No. 713,282. Patented Nov. 11, 1902.

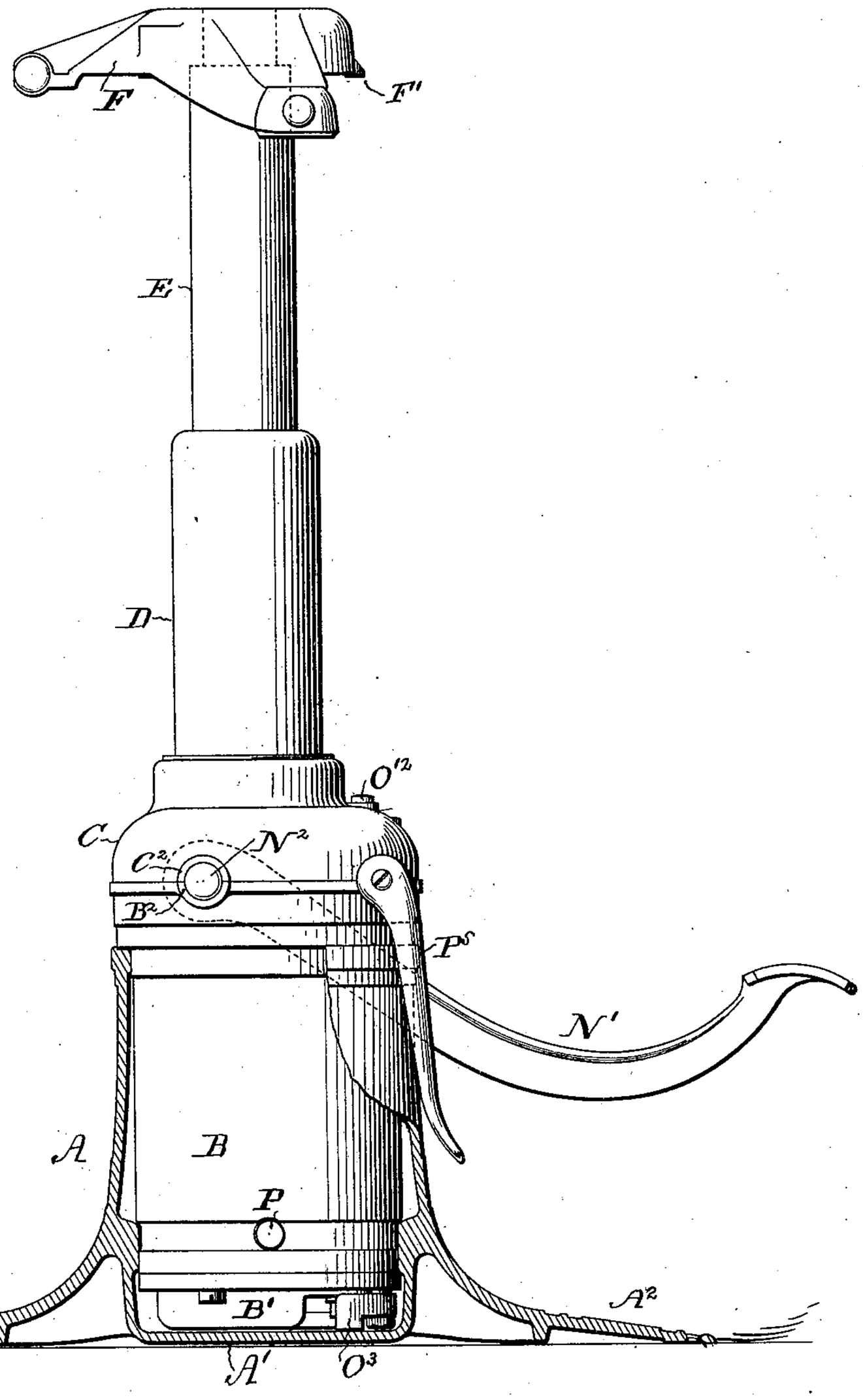
A. W. BROWNE.

DENTAL CHAIR.

(Application filed Mar. 5, 1901.)

(No Model.) 6 Sheets—Sheet 1.

FIG. 1.



WITNESSES:

C. E. Jones

F. W. Baier

INVENTOR:

Arthur W. Browne,

by Edward F. Simpson, Jr.

Attorney.

No. 713,282.

Patented Nov. 11, 1902.

A. W. BROWNE.

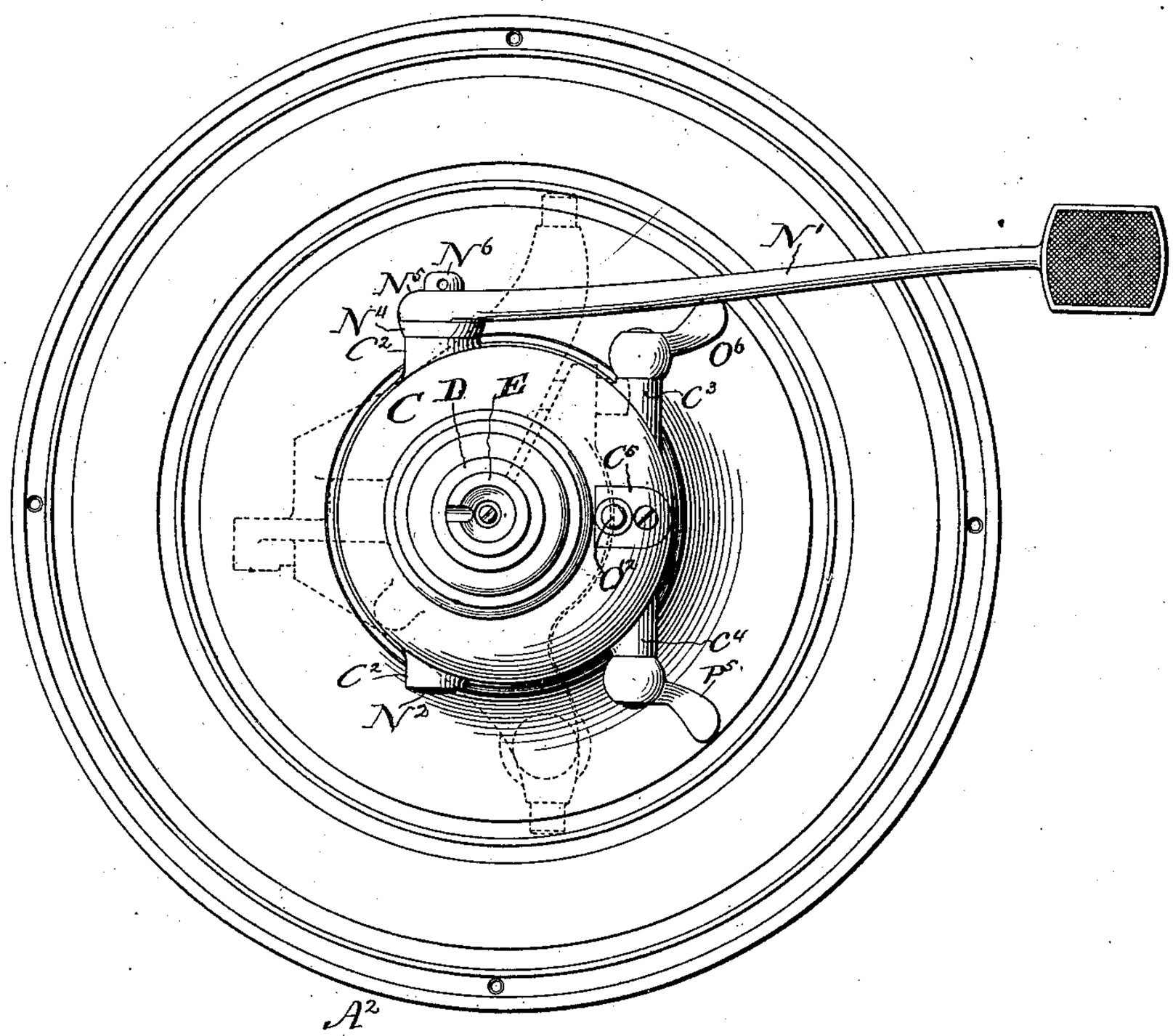
DENTAL CHAIR.

(Application filed Mar. 5, 1901.)

(No Model.)

6 Sheets—Sheet 2.

FIG. 2.



WITNESSES:

C. E. Jones

F. D. Wailes

INVENTOR:

Arthur W. Browne,

by Edward F. Simpson, Jr.

Attorney.

No. 713,282. Patented Nov. 11, 1902.

A. W. BROWNE.

DENTAL CHAIR.

(Application filed Mar. 5, 1901.)

(No Model.) 6 Sheets—Sheet 3.

FIG. 14.

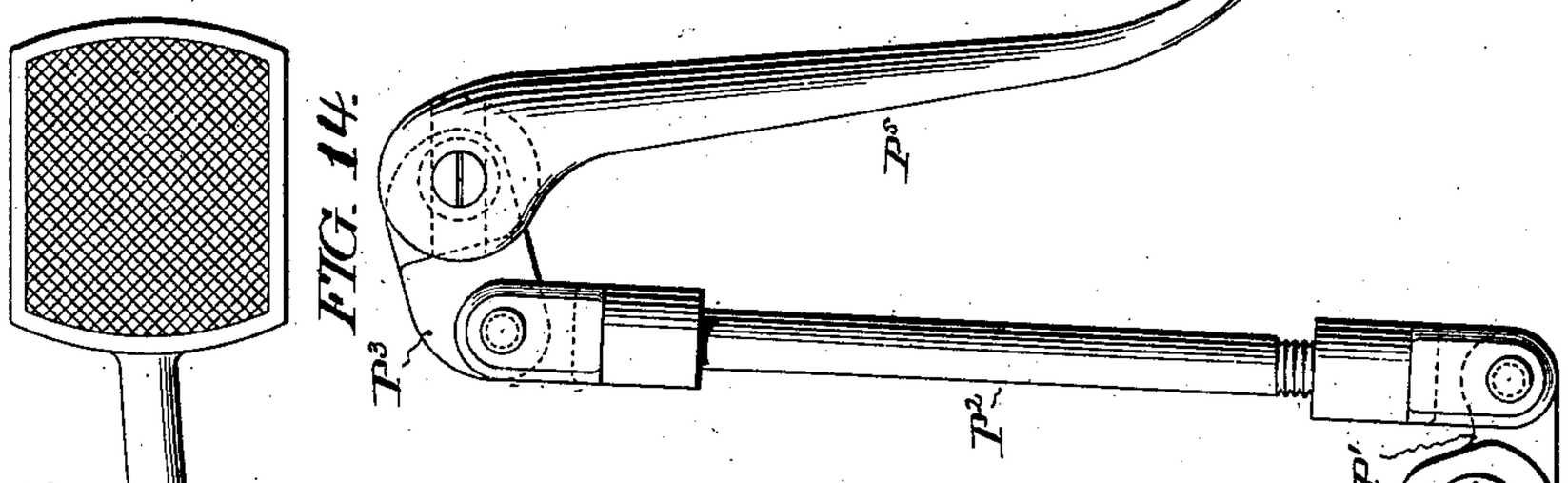


FIG. 13.

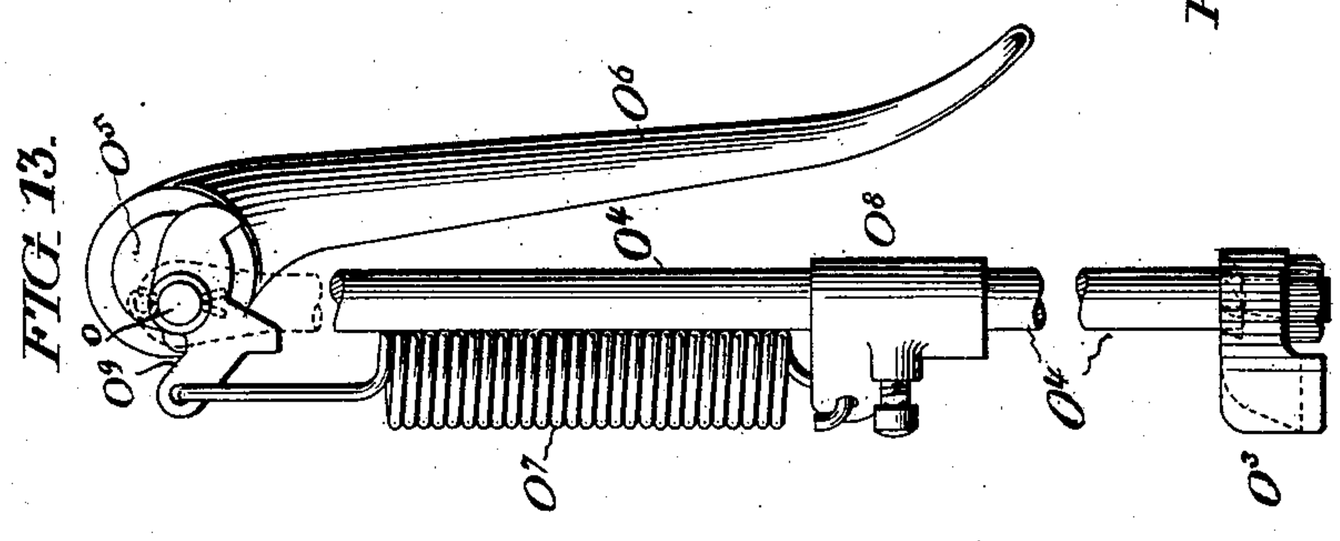
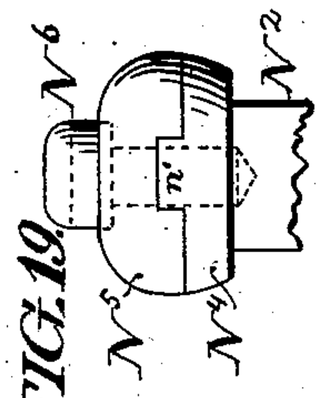


FIG. 3.

FIG. 19.



WITNESSES:

C. E. Jones

J. B. Tuttle

INVENTOR:

Arthur W. Browne,

by Edward F. Simpson, Jr

Attorney.

No. 713,282. Patented Nov. 11, 1902.

A. W. BROWNE.

DENTAL CHAIR.

(Application filed Mar. 5, 1901.)

(No Model.) 6 Sheets—Sheet 4.

FIG. 4.

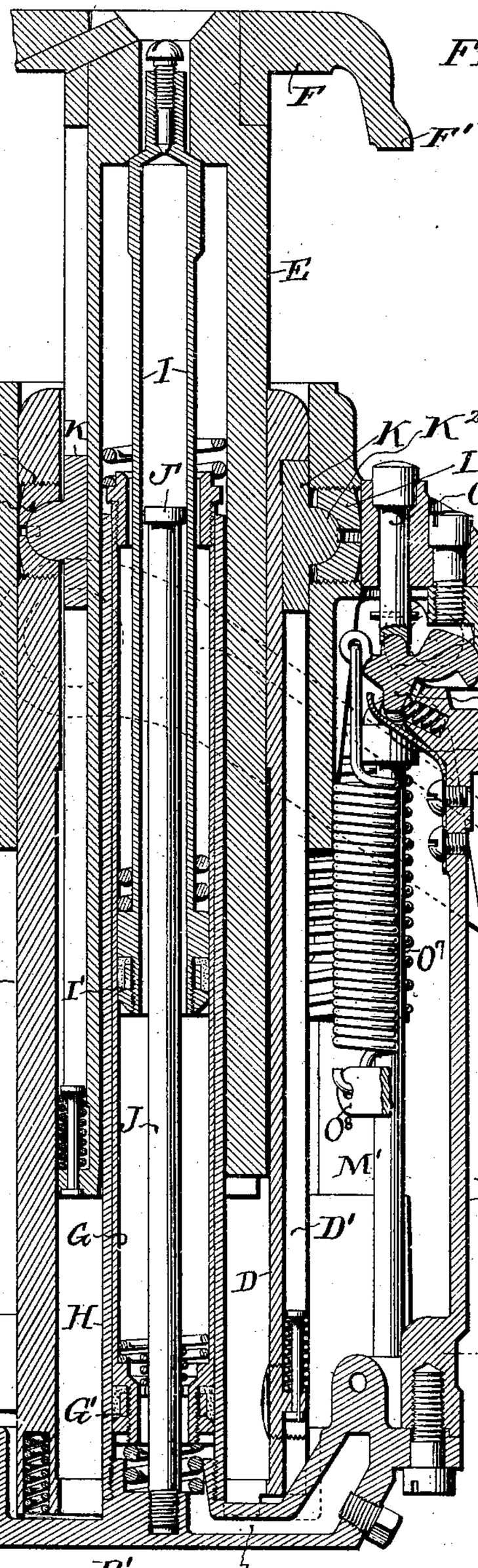


FIG. 17.

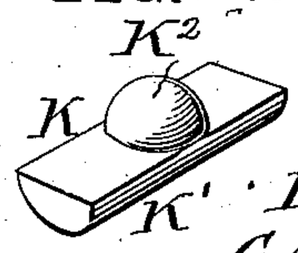


FIG. 18.

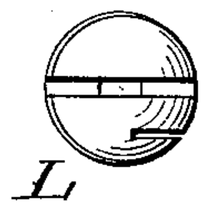
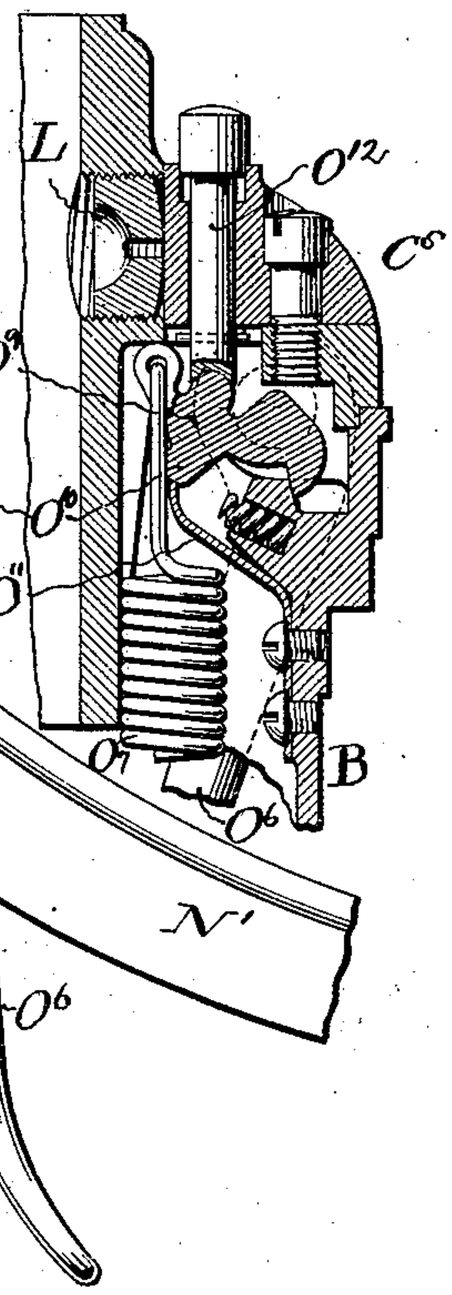


FIG. 7.



WITNESSES:

C. E. Jones
J. R. Vaill.

INVENTOR:

Arthur W. Browne,
by Edward F. Simpson, Jr.
Attorney.

No. 713,282. Patented Nov. 11, 1902.

A. W. BROWNE.

DENTAL CHAIR.

(Application filed Mar. 5, 1901.)

(No Model.) 6 Sheets—Sheet 5.

FIG. 10.

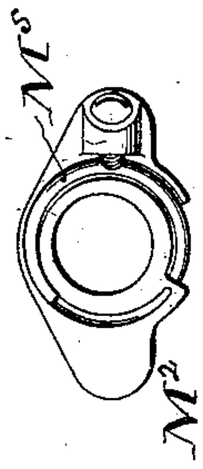


FIG. 9.

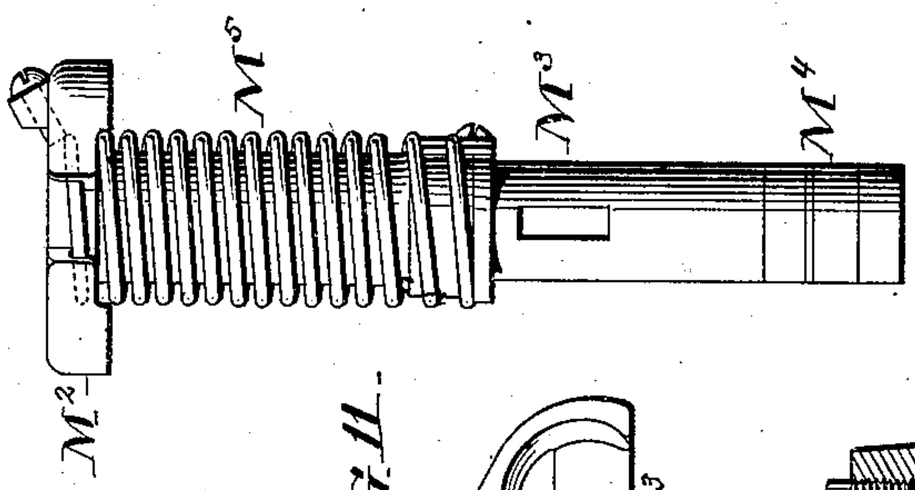


FIG. 12.

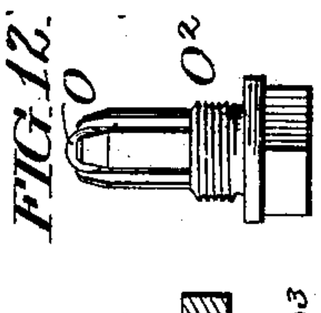


FIG. 11.

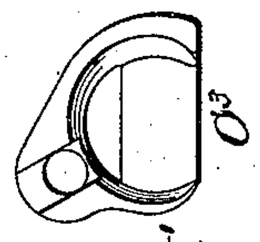
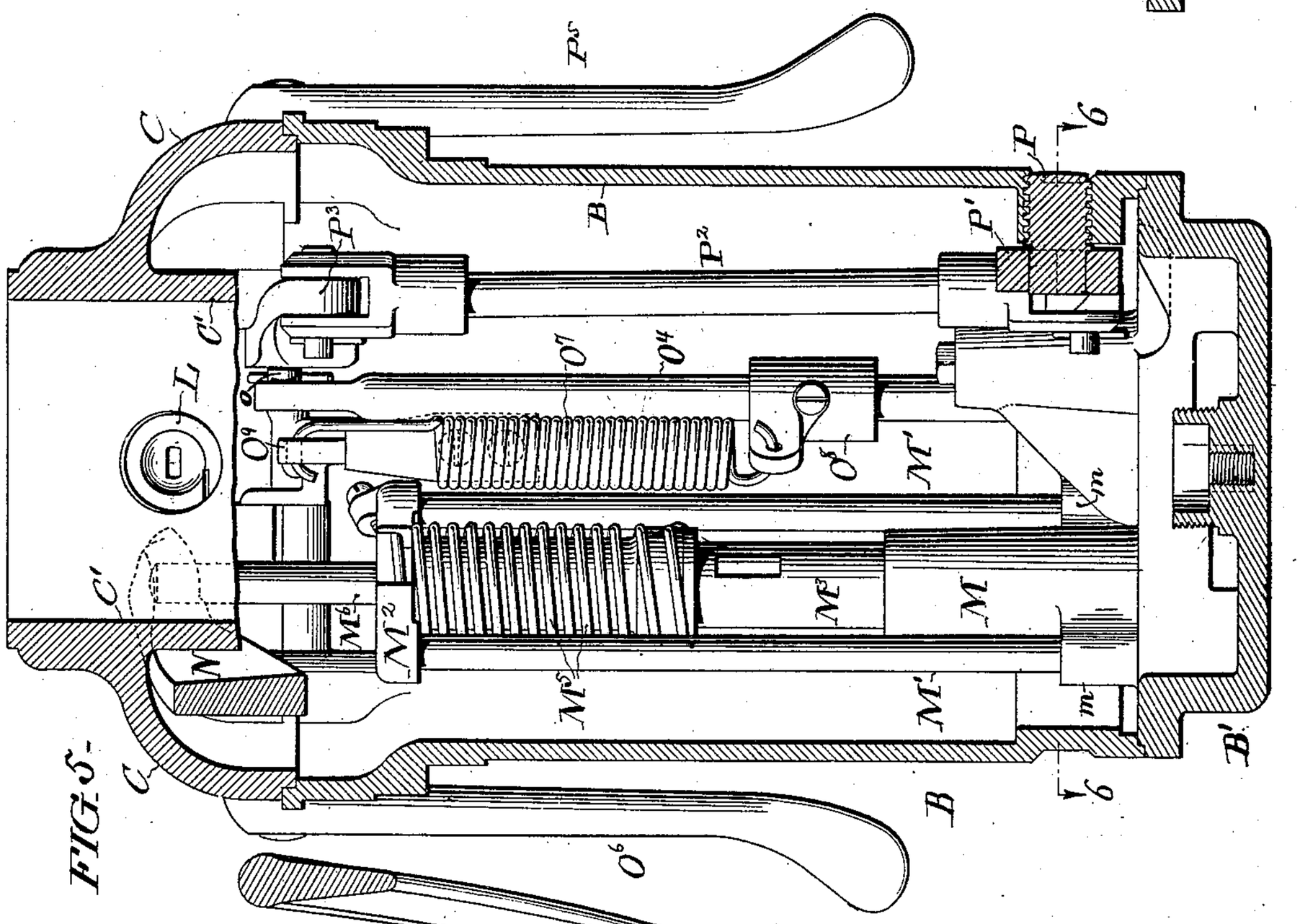


FIG. 8.

FIG. 5.



WITNESSES:

C. E. Jones

F. B. Wall

INVENTOR:

Arthur W. Browne,

by Edward F. Simpson, Jr.

Attorney.

No. 713,282. Patented Nov. 11, 1902.

A. W. BROWNE.

DENTAL CHAIR.

(Application filed Mar. 5, 1901.)

(No Model.) 6 Sheets—Sheet 6.

FIG. 6.

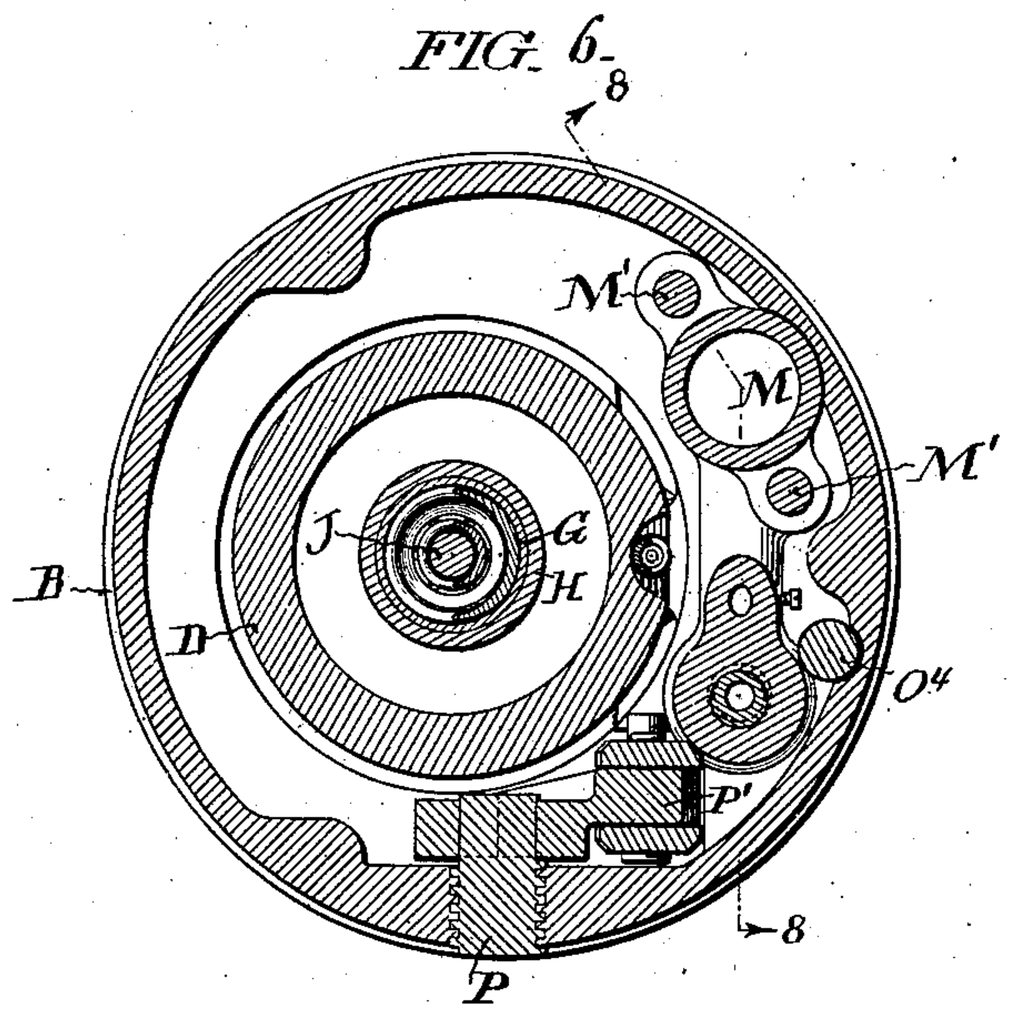


FIG. 15.

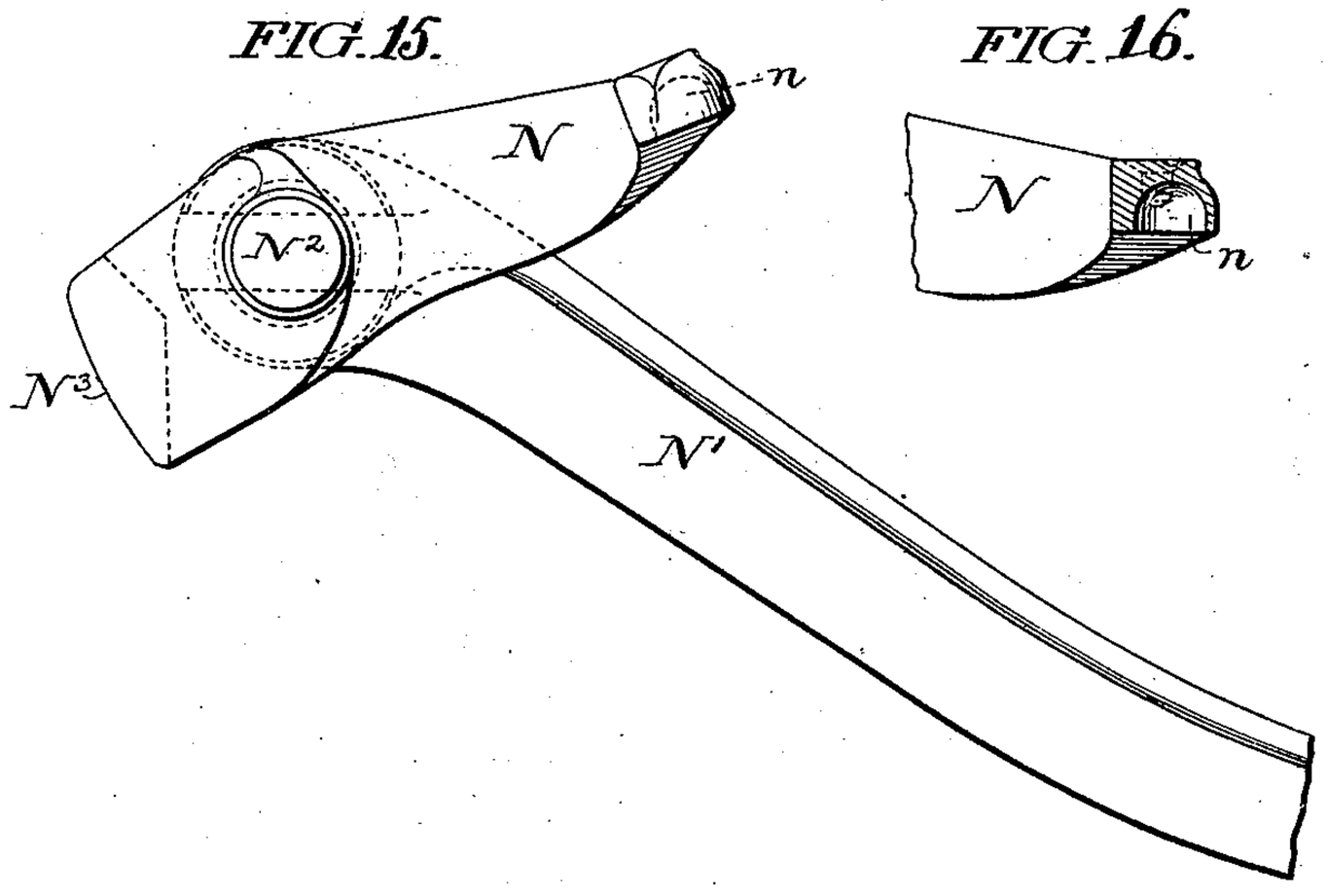


FIG. 16.

WITNESSES:

C. E. Jones

J. B. Wall

INVENTOR:

Arthur W. Browne,

by Edward F. Simpson, Jr.

Attorney.

UNITED STATES PATENT OFFICE.

ARTHUR W. BROWNE, OF PRINCEBAY, NEW YORK, ASSIGNOR TO THE S. S. WHITE DENTAL MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA.

DENTAL CHAIR.

SPECIFICATION forming part of Letters Patent No. 713,282, dated November 11, 1902.

Application filed March 5, 1901. Serial No. 49,800. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR W. BROWNE, a citizen of the United States, residing at Princebay, in the county of Richmond and State of New York, 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 appertains to make and use the same.

My invention relates to hydraulic supporting and elevating mechanism for dental chairs; and it consists of certain improvements which will be hereinafter described and claimed.

In the accompanying drawings, illustrating a single embodiment of my improvements, Figure 1 is a view in side elevation of a dental-chair base with its supporting and elevating mechanism extended and with its pedestal in vertical section. Fig. 2 is a plan or top view of the same. Fig. 3 is an enlarged view similar to Fig. 2, but with the supporting-cylinder cap removed to disclose the interior of said cylinder. Fig. 4 is a central vertical section on the line 4 4 of Fig. 3, showing the supporting and elevating mechanism partly extended and illustrating a portion of the chair-body-supporting yoke which is not shown in said Fig. 3. Fig. 5 is a central vertical section on the line 5 5 of Fig. 3 and with the supporting and elevating columns omitted. Fig. 6 is a horizontal sectional view on the line 6 6 of Fig. 5. Fig. 7 is a partial view of the mechanism shown in Fig. 4 with the parts in a different position. Fig. 8 is a vertical sectional view of the pump, the section being taken on the irregular line 8 8 of Fig. 6. Fig. 9 is a view in side elevation of the pump-piston detached. Fig. 10 is a top or plan view of said pump-piston. Fig. 11 is a plan view of the footpiece of the outlet or lowering valve tripping mechanism detached. Fig. 12 is a view in side elevation of the outlet or lowering valve and its plug. Fig. 13 is a view in side elevation of the tripping mechanism for the outlet or lowering valve. Fig. 14 is a view in side elevation of the rotary lock mechanism. Fig. 15 is a view in side elevation of the inner end of the elevating-lever, and Fig. 16 is a vertical section of the same on the line 16 16 of Fig. 3. Fig. 17 is a perspective view of one of the shoes for preventing lateral vibration of the supporting-column, and Fig. 18 is an end view of the adjustable bearing for the same. Fig. 19 is a detached view of the connection between the elevating-lever and its rock-shaft, the parts being turned at an angle as compared to corresponding parts in Fig. 3.

Mounted in a stationary or non-rotatable pedestal A, (see Fig. 1,) provided with the usual closed bottom A′ and the annular or disk portion A^2 for resting upon the floor, is a rotatable supporting cylinder or frame B, in which is contained the entire chair-body supporting and elevating mechanism. The upper open end of this supporting-cylinder is closed by a detachable cap C, provided with an inner cylinder C′. (See Fig. 4.) Fitting snugly in said cylinder C′ is the outer member D of a telescopic or extensible chair-body-supporting column adapted to be projected above the supporting-cylinder and telescoped or nested into the same. To the upper end of the inner member E of said supporting-column is connected the chair-body by way of the yoke F, the chair-body not being shown herein. An extensible or telescopic elevating-column located inside the supporting-column and vertically movable therewith is formed by an outer member G, movable up and down in a cylinder H, projecting from the base-piece B′ of the supporting-cylinder, and an inner member or plunger I. The members G and I of the elevating-column are each provided at their lower ends with piston-packing G′ and I′, respectively, and a passage-way *b* in the base-piece B′ affords communication between the cylinder H and a pump, hereinafter described. A rod J, projecting from the base-piece B′ inside the cylinder H, is provided with an enlargement or head J′ at its upper extremity for limiting the extent of upward movement of the member G, the piston end of which is adapted to abut against said head when said member is projected to its extreme upward limit. The member I is made tubular for the purpose of accommodating the rod J when said member has been telescoped into the member G.

It is desirable that the supporting-column

should be as rigid as possible, and hence free from lateral vibration at all points of vertical adjustment, particularly when the same has been projected to a considerable extent, and for this purpose I have provided simple and efficient means now to be described. A block or shoe K, (see Figs. 4 and 17,) mounted in the cylinder C′ of the pedestal-cap C, engages a longitudinal groove D′ in the outer member D of the supporting-column. The groove D′ is half-round (see Fig. 3) to correspond with the semicylindrical inner surface K′ of the shoe K, which shoe is provided on its outer surface with a rounded projection K^2, seated in a corresponding socket of an adjustable bearing-block L, having threaded connection with the cap-cylinder C′. The cross-section of the shoe on a plane with the horizontal center of the hemispherical projection K^2 describes a complete circle, the axis of the semicylindrical shoe intersecting the center of the hemispherical projection. A shoe constructed in this manner readily and accurately seats itself in the groove of the column and provides for any slight inaccuracies in fit between the parts, while at the same time preserving the proper rigidity of the column by preventing lateral vibration thereof. The shoe may be properly adjusted and all wear of the parts taken up by means of the adjustable bearing L. A similar shoe is provided between the outer and inner members of the column, the bearing L′ in this instance screwing into a threaded opening *d* in the outer member D of the supporting-column.

The pump-cylinder M is preferably cast integral with the base-piece B′ of the supporting-cylinder B. Two vertical rods M′ M′, detachably seated in sockets *m m* of the pump-casting, support a headpiece M^2, loosely fitted upon the top of said rods. A pump-piston M^3, tubular except for its solid head M^4, is adapted to be reciprocated in the pump-cylinder, and a coiled-wire return-spring M^5, surrounding said piston, is connected at one end thereto about midway the length of said piston and at its opposite end is connected to the headpiece. A piston-rod M^6 is loosely fitted in the tubular piston, with its lower end resting upon the solid piston-head and its upper end projecting above the top of the headpiece M^2, which is provided with a central opening for the passage of this rod. The short arm N of an elevating-lever N′ bears upon the upper end of the piston-rod, said short arm being provided with a socket *n* (see Fig. 16) for fitting upon said rod. A pump constructed in this manner may be readily assembled and taken apart.

An outlet or lowering valve is indicated at O, Fig. 8, with its stem O′ projecting beyond the under surface of the valve-plug O^2. A footpiece O^3, (see Figs. 8, 11, and 13,) carried at the lower end of a vertical rod O^4, bears upon the valve-stem O′, and when said rod is slightly raised the outlet-valve is opened. The upper end of the rod O^4 is pivoted to a stud *o*, arranged eccentrically upon the rock-shaft O^5, to which an operating-lever O^6 is secured. A coiled pull-spring O^7, connected at one end to a collar O^8, secured upon said rod O^4, and at its opposite end to an arm or lever O^9, projecting from said rock-shaft O^5, tends to pull said arm O^9 downwardly to turn the rock-shaft. As the rod O^4 is eccentrically connected to said rock-shaft, said rod is forced downwardly and the footpiece O^3 normally held in its lower or inoperative position, during which the outlet or lowering valve is closed. Pressure upon the lever O^6 turns the rock-shaft and raises the rod O^4 against the stress of the spring O^7 and elevates the footpiece O^3, which trips or opens the outlet-valve for the purpose of lowering the chair-body. Upon relieving said lever of pressure the outlet-valve instantly closes, and the chair-body, as usual, is sustained in whatever position of vertical adjustment it may at the moment occupy.

When it is desired to lower the body of a hydraulic dental chair from its highest to its lowest position, it is necessary to apply pressure to the lowering-lever during the entire descent of the chair-body. I have overcome the necessity for this constant application of pressure by providing means for holding the lowering-valve open after pressure has been removed from the lowering-lever and for automatically releasing the same when the chair-body reaches its lowest position. The means herein shown for accomplishing this is in the form of a detent consisting of a lug or projection O^{10} on the arm or lever O^9, a plate-spring O^{11}, secured to the supporting-cylinder B, and a rod or plunger O^{12}, loosely fitted in an opening in the cap C, or rather in a removable section C^5 thereof.

In order to trip the lowering-valve without locking it, the lowering-lever O^6 is pushed inwardly to the usual extent, and when relieved of pressure the downward movement of the chair-body is arrested. When, however, the lowering-valve is to be held open until the chair-body reaches its lowest position, the lowering-lever is pushed inwardly to a greater extent than usual. This movement causes the lug O^{10} to ride over the end of the spring O^{11}, which yieldingly locks it in this position, with the lowering-valve open, as shown in Fig. 7. The lowering-valve remains open until the chair-body reaches its lowest position, when a projection F′ (see Fig. 4) on the yoke F strikes the upper end of the plunger O^{12}, which releases the lug O^{10} from engagement with the spring O^{11} and allows the valve to close.

The means for locking the rotatable supporting-cylinder B to the non-rotatable pedestal for preventing rotation of the chair-body is as follows: A clamp-screw P, having threaded engagement with an opening in the supporting-cylinder, is adapted to be thrust beyond the outer surface of said cylinder to bear upon the interior of the pedestal A. The means for actuating this clamp-screw to lock

or unlock the supporting-cylinder consists of an arm or lever P′, rigidly connected to said screw, and a rod P^2, pivoted at one end to said arm or lever and at its opposite end to another arm or lever P^3, which is rigidly connected to a rock-shaft P^4, provided with an operating-lever P^5. When said lever is moved inwardly or toward the pedestal, the chair-body is locked against rotation, and when moved outwardly into its inoperative position the chair-body is free to be rotated at will.

The several operating-levers are so mounted upon the supporting-cylinder as to be readily detachable therefrom for the purpose of facilitating manufacture and assembling of parts. The elevating-lever N′ is connected to a rock-shaft having two end or journal portions N^2 N^2 in alinement with each other and connected by a piece N^3, curved or bent to partly surround the extensible chair-body-supporting column, the before-referred-to short arm N of the elevating-lever projecting from this rock-shaft. The journals N^2 N^2 are seated in half-bearings B^2 B^2, formed in the upper end of the supporting-cylinder, and corresponding half-bearings C^2 C^2 are formed in the detachable cap C. The respective rock-shafts O^5 and P^4 of the lowering-lever O^6 and the rotary lock-lever P^5 are each seated in half-bearings B^4 and B^5, respectively, formed in the upper end of the supporting-cylinder, preferaby in alinement with each other. The detachable cap C is provided with half-bearings C^3 and C^4, corresponding with the half-bearings B^4 and B^5, for completing the bearings for the lever rock-shafts.

When the cap C is removed, as shown in Fig. 3, the elevating, lowering, and rotary lock-levers may be readily seated or detached, as desired; but when said cap is in place the said levers are firmly held in position.

Instead of connecting the elevating-lever N′ to its rock-shaft in the usual manner I have devised a connection which is readily detachable and at the same time strong and not liable to become loose or accidentally separated. The end of the journal N^2 of the rock-shaft which projects outside the supporting-cylinder is formed with an enlargement or head N^4, corresponding to a similar enlargement or head N^5 on the inner end of the elevating-lever, the said enlargements having groove-and-tongue connection. This groove-and-tongue connection (see Fig. 19) may consist of a tongue n' on the rock-shaft enlargement and a corresponding groove in the lever enlargement, said tongue and groove extending transversely across said enlargements. The parts are firmly held together by a screw N^6 passing through the enlargement or head N^4 of the elevating-lever into the rock-shaft. Similar connections may be provided for the operating-levers of the lowering mechanism and the rotary lock mechanism.

Without attempting to enumerate the many advantages of my improvements, it may be briefly stated that they may be embodied in a structure which, as compared to similar structures heretofore devised, is characterized as follows: It is compact in form, simple in construction, easily assembled and taken apart, provides a wide range of vertical adjustment with great rigidity and steadiness, and affords a greater degree of facility of manufacture.

Although I have shown but a single embodiment of my improvements, it is understood that said improvements may be incorporated in a dental-chair base differing more or less in general construction and in detail from the one herein shown and described; also, that some of the detail improvements hereinafter claimed may be used without the others.

I claim as my invention—

1. In extensible or telescopic chair-body-supporting columns, the shoe consisting of a semicylindrical portion adapted to slide in a corresponding longitudinal groove in one member of said column, and a semispherical portion adapted to be seated in a corresponding bearing in another member of said column, the axis of the semicylindrical portion intersecting the center of the semispherical portion, substantially as and for the purpose described.

2. An extensible or telescopic chair-body-supporting column, in combination with an adjustable block having bearing in one member of said column and provided with a socket, and a shoe having a rounded projection seated in the socket of said adjustable block, and also provided with a semicylindrical portion fitted to slide in a corresponding longitudinal groove in another member of said column, substantially as and for the purpose described.

3. In supporting and elevating mechanism for dental chairs, the combination of an upright pump-cylinder, a piston movable therein and tubular save for its solid head, vertical rods detachably connected with the pump-casting, a headpiece detachably fitted upon the upper ends of said rods, a coiled-wire spring surrounding said piston and connected thereto and to said headpiece, and a piston-rod loosely placed in said tubular piston and projecting above said headpiece which is provided with an opening for the passage of said rod, substantially as described.

4. In supporting and elevating mechanism for dental chairs, the combination of an extensible column, mechanism for elevating said column, a normally closed outlet or lowering valve, means for tripping or opening said valve for lowering the chair-body, and a detent for holding said valve in its open position, substantially as and for the purpose described.

5. In supporting and elevating mechanism for dental chairs, the combination of an extensible column, mechanism for elevating said column, an outlet or lowering valve, means for tripping or opening said valve for

lowering the chair-body, means for locking said valve in its open position, and means for automatically releasing said valve when said chair-body reaches its lowest position, substantially as and for the purpose described.

6. In supporting and elevating mechanism for dental chairs, the combination of an extensible column for supporting a chair-body, mechanism for elevating said column, an outlet or lowering valve, mechanism under the control of an operating-lever for tripping or opening said valve for lowering said column, a spring for yieldingly locking said valve in its open position when said operating-lever has been moved in the proper direction and to the desired extent, a rod or plunger, and a projection at or near the top of said column, said projection being adapted to strike said rod or plunger when the chair-body reaches its lowest position, thereby automatically releasing the mechanism for tripping the outlet-valve and allowing the same to close, substantially as and for the purpose described.

7. In supporting and elevating mechanism for dental chairs, the combination of a non-rotatable pedestal, a supporting-cylinder mounted to rotate therein, a clamp-screw having bearing in said supporting-cylinder near the lower end thereof and adapted to bear upon said pedestal to lock said supporting-cylinder against rotation in said pedestal, an arm or lever connected to said clamp-screw inside said supporting-cylinder, a rod pivoted at one end to said arm or lever, another arm or lever pivoted to the opposite end of said rod and rigidly connected to a rock-shaft having bearing at or near the upper end of said supporting-cylinder above the top of said non-rotatable pedestal, and an actuating-lever exterior to said supporting-cylinder and pedestal, and connected to said rock-shaft, substantially as described.

8. In supporting and elevating mechanism for dental chairs, the combination of a supporting cylinder or frame formed with two half-bearings in its upper end in alinement with each other, an extensible chair-body-supporting column therein, a pump also located in said cylinder, a rock-shaft consisting of two journals in alinement with each other and connected by a central portion curved to partly surround the said extensible chair-body-supporting plunger, the said journals being loosely seated in said half-bearings, an arm projecting from said rock-shaft inside said cylinder for operating said pump, an elevating-lever connected to said rock-shaft outside of said cylinder, and a detachable cap for closing the open upper end of said cylinder, said cap being formed with half-bearings corresponding to said half-bearings in said cylinder and adapted to hold said rock-shaft in place, substantially as described.

9. In supporting and elevating mechanism for dental chairs, the combination of a non-rotatable pedestal, a supporting cylinder or frame mounted to rotate therein and containing chair-body-lowering mechanism, and mechanism for locking said cylinder against rotation in said pedestal, two half-bearings B^4 and B^5 formed in the upper end of said cylinder in alinement with each other, a rock-shaft loosely seated in each of said half-bearings, connections between the respective rock-shafts and the said mechanisms contained in said cylinder, actuating-levers connected to the respective rock-shafts outside said cylinder, and a detachable cap for closing the open upper end of said cylinder, said cap being provided with half-bearings corresponding to the half-bearings in said cylinder for holding said rock-shafts in place, substantially as described.

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

ARTHUR W. BROWNE.

Witnesses:

W. LITTELL WHITE,

SEYMOUR CASE.