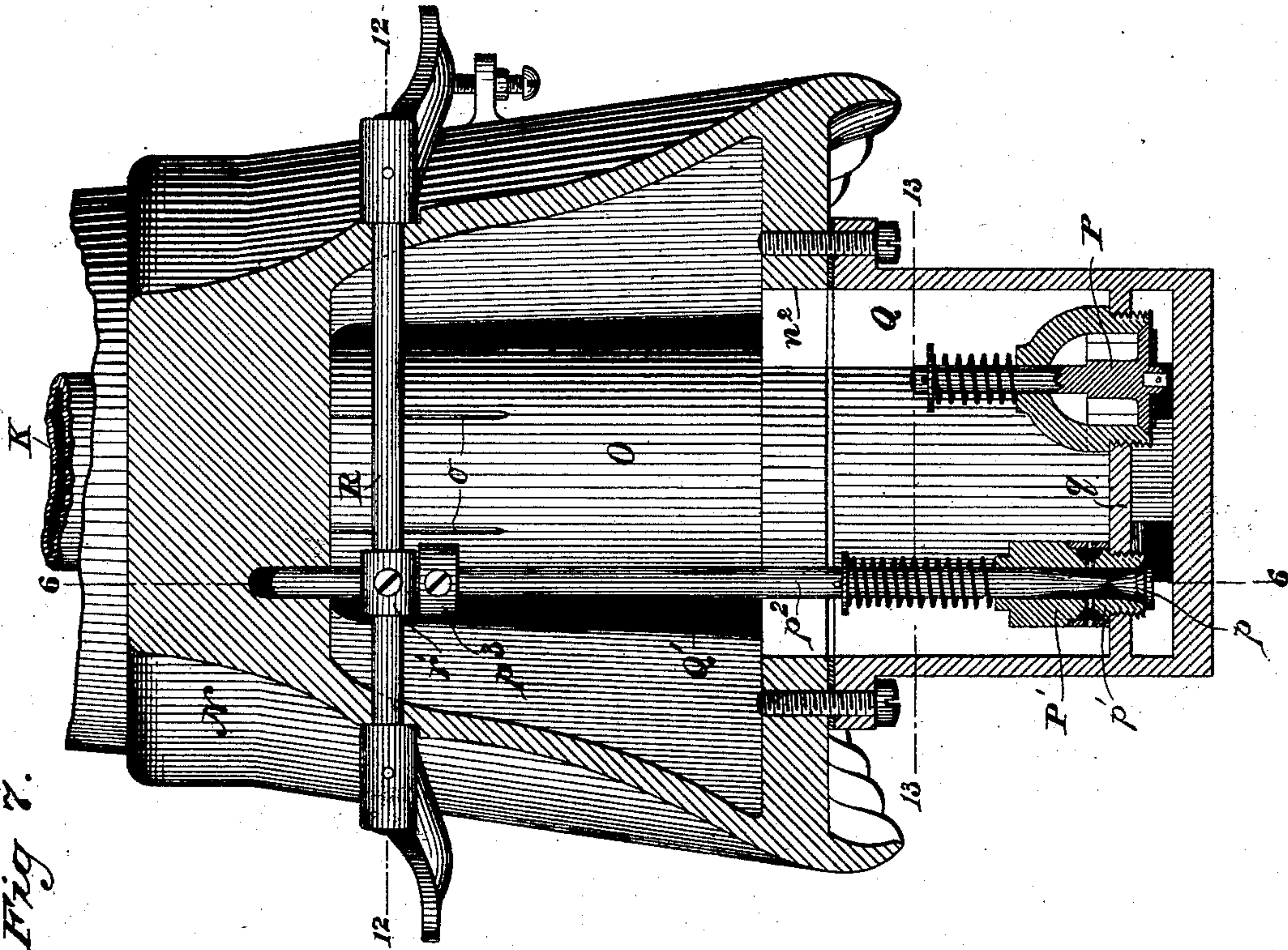
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Fig 8.

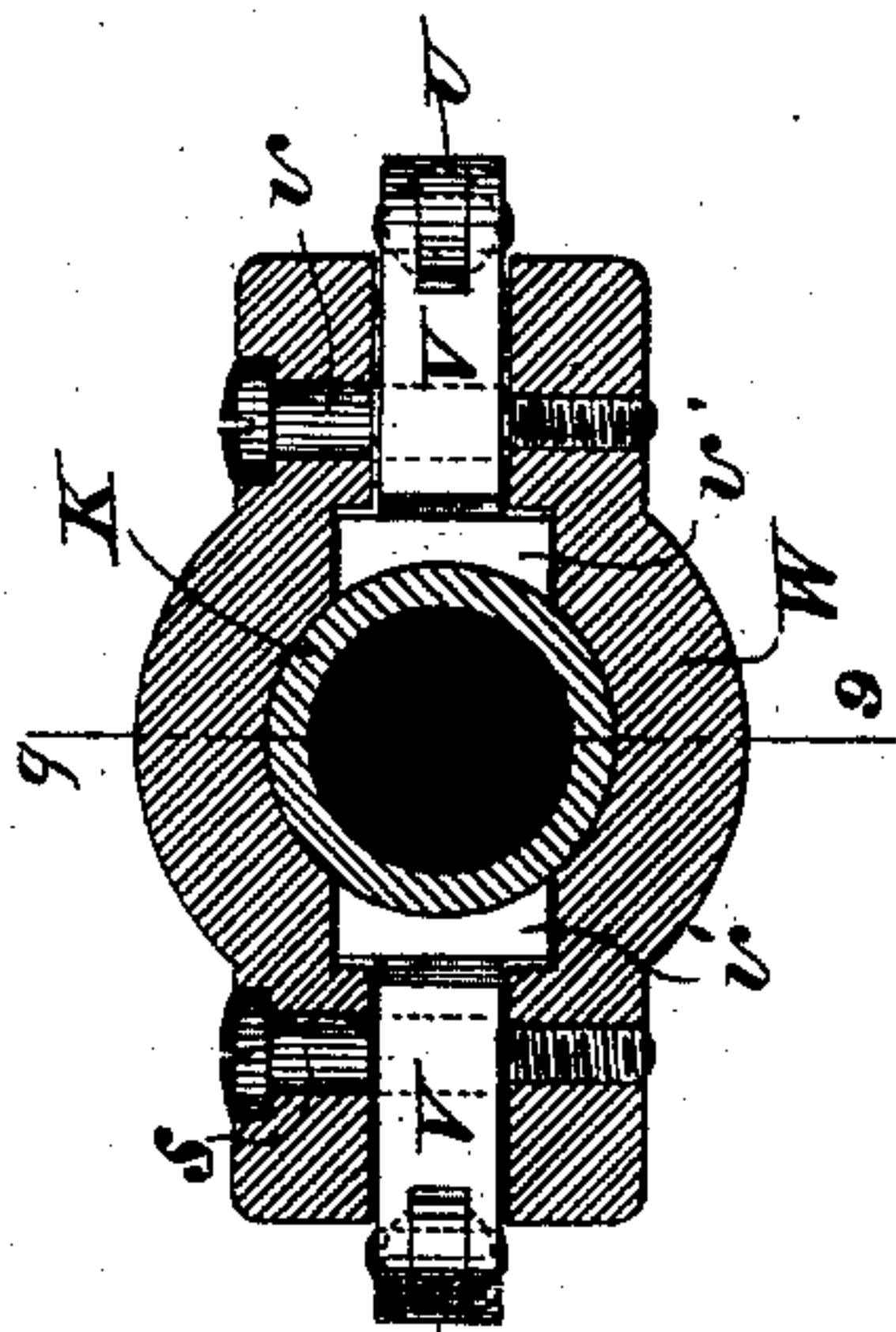


Fig 9.

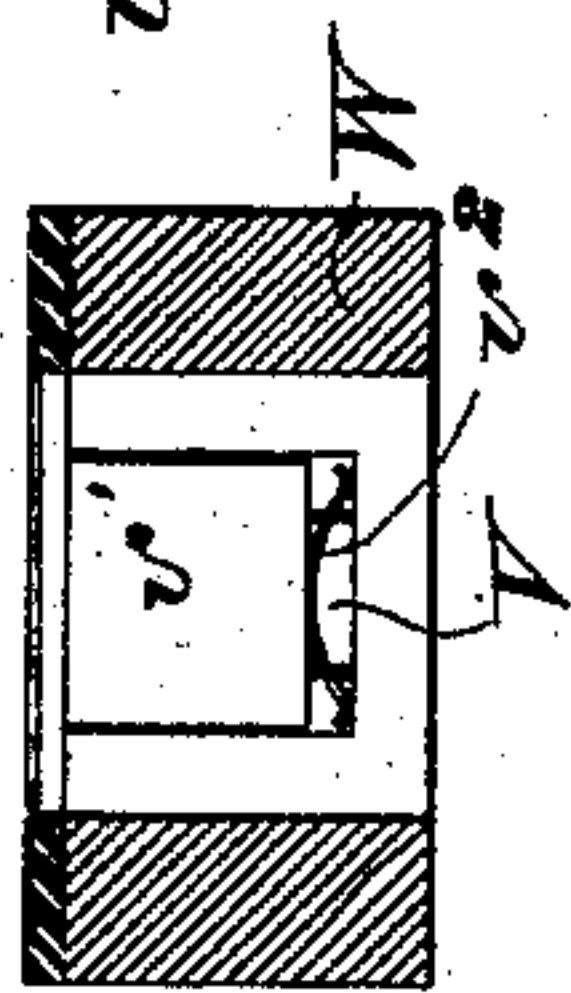
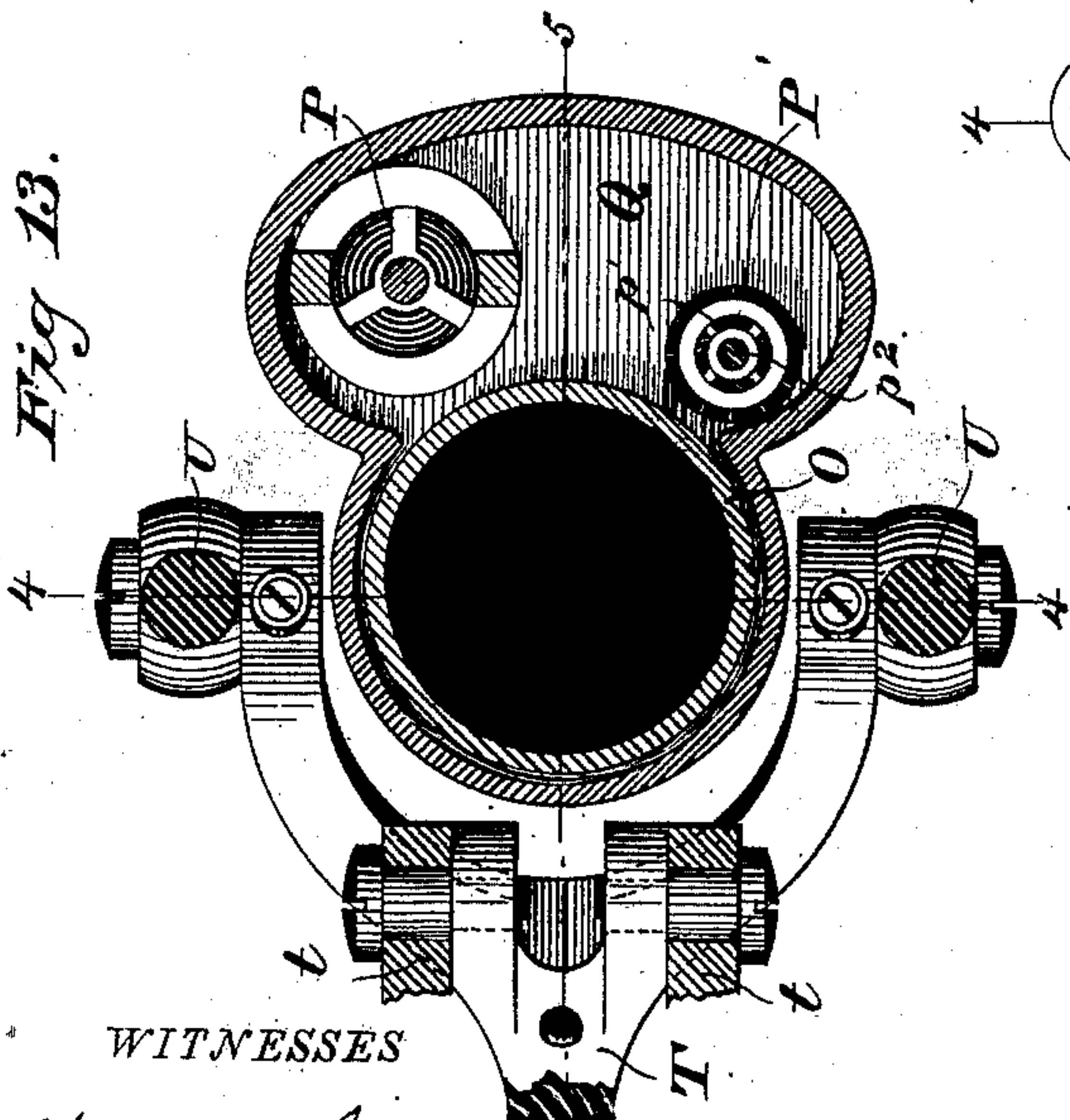


Fig 13.



WITNESSES

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Fig 10.

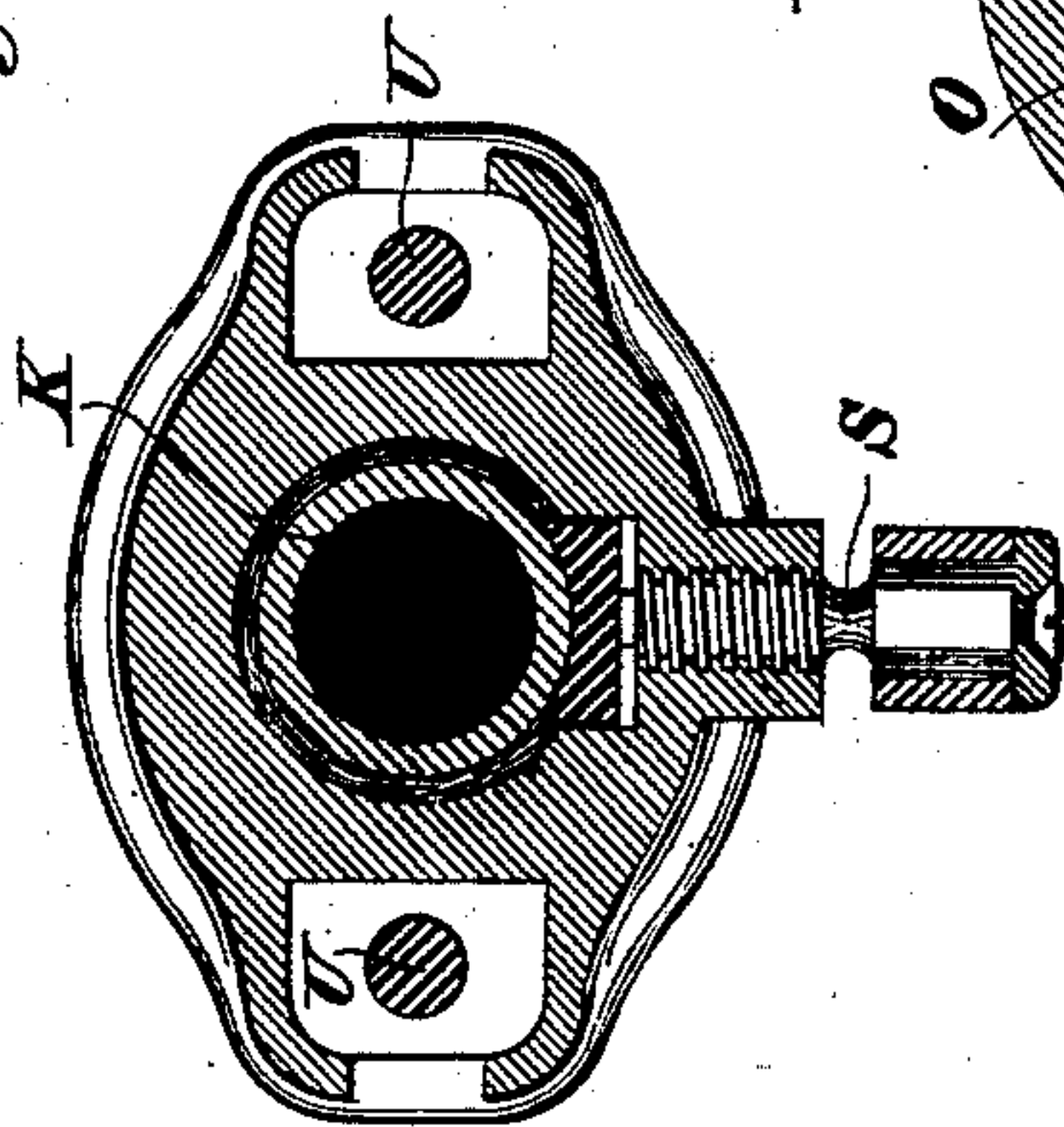


Fig 12.

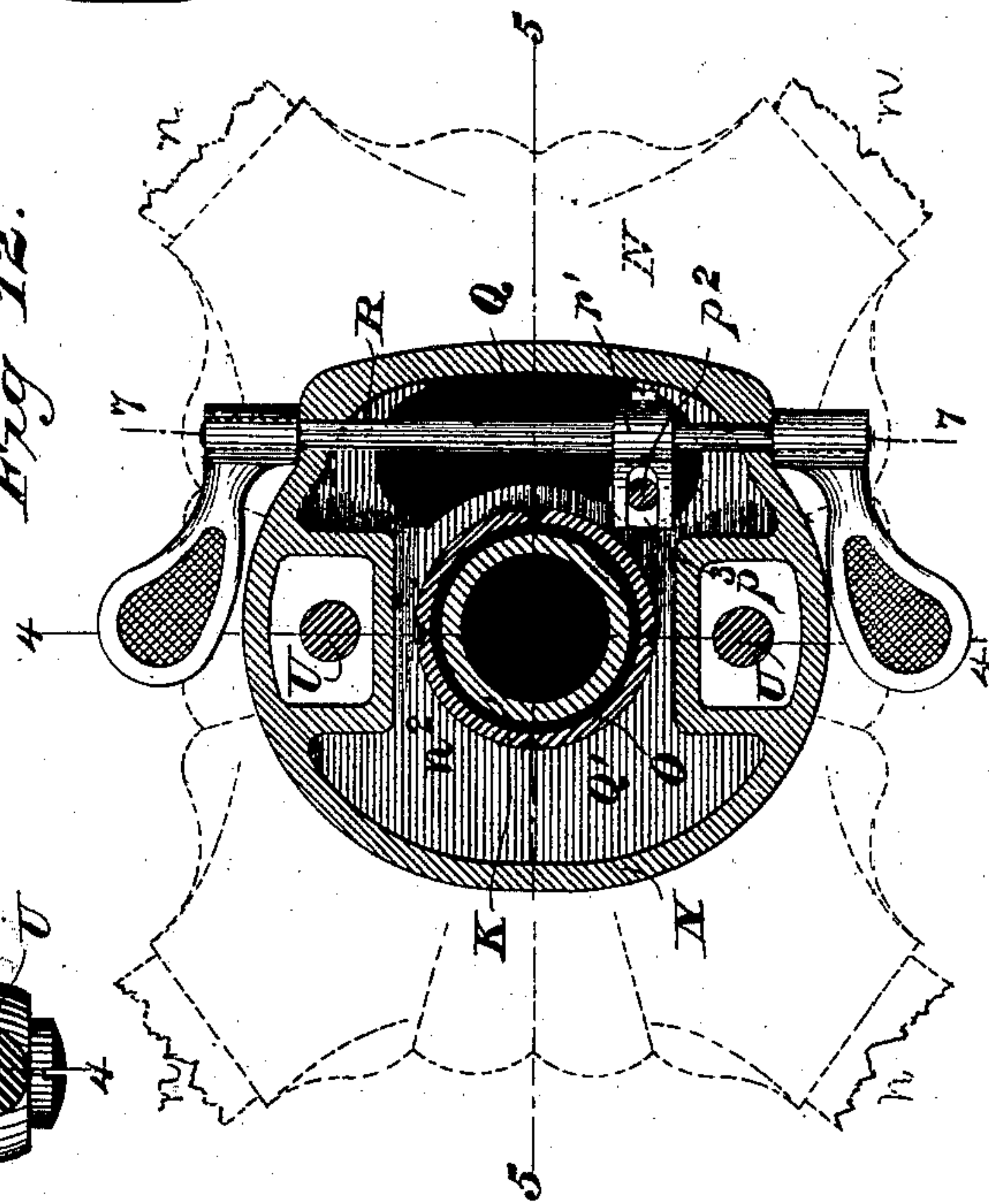
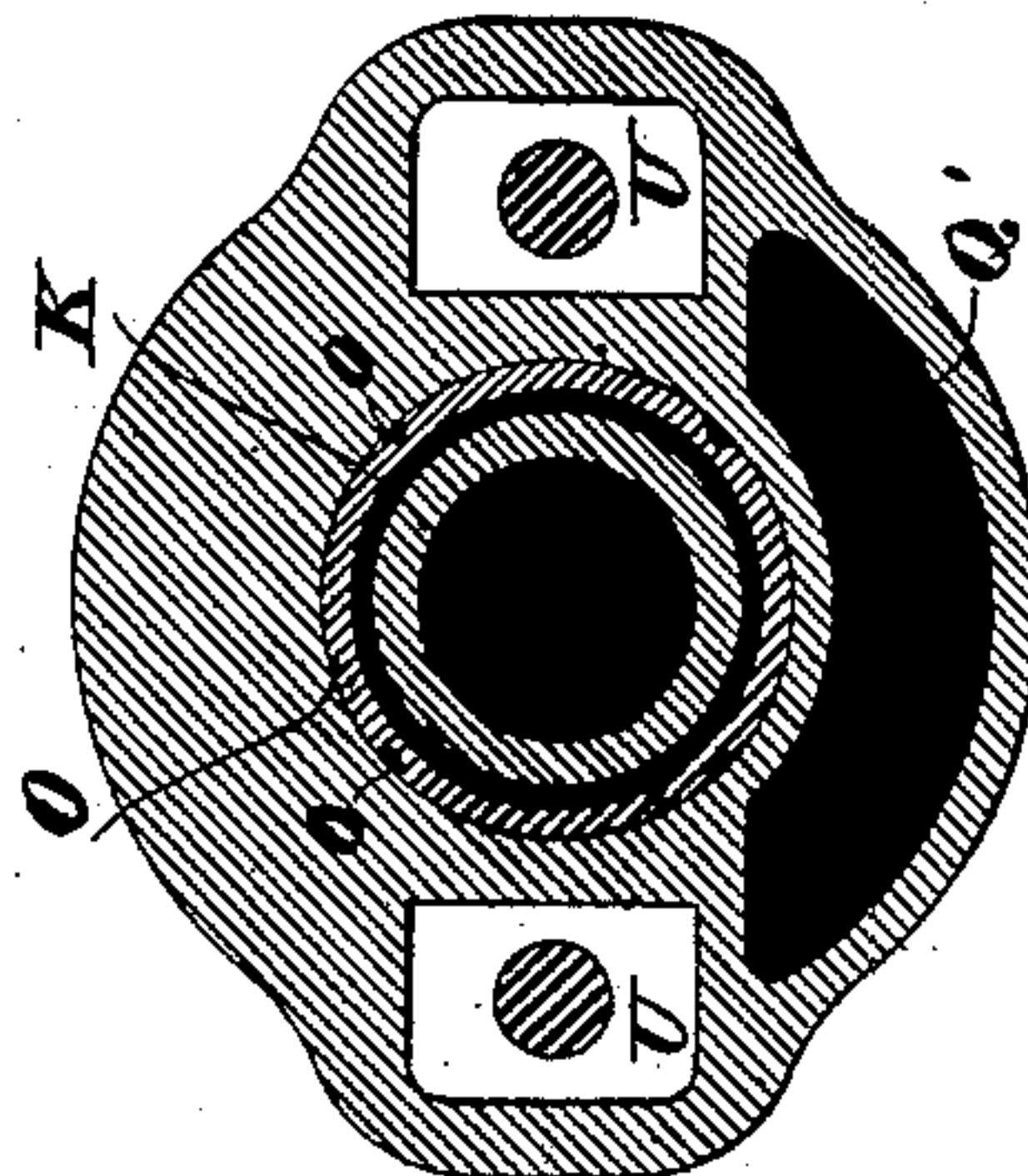


Fig 11.



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Patented Nov. 25, 1879.

Fig 14.

Fig 15.

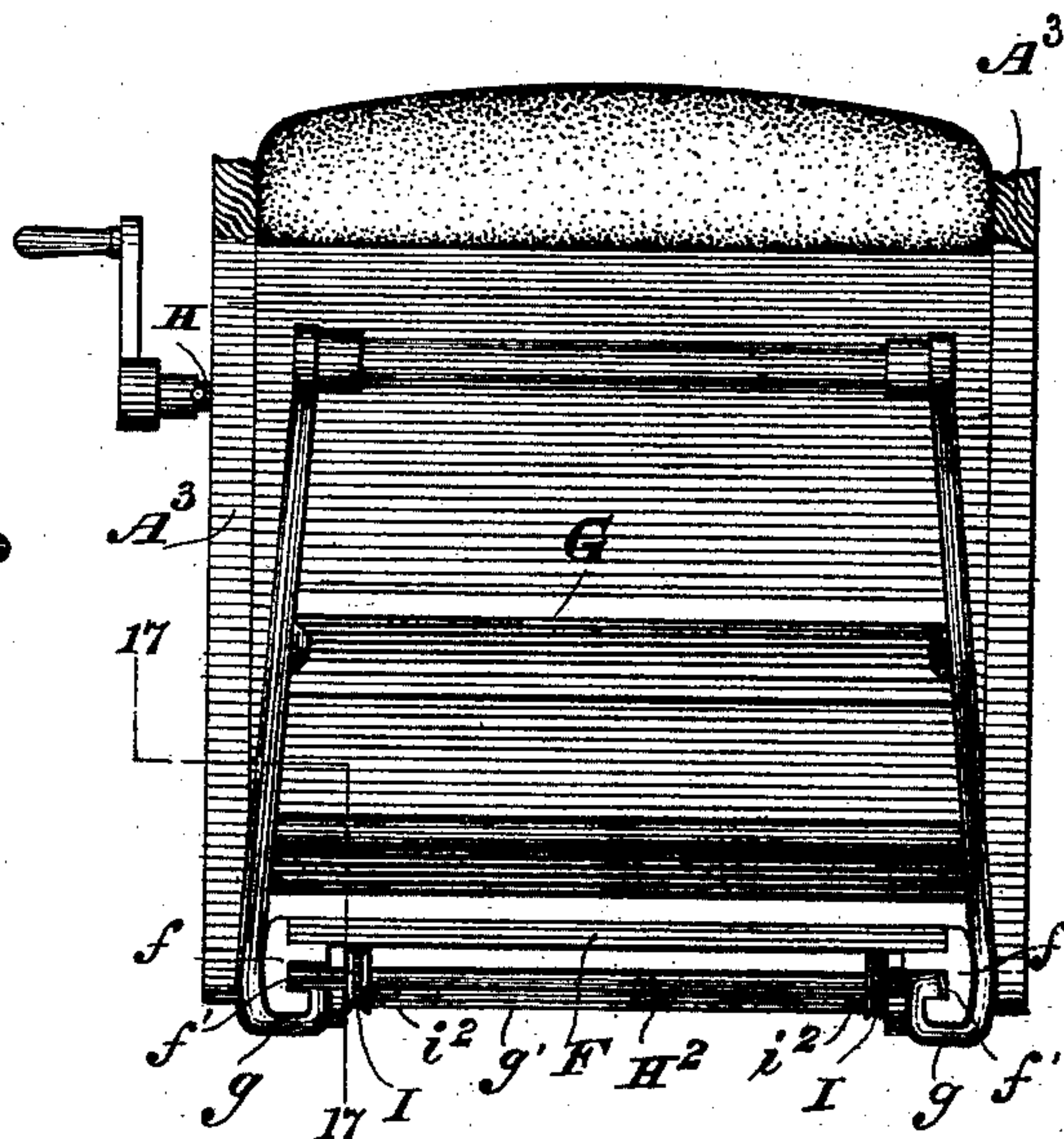
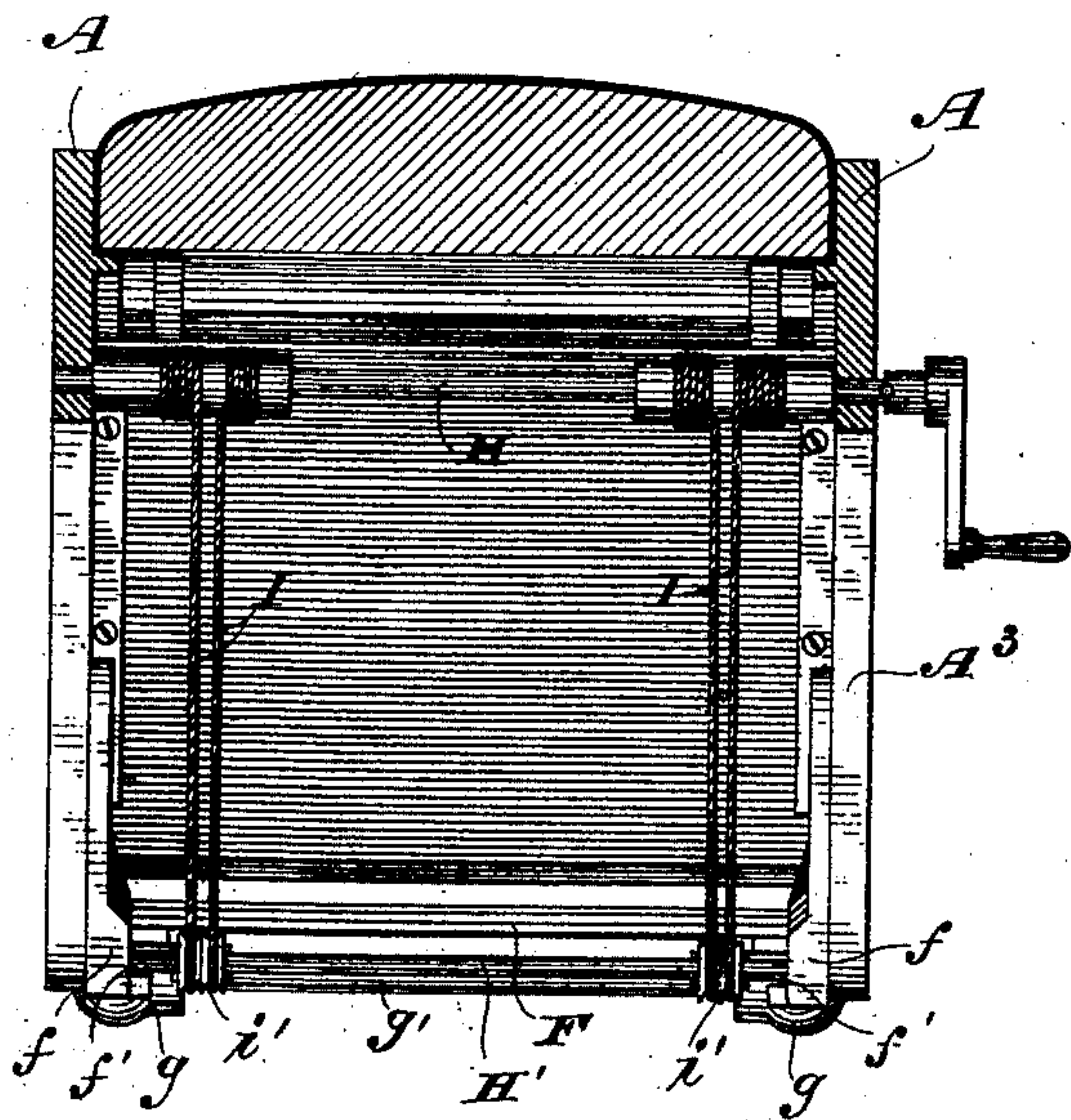


Fig 16.

Fig 17.

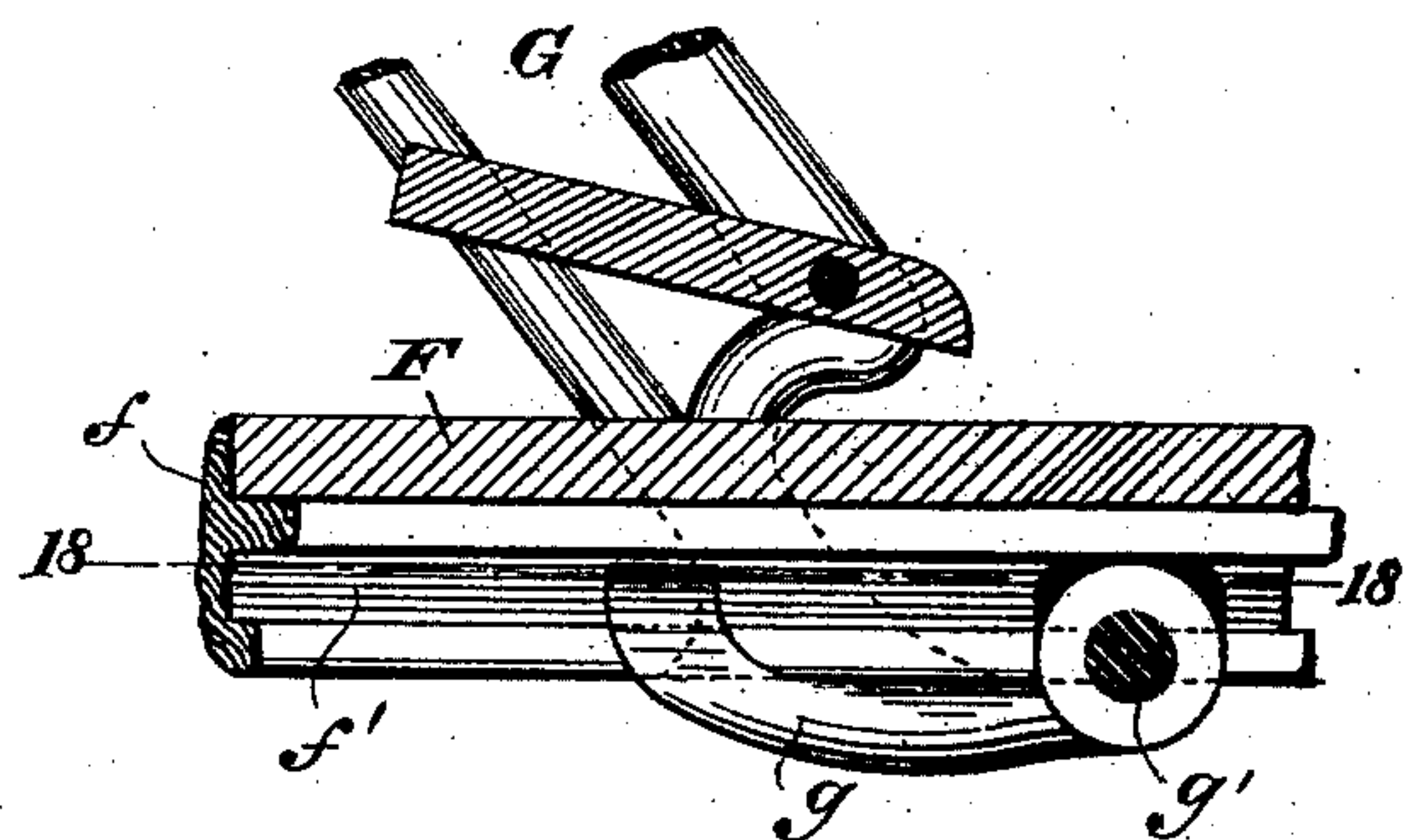
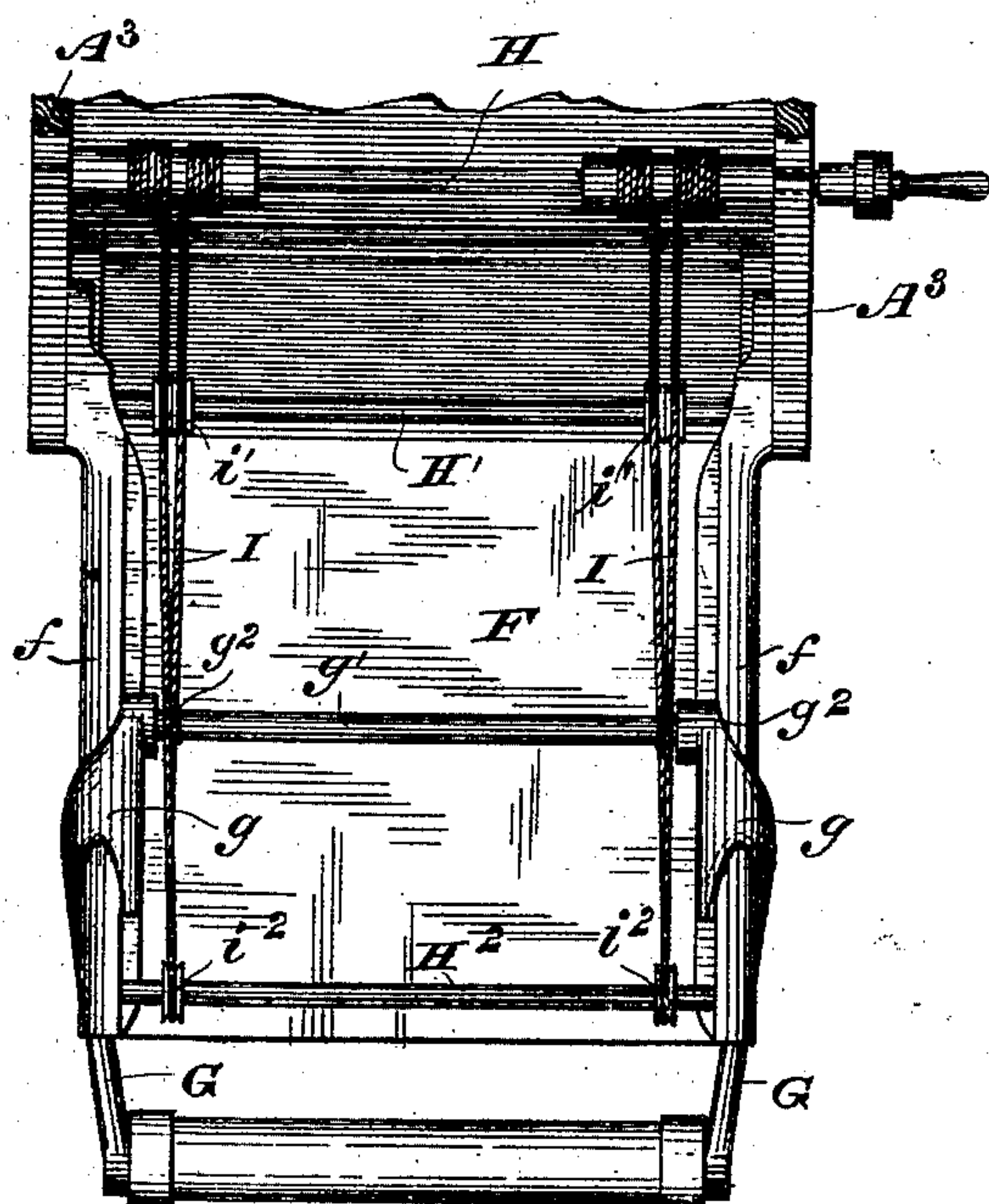
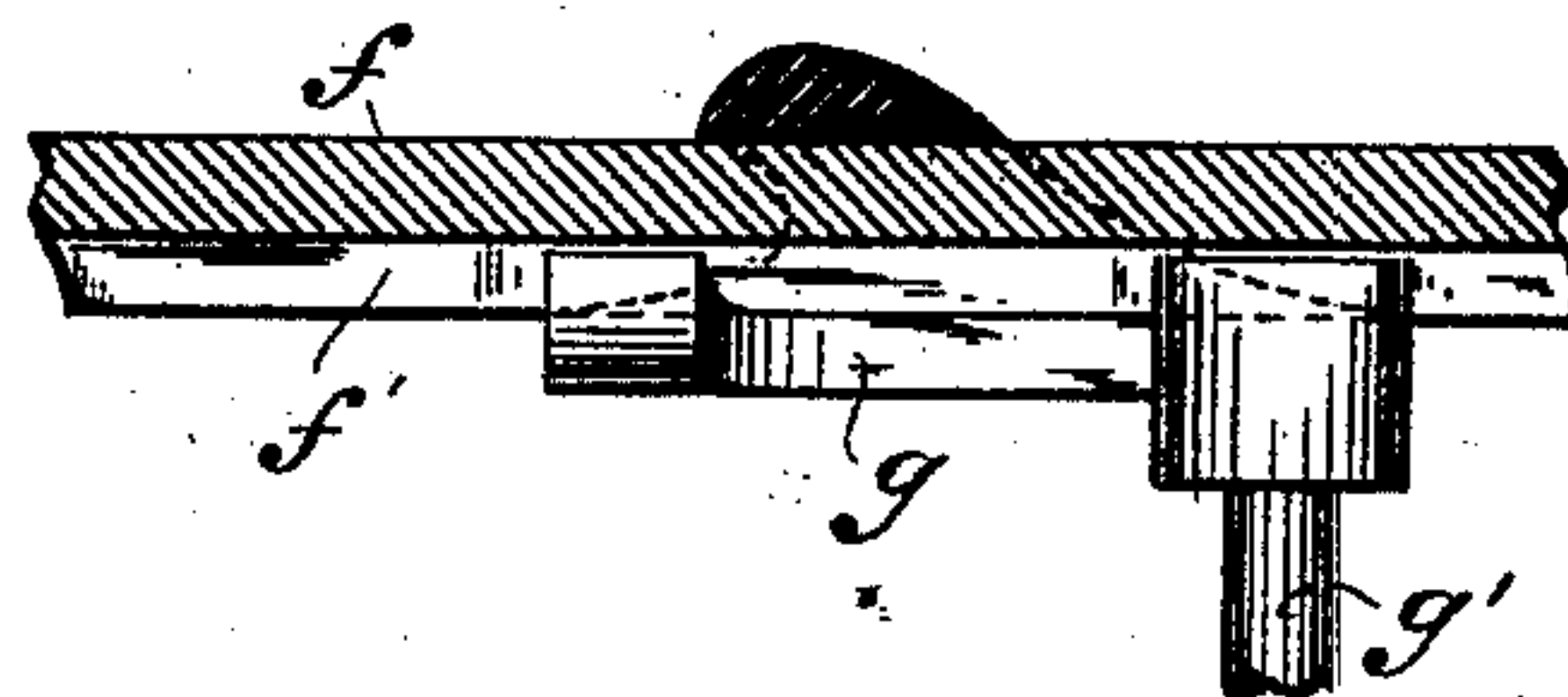


Fig 18.



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UNITED STATES PATENT OFFICE.

ELI T. STARR, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO SAMUEL S. WHITE, OF SAME PLACE.

IMPROVEMENT IN DENTISTS' CHAIRS.

Specification forming part of Letters Patent No. **222,092**, dated November 25, 1879; application filed November 21, 1878.

To all whom it may concern:

Be it known that I, ELI T. STARR, of the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Dentists' Chairs, of which the following is a specification.

My invention relates to dentists' chairs of the class in which is embodied a fluid supporting or sustaining column and mechanism to raise and lower the chair body or seat relatively to its base, and constitutes an improvement upon the hydrostatic pedal-lever stool or chair shown in Bramble and Deihl's patent of March 31, 1868, reissued to S. S. White, as assignee, June 25, 1878, as No. 8,294, and upon the dental chair shown in John B. Waring's application for Letters Patent of the United States filed January 2, 1878.

The general objects of my invention are readily to raise and lower the chair body or seat relatively to the base without shock or jar; to enable the supporting-plunger and chair body or seat mounted thereon to turn relatively to the lifting mechanism, to the fluid-cylinder, in which the plunger moves, and to the base; to avoid the necessity of providing the supporting-plunger with teeth, depressions, or irregularities in its surface or periphery for the purpose of elevating it while applying the lifting mechanism to the side of the plunger, (in contradistinction to applying the lifting mechanism beneath or upon the end of the plunger, as when the fluid-column is employed as the lifting mechanism in connection with a pump, or to applying the lifting mechanism to the side of a plunger provided with a rack or irregularities in its surface;) to prevent injurious strains between the plunger and the cylinder in which it moves; to preserve a tight joint between the plunger and cylinder, and to hold the chair-body securely at any desired height or elevation relatively to the base; and, finally, to improve the construction of various parts of the chair conducive to its more easy, steady, and advantageous operation, as hereinafter specified.

The subject-matter claimed will hereinafter specifically be designated.

The accompanying drawings represent a chair embodying all my present improve-

ments. Obviously, however, some of them may be used without the others, and in chairs differing in details of construction from the one therein represented. The details of construction shown may, obviously, also be modified in various well-known ways without departing from the spirit of my invention, which variations would readily suggest themselves to a skilled mechanic on examining the specification and drawings.

Figure 1 represents a side elevation of my improved chair; Fig. 2, a vertical longitudinal central section through the portions other than the base and the devices secured thereto. Fig. 3 represents a transverse section through the front of the chair-body, partly on the line 3 3 of Fig. 2, showing the mechanism for rocking or tilting the chair on its supporting-plunger. Fig. 4 represents a view, in elevation, partly in vertical section on the line 4 4 of Figs. 5, 12, and 13, through the chair lifting and supporting mechanism. Fig. 5 represents a similar view on the line 5 5 of Figs. 4, 12, and 13, showing a section at right angles to that depicted in Fig. 4. (Figs. 4 and 5 are on a scale larger than that of the preceding figures.) Fig. 6 represents a vertical section through the base of the chair on the line 6 6 of Fig. 7; and Fig. 7, a similar section on the line 7 7 of Fig. 6, both these figures showing the valve-tripping mechanism, and both figures being on a still larger scale than that of Figs. 4 and 5. Fig. 8 represents a horizontal transverse section through the base on the line 8 8 of Fig. 4, showing the details of the lifting-shoes. Fig. 9 represents a vertical transverse section on the line 9 9 of Fig. 8. Fig. 10 represents a transverse section through the base on the line 10 10 of Fig. 5, showing mechanism for clamping the supporting-plunger to prevent its turning horizontally in its sheath or cylinder; Fig. 11, a similar section on the line 11 11 of Figs. 4 and 5; Fig. 12, a similar section on the line 12 12 of Figs. 6 and 7, showing other details of the valve-tripping mechanism. (Figs. 8 to 12, inclusive, are on the same scale as Figs. 4 and 5.) Fig. 13, a similar section on the line 13 13 of Figs. 5, 6, and 7, showing further details of the valve and of the lifting mechan-

ism, this figure being on the same scale as Figs. 6 and 7; Fig. 14, a view of the back side of the foot-board-supporting pendent frame, partly in section on the line 14 14 of Fig. 2. Fig. 15 is a view, in elevation, of the foot-supporting mechanism, as seen from the front; Fig. 16, a bottom or inverted plan view of the parts shown in Figs. 14 and 15; Fig. 17, a detail view, partly in section, showing portions of the foot-support or foot-rest frame; and Fig. 18, a longitudinal section on the line 18 18 of Fig. 17.

The chair-body is shown as constructed in a manner similar to that of the body of the well-known S. S. White dental chair, patented February 20, 1877; and it consists of a seat-frame, A, supporting a back-frame, A', arm-frame A², and pendent foot-board-supporting frame A³, which, in this instance, forms a continuation of the arm-frame.

In a socket or guide in the back-frame A' a tube section or slide, B, carrying a back-pad, C, telescopes or moves freely endwise, and is locked at any point in its range of movement by a suitable clamp-screw, b. The back-pad is hinged or pivoted at its upper end, and its lower end has the capacity of being adjusted backward and forward (or to and from the supporting-frame) by means of a set-screw, c. The telescoping or endwise-moving tube carrying the back-pad receives an endwise-moving or telescoping rod, D, carrying on its upper bent end a head-rest, E, and its adjusting mechanism, which may be of any well-known construction. This vertically-adjustable head-rest bar is locked in position by a set-screw or clamp, d. This construction permits adjustment to accommodate persons differing in size, as well as to insure their ease and comfort, by varying the angle of inclination between the seat and back; but as this improved construction of chair-body is the invention of S. S. White, (patented as before stated,) it, of course, is not claimed herein.

The foot-board proper, F, is secured between suitable side bars or brackets, f f, one at each side, the inner bent ends of which are securely attached to and between the lower ends of the side pieces of the pendent frame A³ in a well-known way. It is obvious, however, that the brackets which support the foot-board may be cast with or form part of the pendent frame A³. The inner sides of the straight projecting portions of these bars or brackets f f are provided with longitudinal grooves f' f' for the reception of the lower ends of the side arms or supports, g g, of a foot-rest or foot-rest frame, G, the said lower ends being cast in such form or bent over in such manner as to fit the outer sides of the bars f f while projecting around beneath the bars to enter the guide-grooves f' f', above mentioned. This construction gives the foot-rest frame a capacity to slide or be adjusted upon the side bars of the stationary foot-board F to and from the seat of the chair, while the said frame is firmly supported at all points in its range of movement, the ends of the arms

g g of the foot-rest frame fitting the guide-grooves, being divided or branched, in order to give two points of support or bearing in the grooves for said frame at each side thereof. These side arms or supports, g g, of the foot-rest frame carry three foot-rest or foot-supporting cross-bars—in this instance one a swiveling turning bar, connecting their outer ends, another bar or board connecting their lower ends just above the stationary foot-board proper, and a third or intermediate bar connecting the arms at or about their center. The ends of the arms beneath the stationary board are also connected by a brace bar or rod, g', which also serves an additional purpose, as will presently appear.

In order to adjust the foot-rest or foot-rest frame upon the foot-board toward and from the seat to accommodate the various persons occupying the chair in an easy, noiseless, and convenient manner, I mount in suitable bearings, preferably near the front and beneath the seat-frame, a windlass-shaft, H, to which a suitable crank or handle is to be applied from a suitable drum, at each end of which shaft passes an endless cord, I, to and under a double set of intermediate pulleys, i' i', one set being mounted upon the shaft H' near each end, and from thence each cord passes around its respective pulley, i², mounted upon a shaft, H², secured near the front end of the foot-board proper. These cords or belts are so wound upon their respective drums that one portion or the other of each cord winds upon or unwinds from its drum in whichever way the windlass-shaft is rotated; and as one portion of each cord, intermediate of the pulley-shafts H' H², is secured or fastened at g² to the rod or bar g', the foot-rest frame will be drawn positively toward the seat, or carried positively away therefrom, according to the direction in which the windlass is turned, which operation will clearly be understood by inspecting Figs. 2, 14, and 16 of the drawings.

It will be obvious that instead of having a belt or cord at each side to adjust the foot-rest a single belt might be employed, located at the center. Other devices for reciprocating the foot-rest will also suggest themselves to a skillful mechanic as advantageous in particular cases.

The foot-board proper, instead of being fixed both as to vertical and horizontal adjustment, might be constructed in well-known ways so as to be vertically adjustable in reference to its pendent supporting-frame, a suitable belt-tightening device being employed to preserve the requisite tension of the belts or cord.

The chair body or seat is pivoted or mounted on trunnions j, on a cross-bar or yoke, J, fixed or supported upon the top of a plunger or piston, K, in such manner that the chair body or seat has the capacity of rocking, or of being rocked or tilted, freely backward and forward on its supports. In order to accomplish this adjustment or rocking of the chair-body, together with the patient, should one be seated

therein, and retain it in position when so adjusted, I preferably employ the device shown in the patent of White of February 20, 1877, hereinbefore referred to, which consists of a screw, *L*, working through a block, *l*, journaled in a step, *j'*, projecting from the cross-bar or yoke on which the body is pivoted, the upper end of this screw being journaled (so as to be capable of turning freely but prevented from endwise movement) in a pivoted bar, *M*, near the front of the seat-frame, and carrying upon said end a bevel-wheel, *m*, driven by a corresponding bevel-gear, *m'*, mounted on a winch-shaft, *M'*, turning in suitable bearings on the bar *M*. Other mechanism may, however, be employed to tilt and lock the body in its tilted position.

The plunger or piston which carries the chair-body is movable endwise through a central opening in a non-rotating base, shell, or casing, *N*, supported upon suitable legs or feet *n*, and is also movable endwise in a cylinder, *O*, supported by and inclosed within the base or shell and its feet, which base and feet are preferably constructed of metal and cast in a single piece.

The plunger is provided at its lower end with packing, as usual in this class of chairs, and has the capacity of turning, as well as of moving freely endwise, in the cylinder, whereby the horizontal as well as vertical adjustment of the chair is accommodated, which is in this particular substantially similar to the chair shown in Bramble and Deihl's patent of March 31, 1868, hereinbefore referred to.

In order to preserve a tight joint between the plunger and cylinder, I construct the plunger of a diameter preferably somewhat less than that of the bore of the cylinder, and secure a packing-head upon its lower end in such manner that the plunger may swivel or turn freely independently or irrespective of the packing-head, though carrying said head with it in its endwise movements.

I prefer to employ a tubular plunger, and provide its bore at the lower end with a suitable box or bearing, *k*, to receive a round shank or journal, *k'*, projecting from the packing-head, which preferably consists of a circular plate, *k²*, between which and another circular plate, *k³*, of somewhat smaller diameter, the packing material is secured, as clearly shown in Fig. 5.

The upper end of the shank *k'* projects beyond its bearing into the bore of the plunger, and is provided with a suitable nut or shoulder, whereby, while the plunger is free to turn upon the packing-head, the two are locked together in respect to endwise movement. The packing projects out from between the plates *k²* *k³*, and envelops the edges of the lower plate, forming a tight joint between said plate and the cylinder.

The plunger is shown as tubular; but it may be solid, if preferred, and suitably recessed at its lower end to receive the journal of the packing-head; or the said head and plunger

may be coupled together by any other suitable swiveling connections.

The cylinder *O* communicates, through valves *P P'*, (see Figs. 6, 7, and 13,) working in a partition-plate, *q*, formed near the bottom of the cylinder, with a fluid-reservoir, *Q*, communicating with or forming a continuation of a cavity, *Q'*, formed in the base or shell *N*, as clearly shown in Fig. 5. The lower portion, *Q*, of the reservoir is secured in place upon the base, shell, or casing, so as to communicate with the cavity in the base, as above stated, by suitable devices—screws, for instance—a suitable packing-ring or gasket being interposed to insure a tight joint and prevent leakage of the fluid.

The shell or base is provided with an opening near its upper end, ordinarily closed by a suitable plug or cap, *r*, through which opening oil or other suitable liquid or fluid may be supplied to the reservoir.

By the construction above described the chair base or shell itself constitutes the walls of the fluid-reservoir, (in contradistinction to a base having a recess for the reception of both a separate reservoir and cylinder,) the advantage of which is obvious.

The cylinder *O*, it will be observed, is secured to the reservoir-casing *Q* just above its bottom, and extends upward centrally in the base or shell, being supported by and fitting snugly in the lower or bottom portion, *n²*, of said base, and through the reservoir-cavity *Q'*, formed in the base. The upper end of the cylinder terminates below the top of the base in an annular recess, *n'*, formed in the base above its cavity, where it is firmly supported, as clearly shown in Figs. 4 and 5, and this upper end is provided on its periphery with longitudinal grooves, ducts, or channels *o*, to return to the reservoir any fluid that may be drawn or forced up by or past the plunger.

It will thus be seen that the plunger, in its movements and when at rest, is not wholly supported by the fluid-cylinder, but above the cylinder is guided and supported by the central opening or walls thereof in the upper end of the base, in which opening or bore the plunger fits snugly. This relieves the cylinder from too much strain, and tends to aid in the preservation of a tight joint between it and the packing of the plunger.

The upward movement of the plunger is limited by the upper plate, *k²*, of the packing-head, which strikes or abuts against the annular shoulder or edge formed in the base or shell above the top of the recess *n'*, in which recess the upper end of the cylinder is supported.

I have shown in Figs. 7 and 13 two valves, to permit of communication between the fluid chamber or reservoir and the cylinder, both opening inwardly or downwardly against the pressure of the fluid, as in Bramble and Deihl's patent, hereinbefore referred to, and have also shown them of different size, as in Waring's application, above mentioned.

The object of employing two valves of different size is, that when the supporting-plunger is elevated or raised the fluid follows rapidly into the cylinder through the large valve to support the plunger or piston in its elevated position, while the smaller or outlet valve, when opened, renders the descent of the piston more gradual, as is well understood. The same result may, however, be attained by valves of the same size, the forcing of the outlet-valve from its seat to a greater or less degree regulating the escape of the fluid from beneath the plunger, and, consequently, the rapidity of descent of the plunger.

A single valve may also be employed to permit both ingress and egress of the oil to and from the cylinder, if desired; but the employment of the two valves is preferred.

The large valve P is of well-known construction; but the smaller or outlet valve, its casing, and its operating mechanism are, preferably, constructed as follows: A tubular casing, p' , is secured in the partition-plate, between the reservoir and cylinder, the upper end of which receives and guides the lower end of a vertical rod, p^2 , said rod being guided at its upper end in a suitable recess formed in the base or shell. The lower end of this rod p^2 is tapering, and is connected with the upper end of a conical or tapering valve or plug, p , fitting the lower end of the casing p' , the rod and valve being, by preference, formed in one piece.

The tubular valve-casing is provided, just above the partition-plate, with a circular groove or channel, into which a series of perforations or openings lead from the bore of the casing, which communicates with the fluid-cylinder, and surrounding this channel or recess and the perforations in the casing leading thereto is a perforated guard or ring, the perforations in which are preferably more numerous than those in the casing p' . This construction gives two series of perforations, through which the oil escapes from the cylinder back into the reservoir when the valve is opened, and thus obviates unpleasant noise from the escaping oil. The opening of the valve is accomplished by means of a toe, wiper, or projection, r' , on a rock-shaft, R, which wiper acts upon a collar, p^3 , on the rod p^2 and forces said rod downward, thus pushing the valve or plug from its seat.

The shaft R, which operates the valve-rod, passes transversely through the base and cavity formed therein, and upon each of its ends, outside the base, is mounted or secured a foot piece or lever, whereby the outlet-valve may be operated by applying the foot to a separate lever upon either side of the chair.

A suitable spring, confined between a collar on the lower end of the valve-rod and the upper end of the valve-casing, serves to raise said rod when the pressure of the foot is removed, thus instantly closing the valve and retaining it in that position, which closing is

aided and facilitated by the back-pressure of the fluid in the cylinder.

A suitable clamp-screw, S, passes through the base, near its top or upper end, and forces (when turned in the right direction by the foot of the operator being applied to a depending lever secured thereto) a shoe or plate against the side of the plunger, to lock said plunger to the base and prevent endwise or turning movement of the plunger therein.

In order to retain the advantages of a foot-lever for elevating the chair-body and plunger, in connection with a fluid supporting-column, which is the invention of Bramble and Deihl, and patented, as hereinbefore stated, while obviating the necessity of applying the lifting mechanism beneath the plunger, as with the fluid-column and pump, or of applying it to one side of the plunger in lieu thereof by means of racks or ratchets and pawls, which latter necessitates the formation of irregularities in or upon the surface of the plunger, which prevent independent rotation of the plunger; and, furthermore, to secure a method of raising the plunger in an easy noiseless manner, in which the fulcrum of the elevating-lever will preferably be at or near the lower part of the base of the chair, and thus remain stationary in connection with said base relatively to the turning plunger or spindle, which permits of the horizontal adjustment of the chair body or seat, I have devised apparatus to these ends.

This elevating apparatus preferably consists of a foot-lever, T, pivoted to a depending arm or bracket, t , secured to the non-rotating chair-base, (or it may be pivoted upon the fixed or non-rotating base itself,) the lever being provided at its outer end with a foot piece or pad, t' , to which the foot of the operator is to be applied, and at its inner end with forked arms partially encircling the fluid-reservoir, which is suspended or inclosed within the legs or base of the chair. To the ends of these arms are pivoted or pin-jointed the lower ends of vertical links or arms, U U, movable endwise in recesses or chambers formed in the base or shell, as clearly shown in Figs. 4, 10, 11, and 12. The upper ends of these links are bent outward and upward, as clearly shown in Fig. 4, (the upper end of the base being slotted for that purpose,) and are pin-jointed or pivoted to the outer ends of short links or levers V V, having their fulera or pivots at v , and provided on their inner ends with cam surfaces or faces, which bear against shoes or plates $v' v'$, fitting upon opposite sides of the plunger.

The inner portions of the levers V V and the shoes are inclosed within a movable head, W, preferably similar in shape to the upper end of the base, which head travels with the cam-levers and shoes, which clamp the plunger in the elevating operation.

In order to accommodate the slight downward movement of the shoes, caused by the

cam-levers acting against them when operated to clamp the plunger, the shoes are loosely mounted in their carrying-head, and rest upon light plate-springs v^2 , as clearly shown in Fig. 9.

Instead of employing two clamping devices to take hold of the plunger from opposite sides, as above described, which is, however, the preferred construction, I have employed, and contemplate employing, in connection with the head W, or some equivalent therefor, only a single clamp, actuated by the lever and acting upon one side of the plunger only, to elevate it.

One obvious way of elevating the plunger by a single clamp, fitted to operate at one side thereof, would be merely to omit or disconnect one of the two vertical links U and its clamping or cam lever V and shoe. A single clamp acting upon one side of the plunger only, however, does not work so perfectly as the preferred and described construction of two clamps fitted to operate upon opposite sides of the plunger to elevate it.

It will also be obvious that additional clamping levers and shoes could be added, so as to clamp the plunger upon more than two sides or places, if desired; but, as above stated, the construction shown is preferred.

The operation of my improved chair, as far as relates to the elevating and sustaining mechanism, is as follows, it being deemed unnecessary to recapitulate the operation and various adjustments of the portion of the chair above the plunger, or of the foot-rest carried thereby, such being obvious from the preceding description thereof: The elevation of the plunger is effected by the foot of the operator, who depresses the outer end of the elevating-lever, which depression raises the inner forked end of said lever, and with it the vertical links pivoted thereto, which links in turn, immediately upon the commencement of their upward movement, act upon the cam-levers, forcing the shoes against the plunger upon and from opposite sides, and securely clamping the plunger between them; and as the elevating movement continues the plunger is lifted bodily, carrying with it, of course, the chair body or seat mounted thereon. This upward movement of the plunger causes the fluid in the reservoir to flow through the large inlet valve opening into the chamber that communicates directly with the cylinder, and follow the plunger in its ascent.

When the pressure on the lever is removed its outer end is raised to its normal position, ready for the next downward movement that is to add to the elevation of the chair, this being caused by the action of suitable springs, (shown clearly in Fig. 4,) the tension of which is always exerted to force or draw down the inner forked end of the lever and elevate its outer end. This downward movement causes a release of the clamping-shoes from the plunger, and causes them, together with the head inclosing the upper portion of the elevating

apparatus, to move down in position ready to act upon the next operation or depression of the elevating-lever. This leaves the plunger free to turn, so that the chair-body can be adjusted horizontally.

Immediately upon the release of the plunger a slight downward or backward movement thereof takes place, which instantly closes the valve by which the fluid was allowed to enter the cylinder, (which closing of the valve may or may not be aided by suitable springs in well-known ways,) and thus prevents the escape of the fluid, which, being practically non-elastic, consequently cushions and supports the plunger in its elevated position.

This elevating operation can, of course, be continued until the limit of the range of movement of the plunger in an upward direction is reached.

To lower the plunger, and consequently the chair body or seat carried by it, the outlet-valve (the small one in the preferred construction) is forced from its seat, which allows the fluid to escape or flow back from the cylinder to the reservoir, thus permitting the plunger to descend gradually and without shock or jar.

The operation of the valve is accomplished by means of the foot of the operator, which may be applied to a separate lever upon either side of the chair, as before stated, which is highly advantageous.

The advantages of a dental chair constructed according to my invention have been amply demonstrated by practical operation, and its superiority over other chairs of this class, constructed as hereinbefore recited, is obvious.

I do not wish to be understood as claiming, broadly, a foot-rest sliding or reciprocating toward and from a seat, as that is very old; but I am not aware that the stationary foot-board or platform of a dental chair has ever heretofore been combined with a sliding foot-rest reciprocated positively backward and forward by mechanism convenient to the operator.

I do not wish to be understood as claiming, broadly, first, the combination, in a dental chair, of a base, a plunger, a chair-body capable of varying adjustment mounted thereon, a fluid supporting-column, an elevating foot-lever, and a handle or lever independent of the elevating foot-lever, or elevating mechanism for operating the valve or mechanism that permits of the escape of the fluid from beneath the plunger to lower the chair; secondly, a chair-body mounted upon a plunger sustained at any desired height by means of a fluid medium, the said chair-body being adapted to be variably inclined, and being provided with means for securing it at any desired angle; and, thirdly, the combination of a base or stand, a vertically-movable support, a fluid medium for sustaining said support, a chair-body carried by said support adapted to be adjusted vertically, horizontally, and as to inclination relatively to the base, and mechanism for accomplishing these adjustments of the chair-body. These three recited combinations or subjects-matter

are the invention of John B. Waring, whose application has hereinbefore been alluded to.

Neither do I wish to be understood as claiming in this application any feature, portion, part, or combination of my present invention (as embodied in the chair illustrated in the accompanying drawings or described herein) other than as specifically set out in the following claims.

My intention is to embody in my application of July 7, 1879, filed as a division of this case, claims to any and all patentable subject-matter of my present invention not herein specifically claimed; and I hereby expressly disclaim in favor of my said application of July 7, 1879, all patentable subject-matter common to said application and this present one not claimed herein, a like disclaimer being entered in my application of July 7, 1879, to the subject-matter covered by the claims hereof.

I claim as of my own invention—

1. The combination, substantially as hereinbefore set forth, of the foot-board, the foot-rest fitted to move backward and forward relatively to the foot-board, the shaft connected with the frame of the chair, and connecting devices, substantially as described, between said shaft and said foot-rest.

2. The combination, substantially as hereinbefore set forth, of the cylinder, the plunger turning therein, the elevating-lever, and mechanism, substantially as described, acting upon the side of the plunger, preventing its rotation when being elevated, but when the pressure on the elevating-lever is removed permitting the plunger to be rotated to accomplish horizontal adjustment or turning of the chair-body carried by the plunger.

3. The combination, substantially as hereinbefore set forth, of the chair-base, the cylinder, the plunger having the capacity of turning relatively thereto, the elevating-lever pivoted to a non-rotating portion of the chair-base, and mechanism, substantially as described, actuated by the lever to clamp or engage the sides of the plunger to elevate it.

4. The combination, substantially as hereinbefore set forth, of the plunger, the clamp fitted to operate at one side thereof, the movable head, and the elevating-lever for moving said clamp.

5. The combination, substantially as hereinbefore set forth, of the plunger, the clamp fitted to operate at one side thereof, the movable head, the elevating-lever, and the spring for releasing the clamp.

6. The combination, substantially as hereinbefore set forth, of the plunger, two clamps fitted to operate at opposite sides of said plunger, the movable head, and the elevating-lever.

7. The combination, substantially as hereinbefore set forth, of the plunger, two clamps fitted to operate at opposite sides of said plunger, the movable head, the elevating-lever, and the spring for releasing the clamps.

8. The combination, substantially as herein-

before set forth, of the plunger, the clamp fitted to operate at one side thereof, the clamp-shoe, the movable head, and the elevating-lever.

9. The combination, substantially as hereinbefore set forth, of the plunger, the movable head surrounding the same, the device, substantially as described, for taking hold of said plunger, and the elevating-lever.

10. The combination, substantially as hereinbefore set forth, of the base, the cylinder, the plunger, mechanism, substantially as described, acting upon the plunger outside of and above the reservoir and base, the elevating-lever actuating said mechanism through the medium of its connections, and a fluid-column to uphold the plunger when elevated.

11. The combination, substantially as hereinbefore set forth, of the base, the cylinder, the plunger, the clamping mechanism acting upon the plunger outside of and above the reservoir and base, and the elevating-lever for actuating said mechanism pivoted upon the base, and connected with the clamping mechanism by link-connections.

12. The combination, substantially as hereinbefore set forth, of the base, the plunger, devices, substantially as described, for taking hold of the plunger to elevate it, carried by a movable head, and the elevating-lever.

13. The combination, substantially as hereinbefore set forth, of the plunger, the devices, substantially as described, for taking hold of the same upon opposite sides to elevate it, and a forked elevating-lever.

14. The combination, substantially as hereinbefore set forth, of the plunger, the clamp fitted to operate at one side thereof, the movable head, the elevating-lever, the cylinder inclosing the plunger, and the outlet-valve of said cylinder.

15. The combination, substantially as hereinbefore set forth, of the cylinder, the plunger, the packing-head, the swiveling connection between the packing-head and the plunger, and the elevating mechanism acting upon the sides of the plunger to elevate it and the packing, while permitting said plunger to turn independently in the cylinder.

16. The combination, substantially as hereinbefore set forth, of the cylinder, the plunger, the packing-head, the swiveling connection between the packing-head and the plunger, and the locking-clamp, to prevent rotation of the plunger.

17. The combination, substantially as hereinbefore set forth, of the plunger, the cylinder inclosing the same, the outlet-valve for said cylinder, the outlet-valve case, and the perforated guard thereof.

18. The combination, substantially as hereinbefore set forth, of the chair-base, the plunger, the clamp fitted to operate at one side of the plunger, the movable head, and the elevating-lever for moving said clamp.

19. The combination, substantially as hereinbefore set forth, of the chair-base, the plun-

ger, the seat-frame carried by the plunger, the clamp fitted to operate at one side of said plunger, the movable head, and the elevating-lever.

20. The combination, substantially as hereinbefore set forth, of the chair-base, the plunger, the seat-frame carried by said plunger, the movable head surrounding the plunger, the device, substantially as described, for taking hold of said plunger, and the elevating-lever.

21. The combination, substantially as hereinbefore set forth, of the chair-base, the plunger, the seat-frame carried by said plunger, the clamp fitted to operate at one side thereof, the movable head, the elevating-lever, the cylinder inclosing said plunger, and the outlet-valve of said cylinder.

22. The combination, substantially as hereinbefore set forth, of the chair-base, the plunger, the seat carried by the plunger, the packing-head of the plunger, and the swiveling connection between said plunger and its packing-head.

23. The combination, substantially as hereinbefore set forth, of the base, the fluid-reservoir, the cylinder, the chair body or seat supporting plunger, the elevating foot-lever, the clamping mechanism acting upon opposite sides of the plunger, the fluid supporting-column, and the valve mechanism, which permits access of fluid to and its withdrawal from the cylinder beneath the plunger.

24. The combination, substantially as hereinbefore set forth, of the plunger with the packing-head, consisting of the upper and lower plates, between which the packing material is secured, the said upper plate being provided with a journal or shank having a bearing in the plunger, whereby the latter is permitted to turn freely independently of the packing.

In testimony whereof I have hereunto subscribed my name.

ELI T. STARR.

Witnesses:

WM. J. PEYTON,
JOHN F. PARET.