

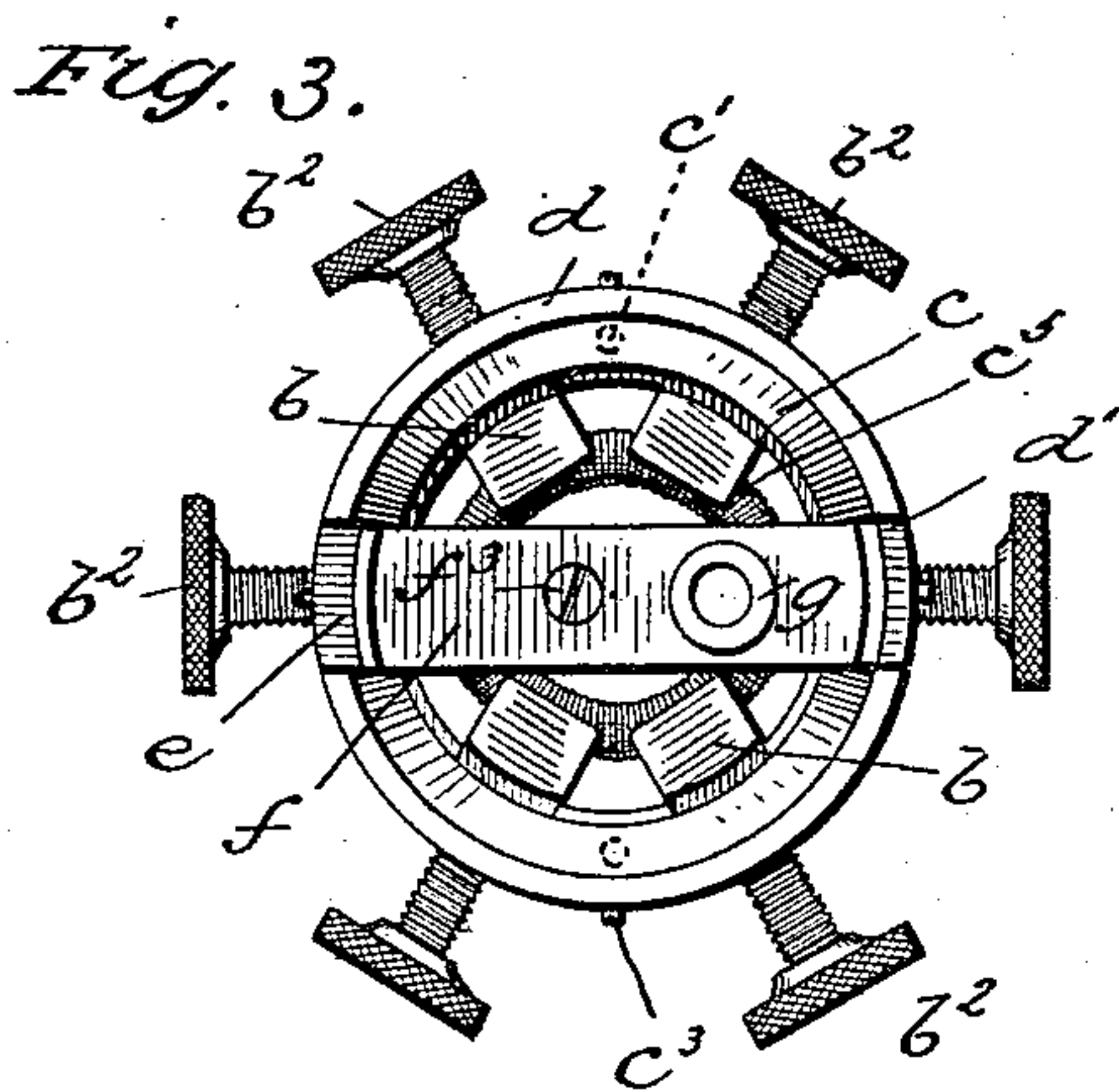
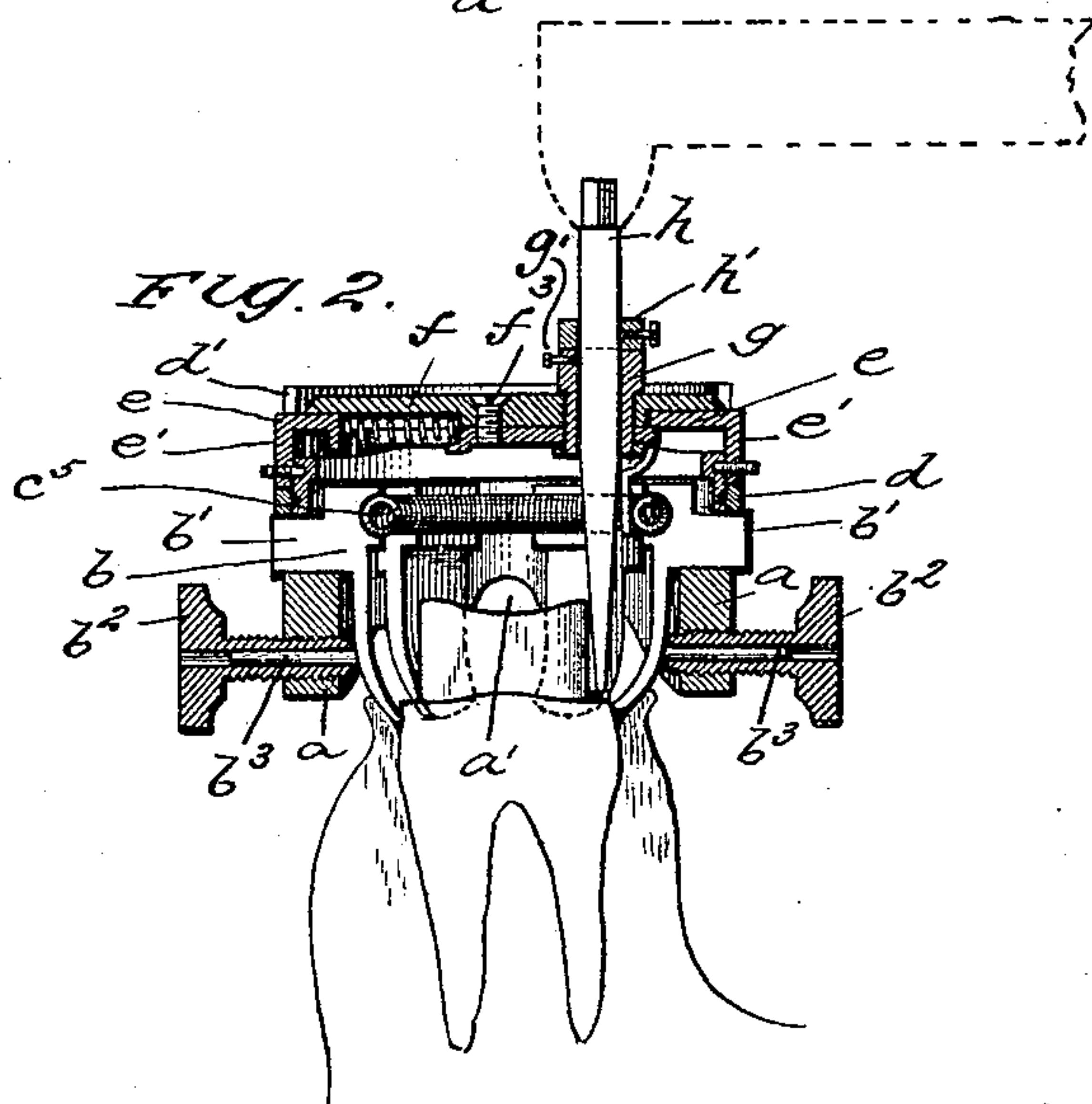
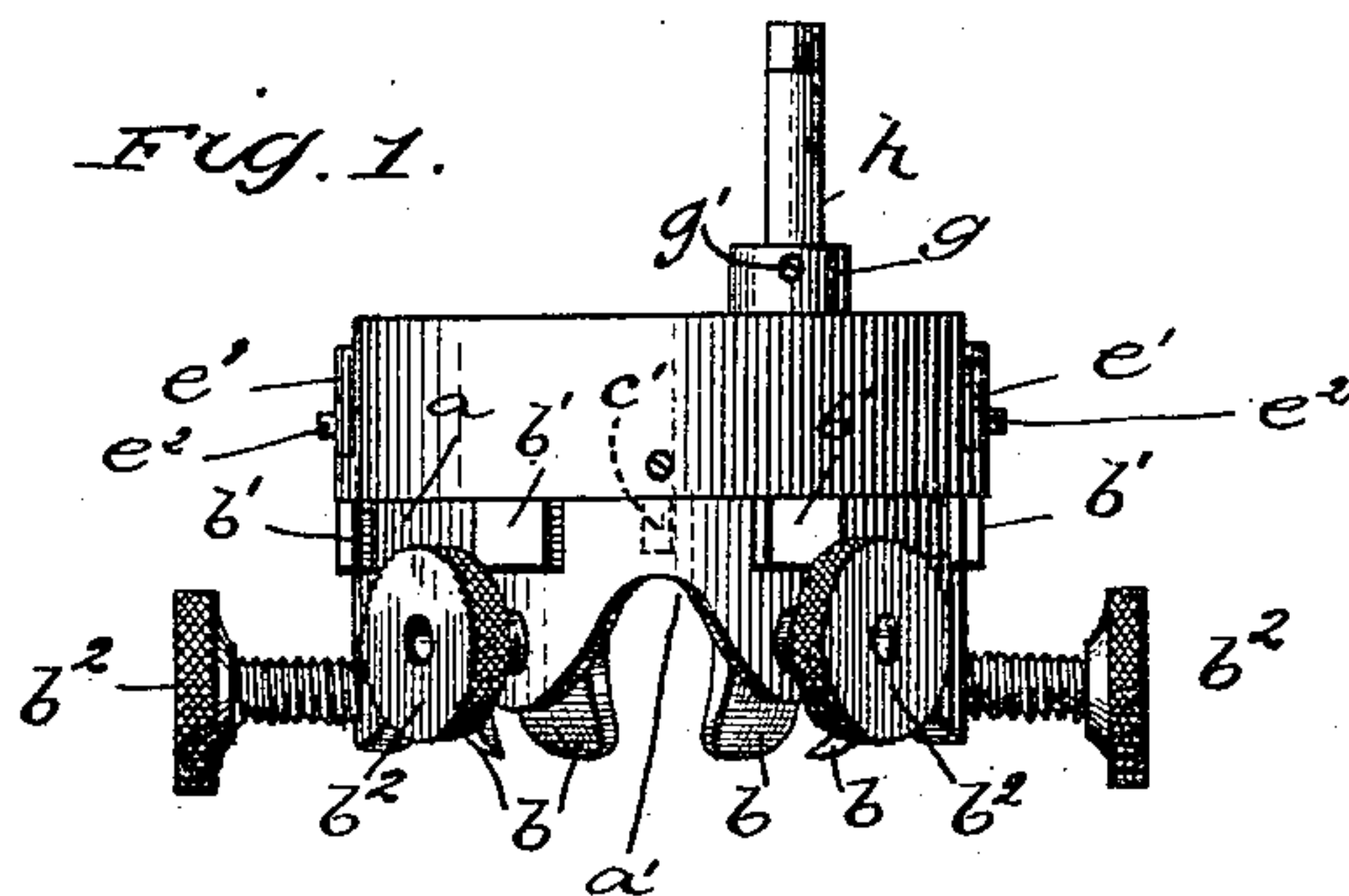
(No Model.)

2 Sheets—Sheet 1.

D. F. SWEET & J. B. PARKER.
DENTAL TOOL.

No. 472,004.

Patented Mar. 29, 1892.



Witnesses
Wm. F. Davis
E. H. Hesse

Inventors,
D. F. Sweet and
J. B. Parker
By Alexander Davis
Attorneys

(No Model.)

2 Sheets—Sheet 2.

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Fig. 4.

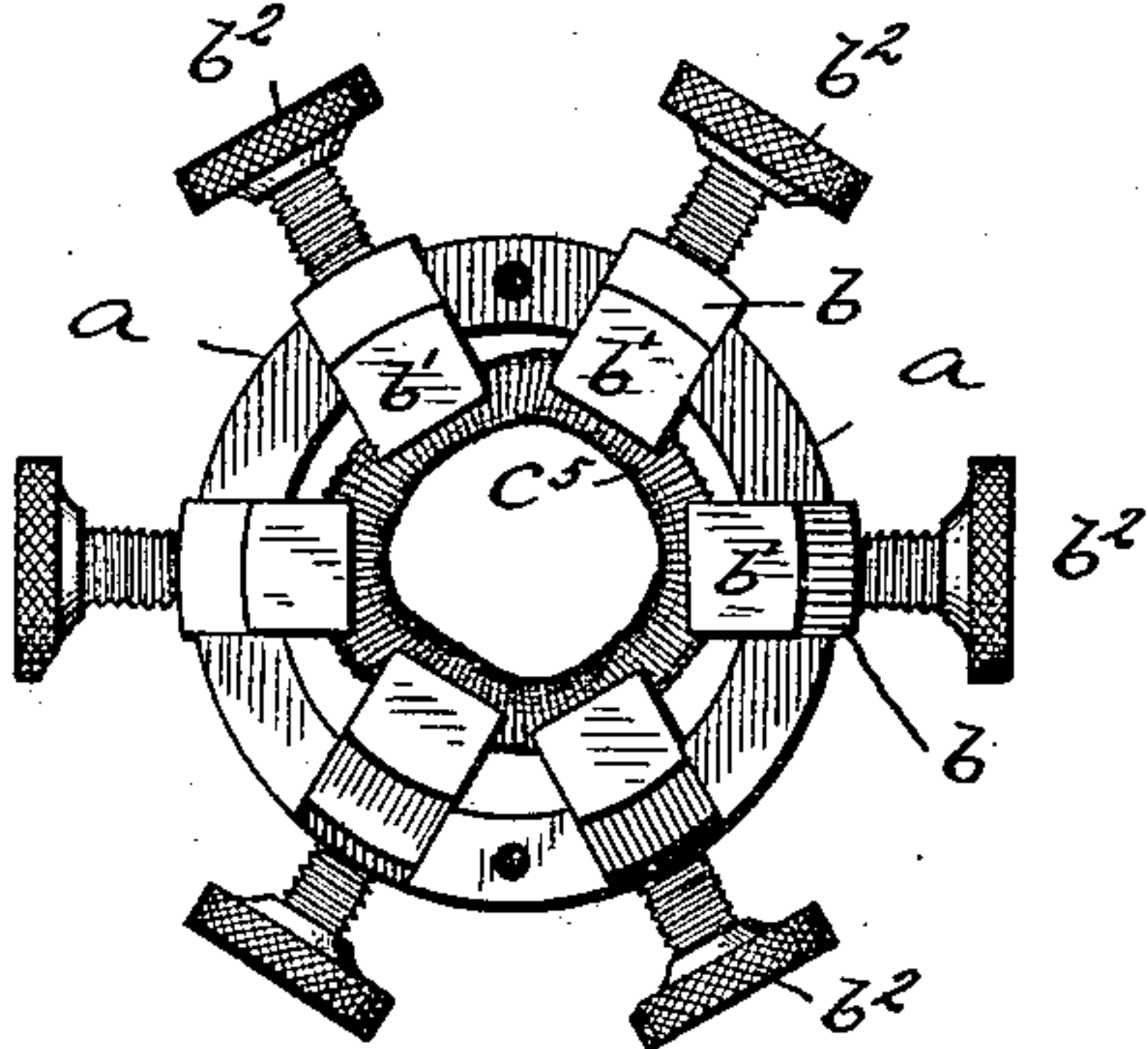


Fig. 5.

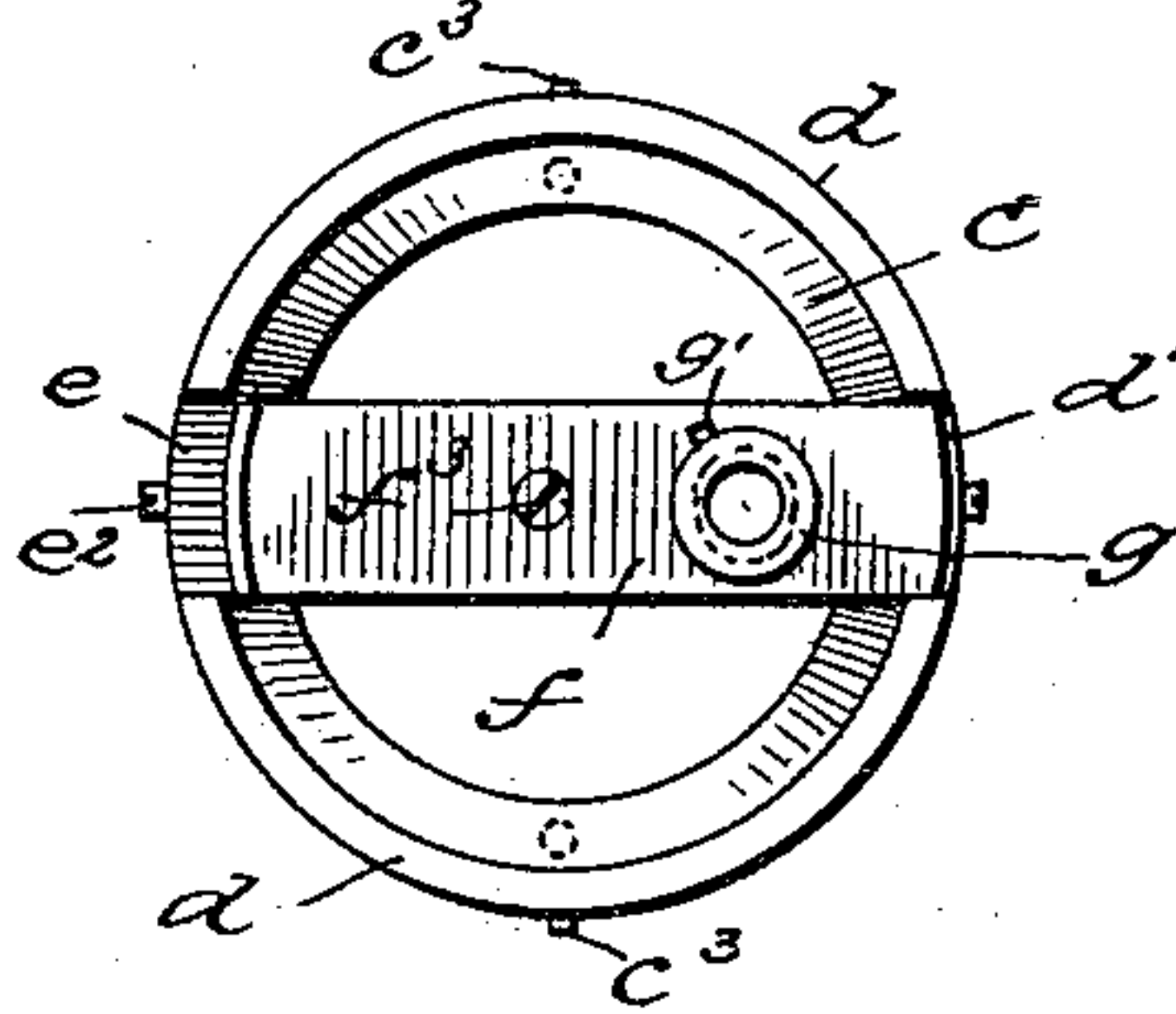


Fig. 6.

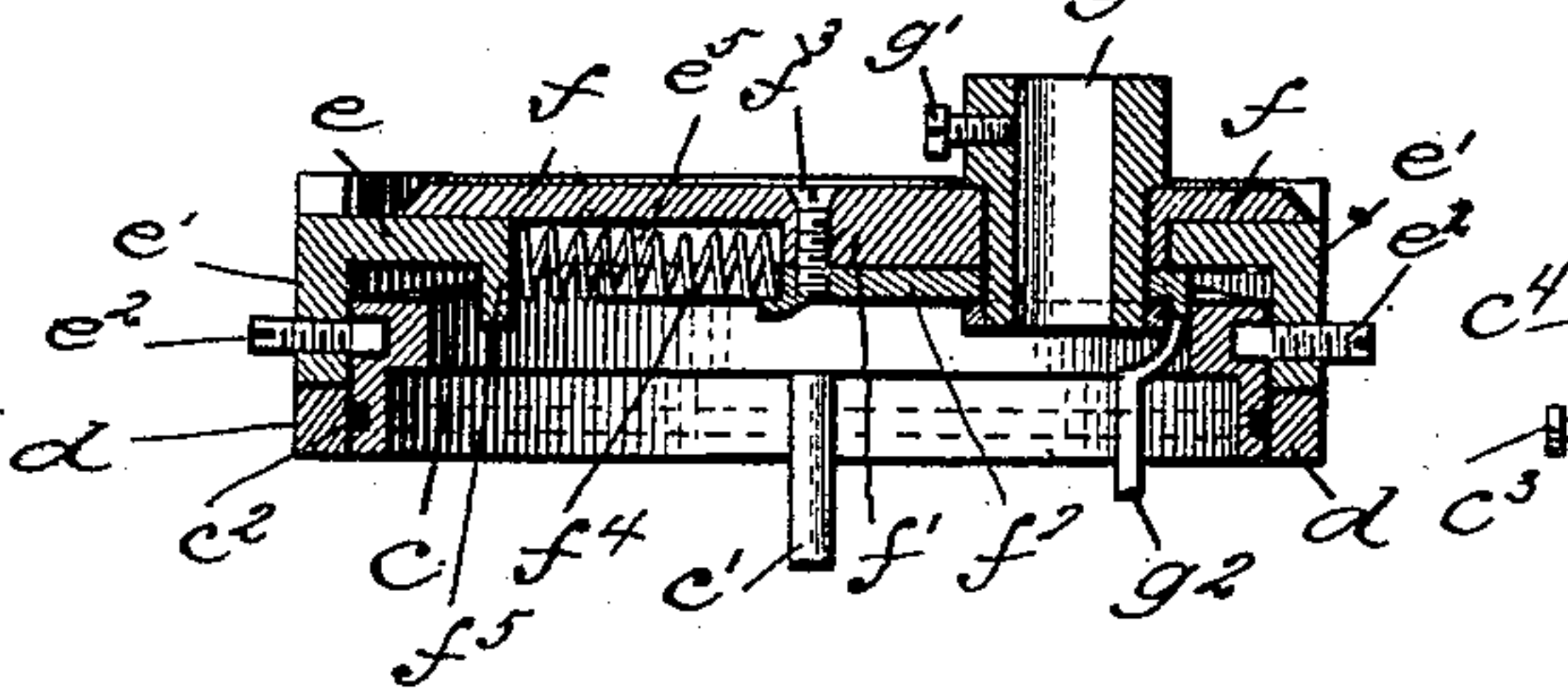


Fig. 7.

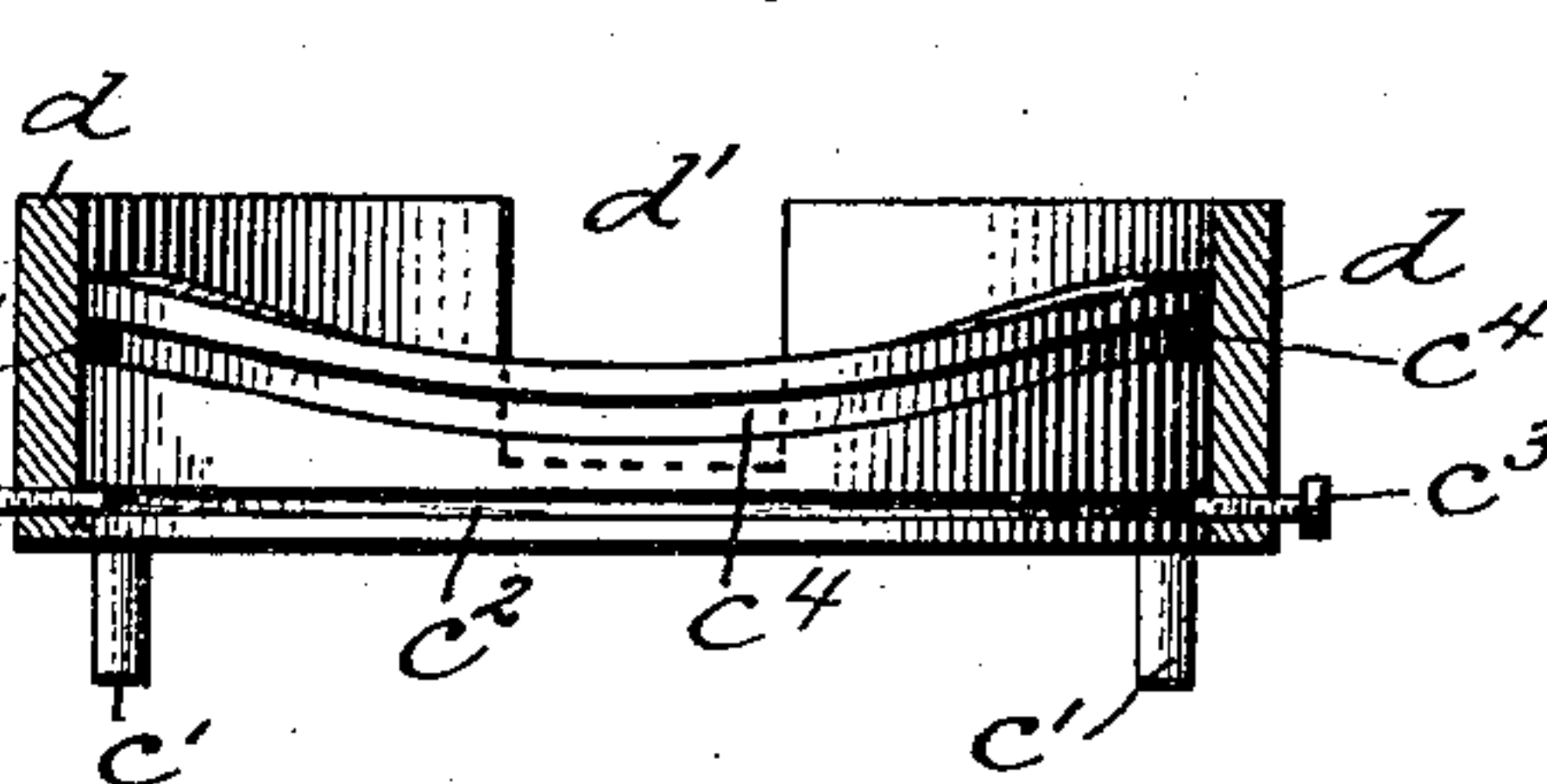


Fig. 8.

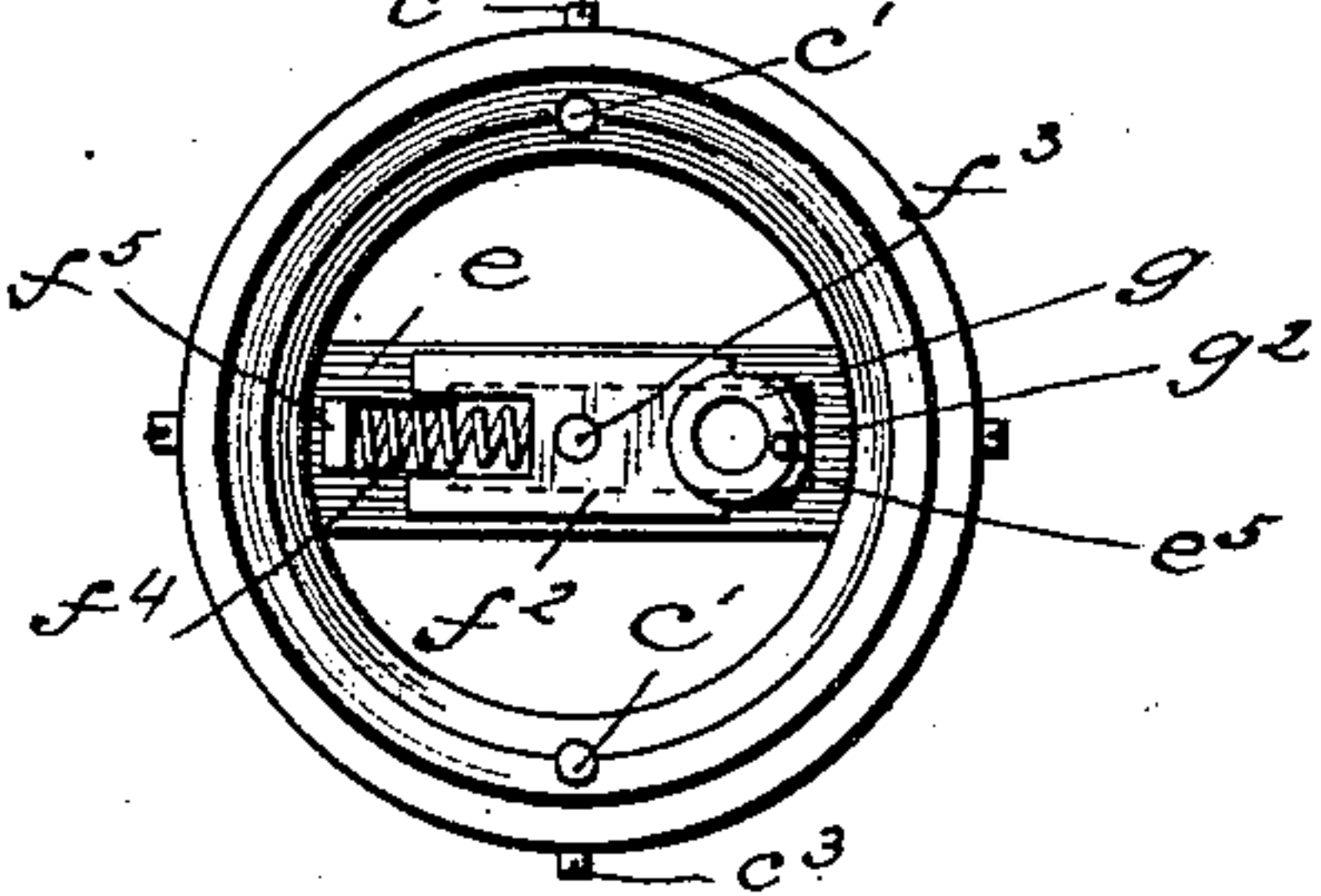


Fig. 11.

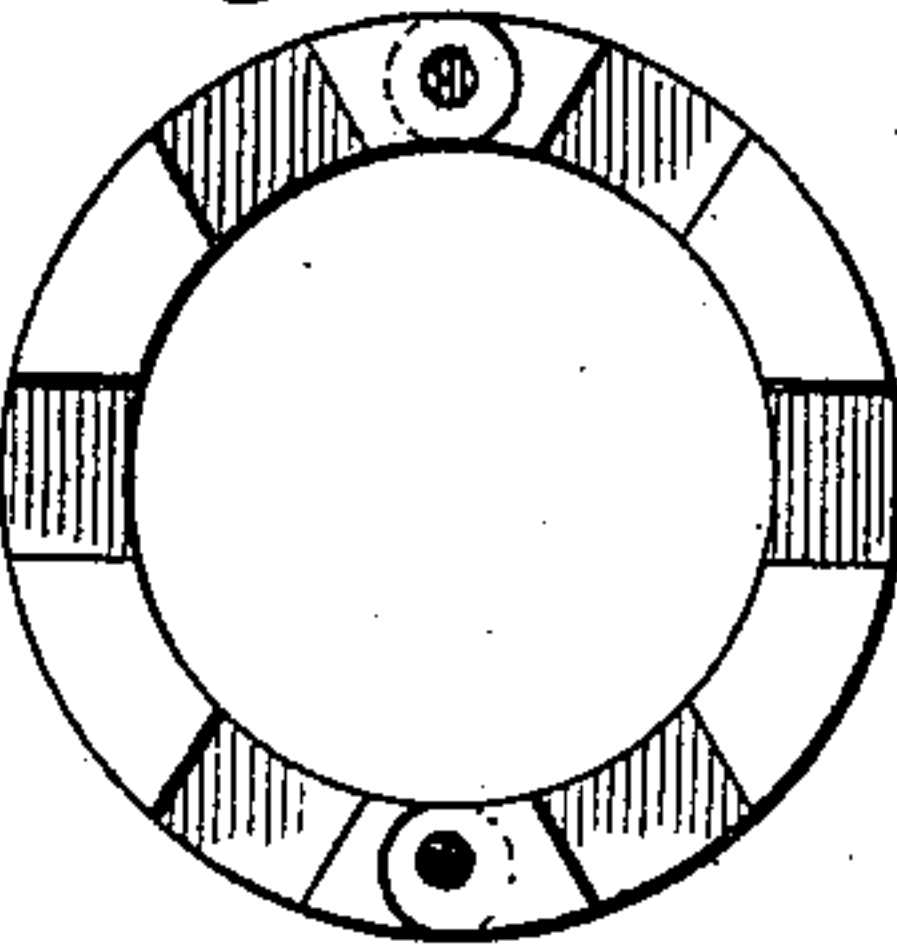


Fig. 9.

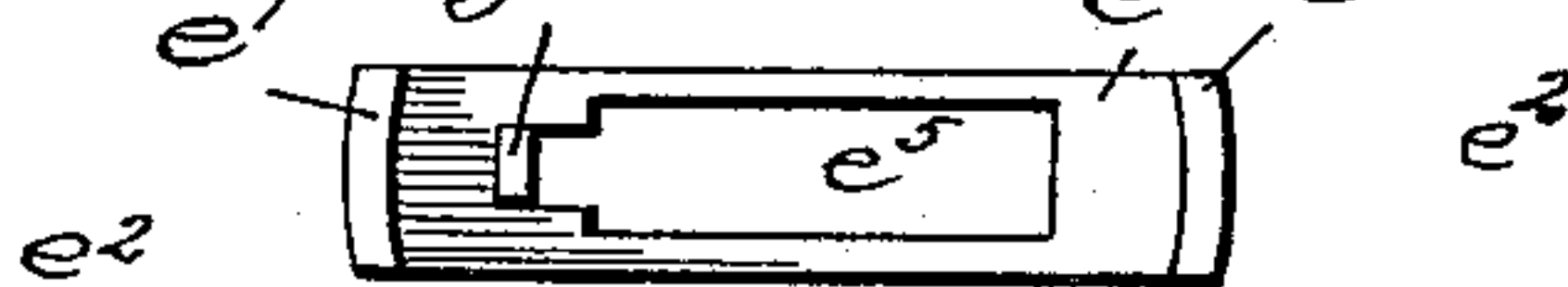


Fig. 12.

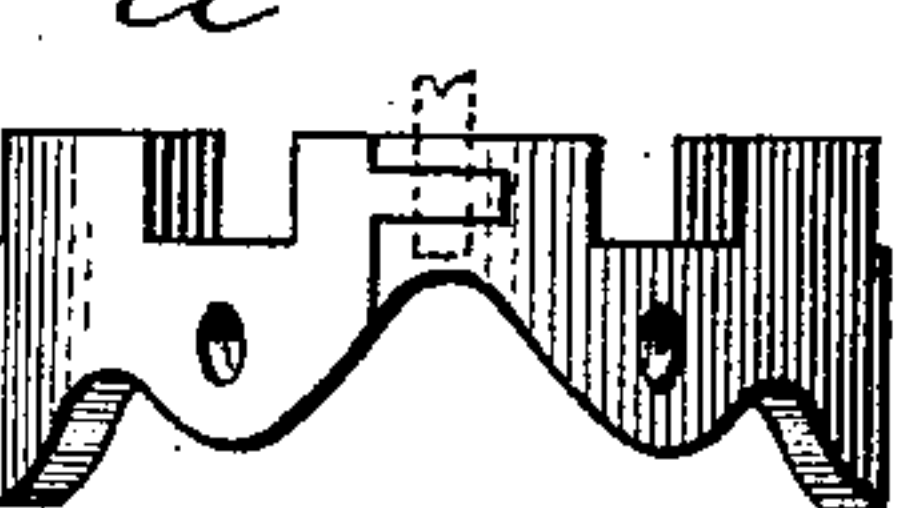


Fig. 10.

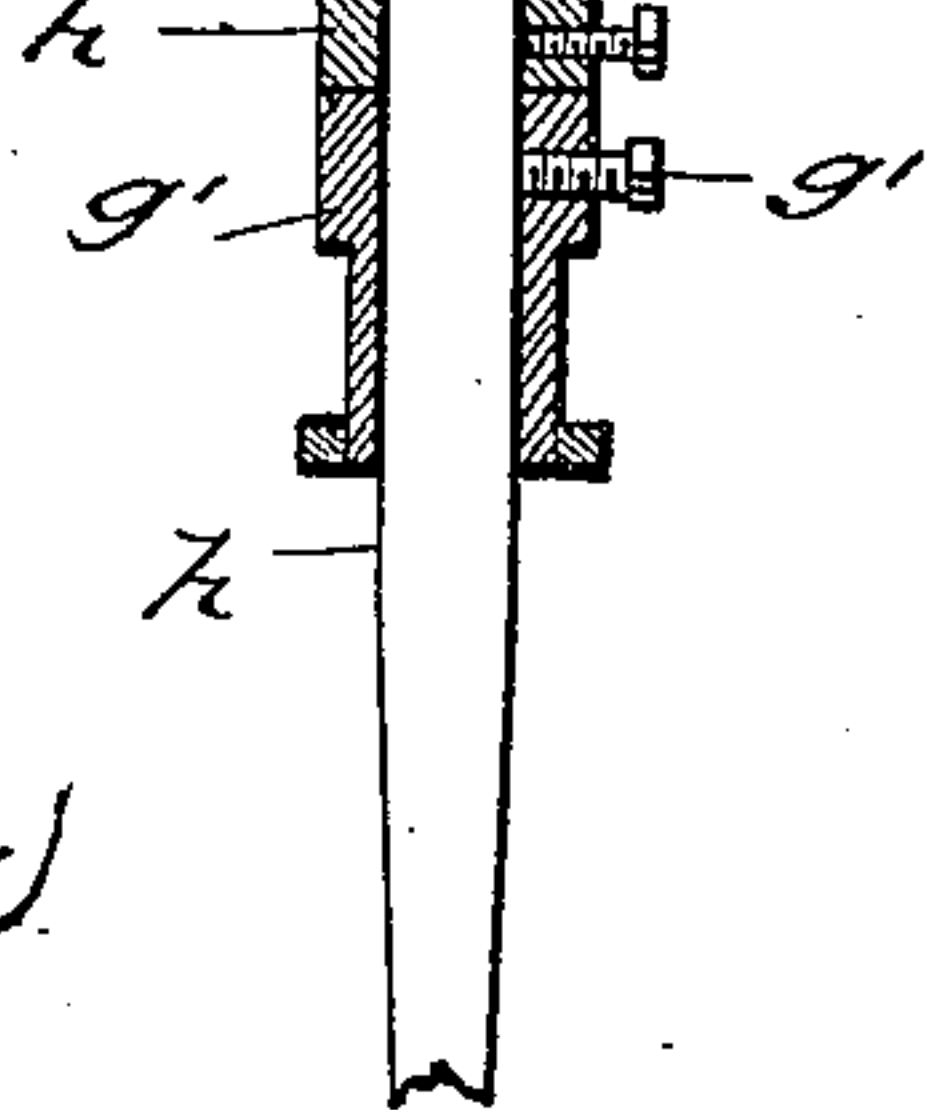
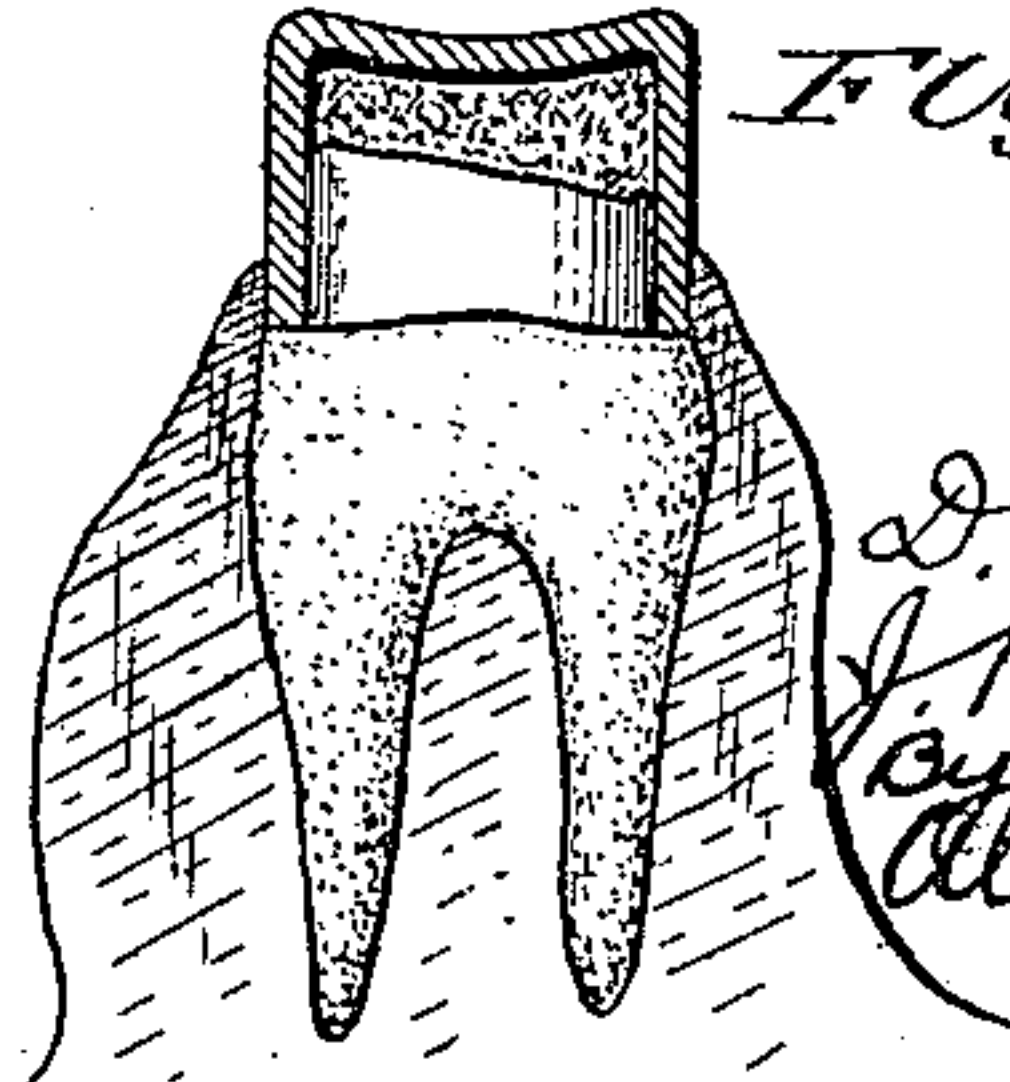


Fig. 13.



Witnesses
W. R. Davis
E. J. Bussey

Inventors
D. F. Sweet and
J. B. Parker
by
Alexander & Dams
Attorneys

UNITED STATES PATENT OFFICE.

DANIEL F. SWEET AND JOHN B. PARKER, OF GRAND RAPIDS, MICHIGAN;
SAID SWEET ASSIGNOR TO SAID PARKER.

DENTAL TOOL.

SPECIFICATION forming part of Letters Patent No. 472,004, dated March 29, 1892.

Application filed January 7, 1892. Serial No. 417,307. (No model.)

To all whom it may concern:

Be it known that we, DANIEL FRED SWEET and JOHN B. PARKER, citizens of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Devices Employed in Dentistry, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention is designed to produce an improved device for shaping natural teeth for the reception of artificial crowns. The artificial crowns referred to are well known to the profession, and they consist either entirely of
15 metal or a combination of metal and porcelain, in the latter form the porcelain grinding or cutting portion being affixed to the metallic band by cementing or otherwise.

In the accompanying drawings, Figure 1
20 represents a side elevation of our improved device enlarged; Fig. 2, a vertical sectional view showing its application to a tooth; Fig. 3, a plan view of the complete device; Fig. 4, a plan view of the clamping-ring, the tool-carrying devices being removed; Fig. 5, a detail
25 plan of the tool-carrying devices; Figs. 6 and 7, vertical sectional views thereof; Fig. 8, a bottom view thereof; Figs. 9 and 10, detail views hereinafter described; Figs. 11 and 12,
30 detail views of the clamp-supporting ring made in two sections, and Fig. 13 a detail view showing a tooth provided with a crown.

It is the object of the present invention to provide a simple device for attachment to the
35 tooth to be prepared for the crown which will guide the burr around the sides of the tooth and cause it to automatically conform to and follow the irregular contour of the same, and at the same time cause it to automatically
40 rise and fall and follow the curvature of the gum around the neck of the tooth, and which will also obviate the numerous drawbacks attendant upon the old process of preparing the teeth, as more fully hereinafter set forth.

45 The invention will be best understood from a detail description of the form of device which we prefer to use in carrying it into effect, such form being shown in the accompanying drawings.

50 In the drawings, the letter *a* designates the clamp-supporting ring. This ring has its

lower edge provided at diametrically-opposite points with notches or arches *a' a'*, which straddle the teeth adjacent to the one being operated on, and thereby permit the ring to
55 be properly clamped down over the latter. Within the ring is supported a series of radially-movable independent clamping-sections *b*, which are adapted to clamp the tooth being operated on and hold the device in
60 place. The shape of these clamps is shown most clearly in Fig. 2, from which view it will be seen that their lower ends are somewhat sharpened and curved slightly inwardly, and their upper ends are provided with outwardly-
65 extending radial arms *b'*, which are preferably rectangular in cross-section and which fit in grooves formed in the upper edge of the supporting-ring. A series of radial set-screws
70 *b²* are tapped through the ring and bear upon the clamps near their lower ends, the clamps being provided with radial guide-pins *b³*, which fit in axial recesses formed in the ends of the set-screws. These radial pins *b³* and the radial arms *b'* on the clamps serve to posi-
75 tively and accurately guide and support them in their proper vertical positions irrespective of their adjusted positions. The upper ends of the jaws on their inner sides are notched for the reception of an elastic expandible
80 guide-ring *c⁵*, which keeps them normally pressed outwardly against the adjusting-screws, said ring consisting, preferably, of an endless coil-spring, as shown.

The tool-holding devices are mounted upon
85 the stationary supporting-ring *a*, said tool-holding devices consisting, essentially, of a stationary inner ring *c* and a revolving outer ring *d*, the former being removably secured to the upper edge of the ring *a* by means of
90 two or more dowel-pins *c'*, carried by the ring *c*, and the latter being secured to said ring *c* in such a manner as to enable it to revolve independently of the same. The exterior of the inner stationary ring is provided with an
95 annular groove *c²* near its lower edge, into which project the inner ends of two diametrically-opposite screws *c³*, tapped through and carried by the outer ring *d*, these screws serving to secure the two rings together and
100 at the same time permit the outer ring to revolve on the inner one. The inner ring is

also provided with another exterior groove c^4 above the groove c^2 , said groove c^4 being suitably curved or made cam-shaped for a purpose hereinafter set forth. The outer ring d is made to closely but loosely fit the inner ring, so that the latter will accurately and positively guide it in its rotary motion. This outer ring carries a cross-bar e , which extends across its upper edge above the inner ring and has its ends e' bent down and fitted loosely into notches d' , formed in the outer ring at diametrically-opposite points, these bent ends carrying radial screws e^2 , whose inner ends fit and work in the cam-groove c^4 in the inner ring. By this arrangement the transverse bar e is compelled to revolve with the outer ring, and at the same time has a free vertical movement independently of it, the cam-groove c^4 serving to impart a gradual rising-and-falling movement to the bar as the same revolves with the outer ring, as is evident. This bar e has no other connection with the revolving and stationary rings than through the medium of the bent ends e' and screws e^2 , and therefore may be readily removed therefrom by simply partly unscrewing one of said screws. It will be observed that the upper edge of the inner ring is curved substantially parallel with the cam-groove c^4 . This feature has no other object than to permit the bar e to rise and fall without interference.

The bar e is provided with a longitudinal slot e^5 , which is covered by a sliding plate f , this plate being provided with a longitudinal rib or projection f' on its under side near one end, which fits and works in the slot in the bar. A plate f^2 , wider than the slot, is secured to the under side of the rib f' to prevent the slide leaving the slot, the plate being secured by a screw f^3 , passing down through the slide, as shown. An expansible coil-spring f^4 is interposed between a depending lug f^5 on the bar e and the adjacent ends of the parts f' f^2 to keep the slide normally pressed outwardly toward one end of the slot in the bar, the spring preferably lying partly in the slot, as shown. A vertical rotatable tool-holding tube or collar g is journaled in the end of the slide farthest from the spring, this tube passing entirely through the slide and plate f^2 and prevented from moving vertically independently of the slide by shoulders on its upper and lower ends. This rotatable tube is provided with a set-screw g' , by means of which the burr or tool h , which passes through it, may be secured to and caused to rotate with it when desired. An adjustable collar h' is secured to the burr above the holding-tube to prevent it passing down too far through it, as will more fully hereinafter appear. Formed integrally with the slide or attached thereto is a depending lip or pin g^2 , which depends far enough to rest against the inner edge of the endless guide on the supporting-ring below, the coil-spring f^4 serving to keep it normally pressed against the guide-

ring c^5 as the revolving tool and the tube are moved around the guide by the operator. If desired, this depending lip g^2 may be omitted and the tool h itself permitted to rest directly against the guiding-ring; but it is preferred to use the lip, inasmuch as it serves to guide the tool accurately, irrespectively of the shape or bevel of the same.

Operation: The supporting-ring is first attached to the tooth to be prepared in the manner shown in Fig. 2—that is, the clamps are slipped down over the tooth until their lower clamping-edges are below the point at which the dressing or guiding is to extend. The dressing is preferably and usually extended down below the free edge of the gum, the gum being forced away from the tooth by the clamps sufficiently for this purpose, as shown in Fig. 2. The clamps are then tightened upon the tooth by means of their set-screws. The clamps move bodily and positively and always preserve their vertical position, and, being independently supported, readily conform to the shape of the tooth in horizontal section. As the clamps are bodily adjusted inwardly to the exact shape of the tooth, the yielding guide-ring supported above the tooth by their upper ends is simultaneously and automatically adjusted to the contour of the tooth, whether the same be regular or irregular, as shown in Figs. 2 and 4. In this way a perfect guide or gage for the tool is always obtained by the simple act of clamping the supporting-ring to the neck of the tooth. This is a very important and valuable feature of this invention, and we do not confine ourselves to any particular construction of the guide or clamping-jaws, but claim, broadly, a series of jaws adapted to conform to the contour of the tooth and a tool-guide connected thereto in such a manner as to be automatically adjusted to the shape of the tooth by the mere act of adjusting the jaws. When the supporting-ring is thus secured to the tooth and the guide-ring set by the jaws, the removable rings c and d are secured in place on the same by means of the dowel-pins or otherwise. The operator then passes a suitable tool or burr h down through the tool-holding tube and rotates the tool by means of the driving mechanism of the dental engine. The tool-holding tube being kept normally pressed outwardly by the coil-spring f^4 , the tool will automatically follow the shape of the guide-ring c^5 when the operator (who holds the operating angle-arm in his hand) moves the rapidly-rotating tool around the tooth. In this manner the tool is caused to follow the exact natural shape or contour of the tooth being operated upon, whereby the depth of the shoulder formed at the neck of the tooth will be uniform entirely around the circumference of the same, leaving the tenon (which receives the crown) the exact shape in horizontal section as the natural tooth. The tool passes loosely through the tube and is free to move up and down within the same, thereby en-

abling the operator to dress off all sides of the tooth smoothly, so that the crown may be fitted closely thereto and have a firm bearing thereon, the bearing usually extending its entire length. The adjustable stop-collar h' on the tool prevents it descending too far and coming in contact with the lower ends of the clamps. When the operation of grinding the tooth is quite finished and it is desired to dress off the shoulder evenly, the tool is passed down until its collar rests on the tube, and is then secured at that point by the set-screw g' in the tube. The operator then moves the tool around as before; but in this case the tube g revolves with the tool, it being secured thereto. To make the shoulder at the neck of the tooth correspond to and follow the natural curvature of the flesh surrounding the neck, the groove c^4 , in which the screws e^2 project, is curved as nearly as possible with the curvature of the gum, so that as the bar e is revolved by the operator it is caused to gradually rise and fall, thus imparting to the shoulder the desired undulating shape. Usually the gum at the two exposed sides of the teeth curves downwardly, while that between the teeth is usually convex in curvature. It is therefore easy to give the cam-groove in the ring such a curvature as to correspond substantially with the curvature of the gum. After the tooth is properly dressed or drilled off the device is readily removed therefrom by simply slightly loosening one or more of the clamp-screws, after which the tooth is ready for the reception of the crown. The crown, which is usually made of metal or porcelain, or both, is fitted down tightly over the tenon, its shoulder abutting squarely against the shoulder at the neck of the tooth, the thickness of the crown being such that its exterior comes flush with the exterior of the tooth, so that the free edge of the gum will extend up on the crown a short distance and completely cover the joint, as shown in Fig. 13. The advantage of thus bringing the joint below the gum is that it will be protected and hidden thereby, and the advantage of bringing the lower edge of the crown flush with the surface of the neck of the tooth is that shoulders and obstructions for the lodgment of food are thereby entirely avoided.

This invention overcomes all the well-known objections to the old method of preparing and fitting crowns to teeth, and we wish it distinctly understood that we do not confine ourselves to the specific features of construction shown and described herein, as the same may be greatly varied without departing from the spirit of the invention in the least. For instance, other forms of tool-guide may be employed, the only requisite being that it shall conform to the shape of the tooth when the clamps are adjusted thereto. Any other form of rotatable tool holding and carrying device may be employed, as it is only requisite that the tool be permitted to follow the guide-ring as the operator moves it

around; and, further, the supporting-ring may be varied in construction, if desired. For instance, it may be constructed in two sections, as shown in Fig. 11, the adjoining ends thereof being suitably tenoned and doweled together, which will not only facilitate the manufacture thereof, but will also enable it to be more readily applied to and removed from the teeth. The operator may after removing the superimposed rings readily make a wax or plaster impression of the tooth by simply pressing the soft material down into the supporting-ring over the tooth, and this cast or mold may be readily removed with the supporting-ring and clamps. Thus obtaining an accurate cast of the tooth to which the crown is fitted enables the dentist to accurately shape the same, and thereby avoid the old process of repeatedly driving the crown over the tooth and removing it therefrom in the process of shaping it to the tooth, which is of course very painful to the patient.

Having thus fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a dental apparatus, a support carrying clamps adapted to be clamped to a tooth, a tool-guide carried by the clamps, and a rotatable tool-holder supported above the guide, substantially as described.

2. In a dental device, the combination of a support carrying means for securing it to a tooth, a yielding guide-ring supported above the tooth, means for adjusting said guide-ring to the contour of the tooth, and a rotatable tool-holder supported above the guide-ring, substantially as described.

3. In a dental device, the combination of a support carrying adjustable clamps, a flexible ring-guide connected to the clamps above their clamping ends, so as to assume the shape of the tooth when the clamps are adjusted thereto, and means for supporting a tool, substantially as described.

4. The combination of a ring, a series of bodily-movable clamps supported therein, means for guiding these clamps radially, set-screws for adjusting them, an expansible guide-ring supported on the upper ends of the clamps, and a superimposed rotatable tool-guide, substantially as described.

5. The combination of a support and means for clamping it to a tooth, a rotatable ring supported thereon, and a tool-holder carried by this rotatable ring, substantially as described.

6. The combination of a support, a ring-guide supported thereon and means for adjusting it to the contour of the tooth, a rotatable ring attached to the support, and a tool-holder supported on said rotatable ring, substantially as described.

7. The combination of a support carrying means for clamping it to a tooth, a guide-ring supported thereon, rotatable tool-holding devices supported above the guide-ring, and means for normally pressing said tool-holding

devices radially outwardly, whereby when rotated they will follow the shape of the guide-ring, substantially as described.

5 8. The combination of a support, an adjustable guide-ring and means for securing the same to a tooth, a ring supported on said support, rotatable tool-holding devices carried by said ring, and means for imparting to the tool-holding devices a rising-and-falling movement during their rotation around the guide, 10 substantially as described.

9. The combination of a support provided with means for securing it to a tooth, a ring-guide therein, a rotatable tool-holding tube 15 supported above the ring-guide, a depending part adapted to rest against the inner surface of the ring-guide, and means for normally pressing the depending part against the guide, substantially as described.

20 10. The combination of a support provided with means for securing it to a tooth, a ring-guide and means for adjusting it, a removable ring supported on said support and provided with a cam-groove in its exterior, a ro-

tatable bar carrying pins working in said 25 grooves, and a tool-holder carried by the bar, substantially as described.

11. The combination of a ring-support carrying a ring-guide and clamping devices, a stationary ring thereon, a rotatable ring se- 30 cured to and revolving on the stationary ring, and a spring-actuated slide on the rotatable ring, said slide carrying a tool-holding tube, substantially as described.

12. The combination of a ring-support car- 35 rying clamping and guiding devices, a rotatable ring supported thereon, and a spring-actuated slide supported on a bar carried by said ring, said slide carrying a rotatable tool-holding tube, substantially as described. 40

In testimony whereof we affix our signatures in presence of two witnesses.

DANIEL F. SWEET.
JOHN B. PARKER.

Witnesses:

C. D. DAVIS,
E. J. CUSSEN.