(No Model.)

5 Sheets—Sheet 1.

C. DORIOT.

DENTAL ENGINE.

No. 503,740. Patented Aug. 22, 1893.

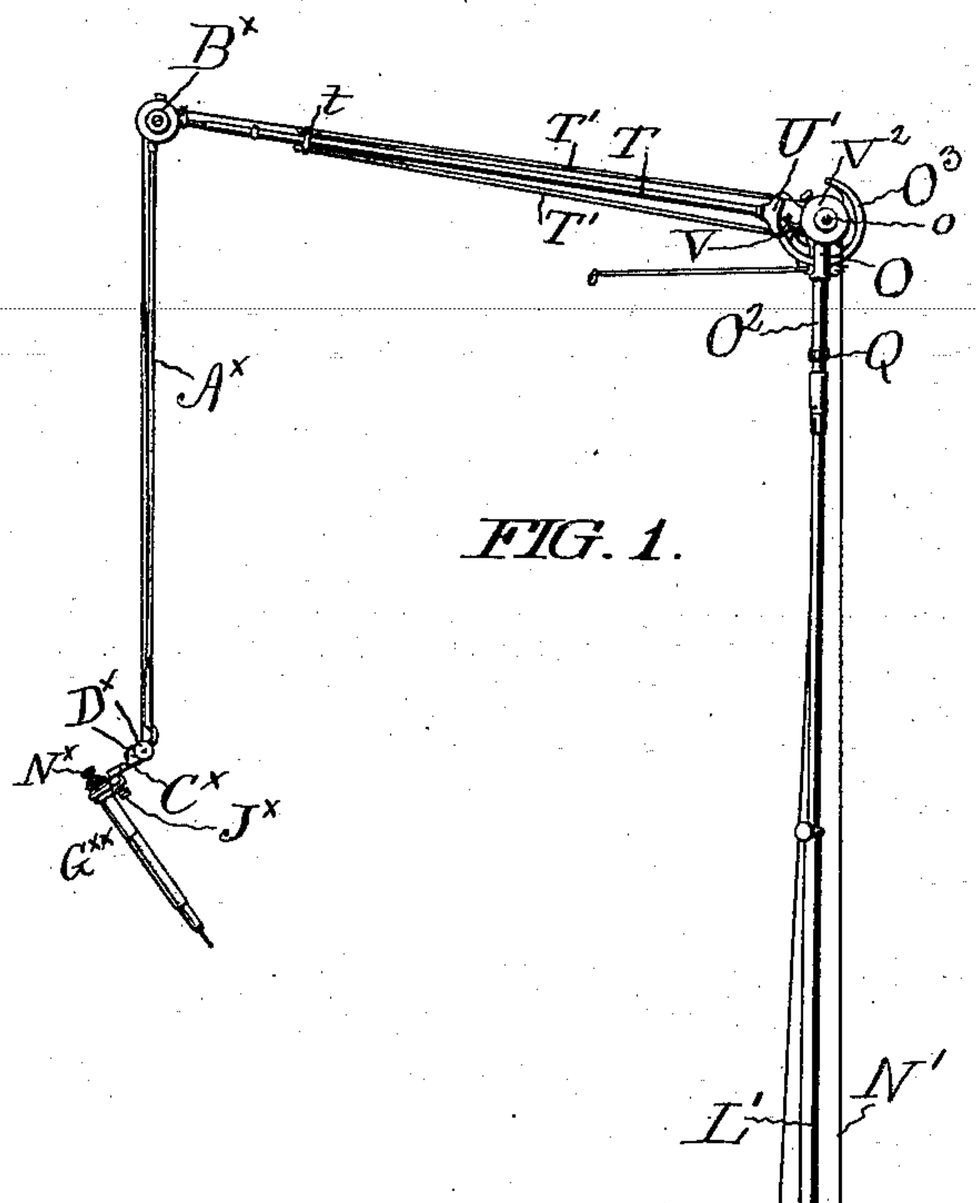

FIG. 1.

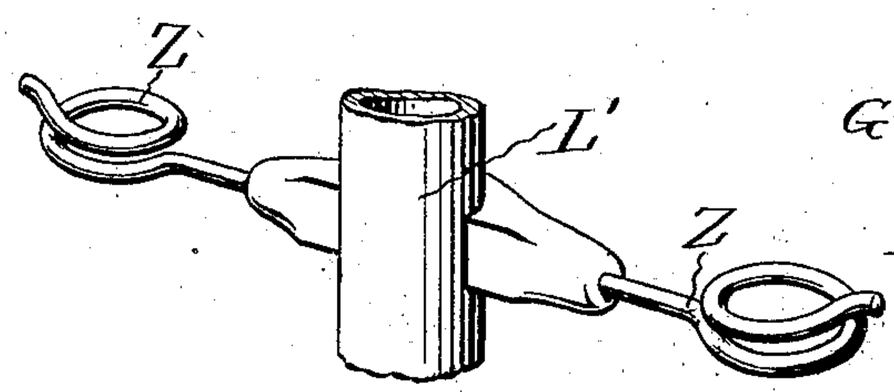

FIG. 14.

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Jacob N Bilt

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By atty J. D. Peyton.

(No Model.)

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C. DORIOT.

DENTAL ENGINE.

No. 503,740. Patented Aug. 22, 1893.

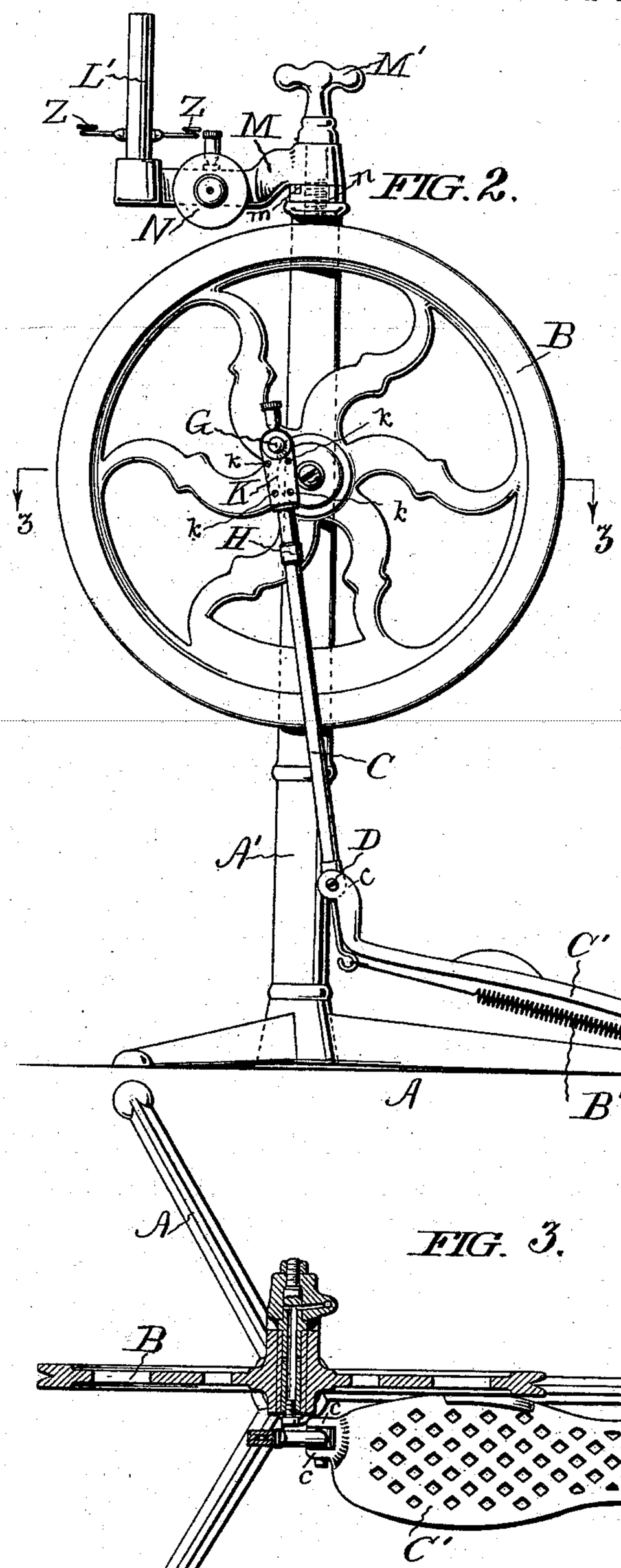

FIG. 2.

FIG. 3.

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(No Model.) 5 Sheets—Sheet 3.

C. DORIOT.

DENTAL ENGINE.

No. 503,740. Patented Aug. 22, 1893.

FIG. 4.

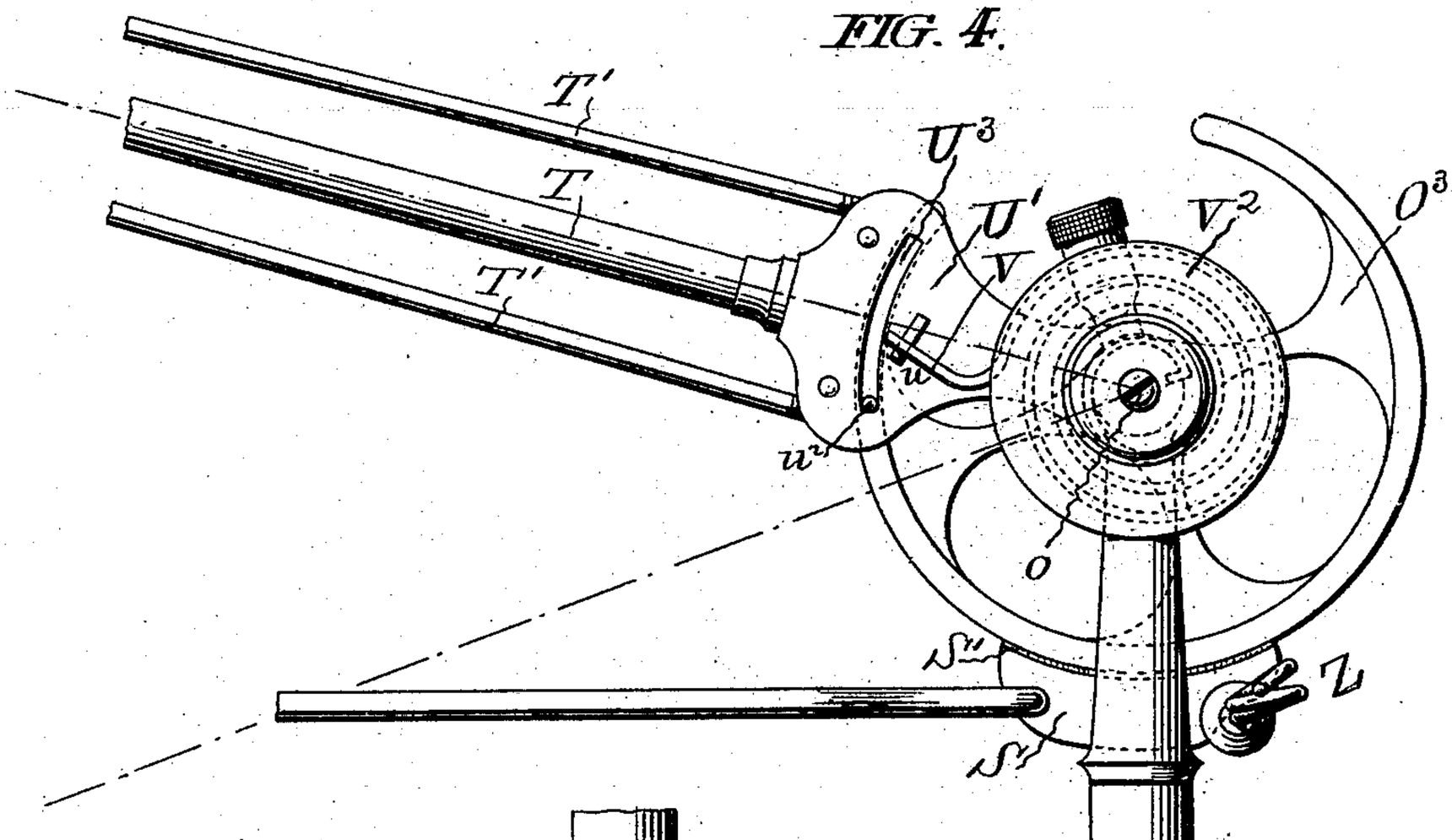
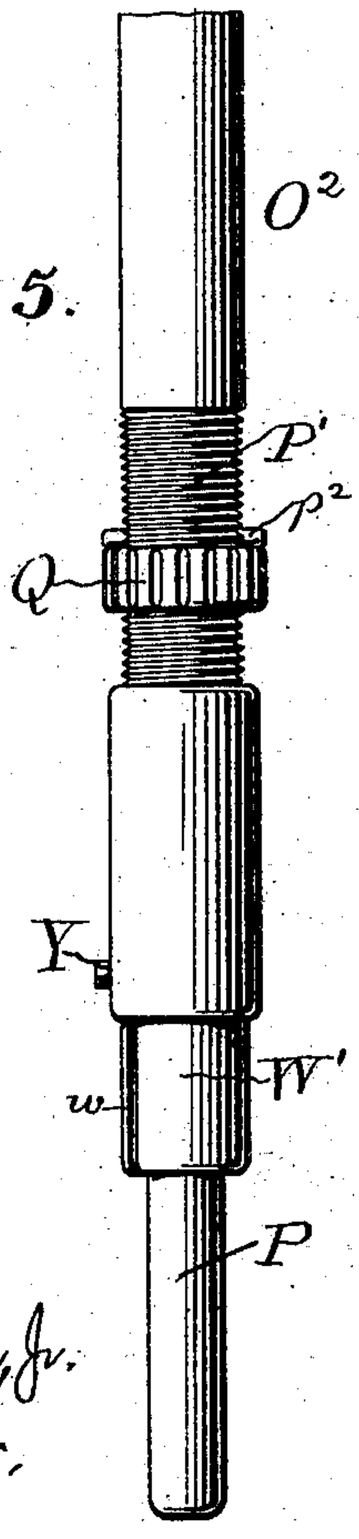
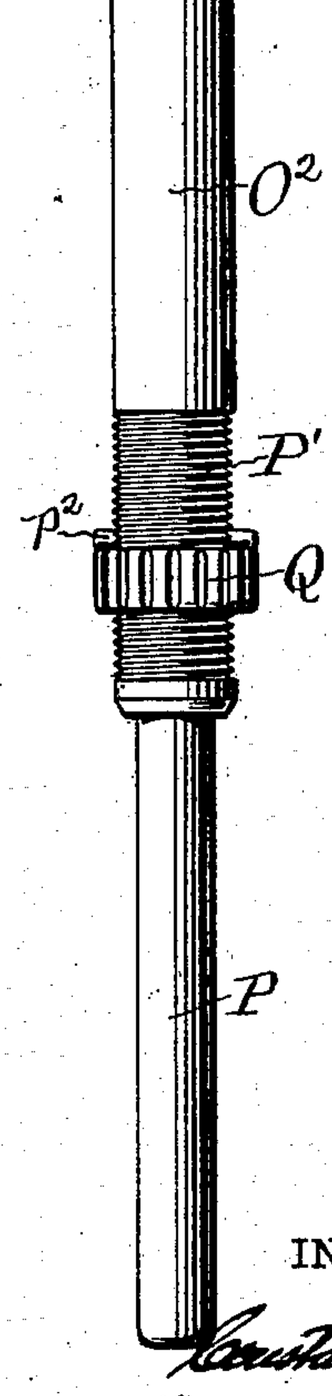


FIG. 5.





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C. DORIOT.

DENTAL ENGINE.

No. 503,740. Patented Aug. 22, 1893.

FIG. 6.

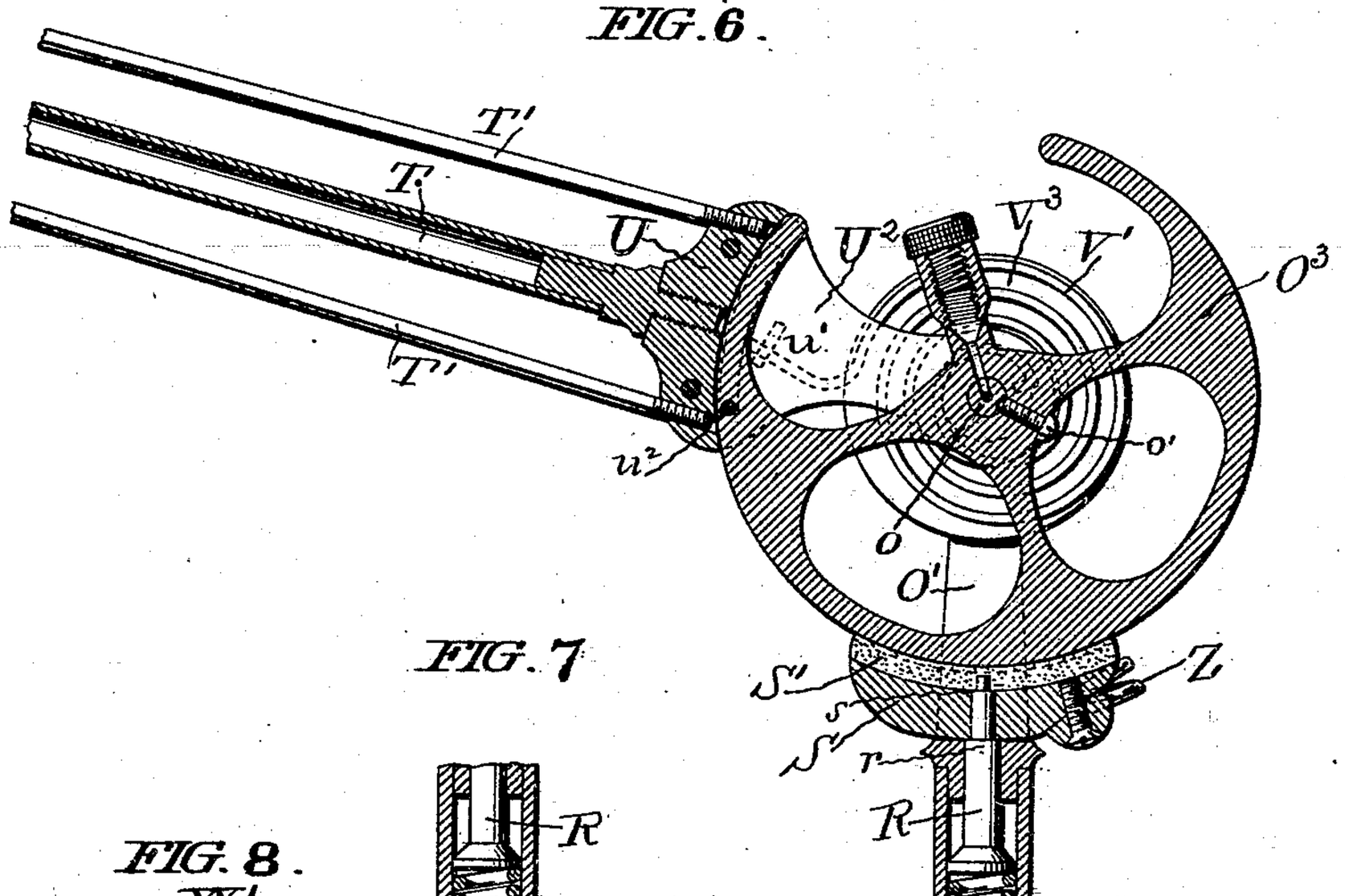


FIG. 7

FIG. 8.

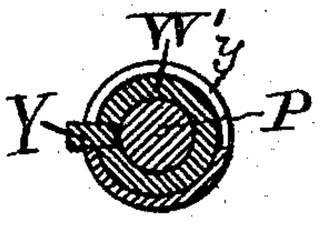
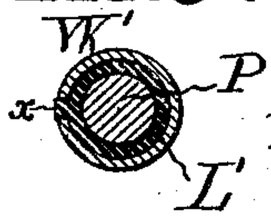


FIG. 9.



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(No Model.) 5 Sheets—Sheet 5.

C. DORIOT.

DENTAL ENGINE.

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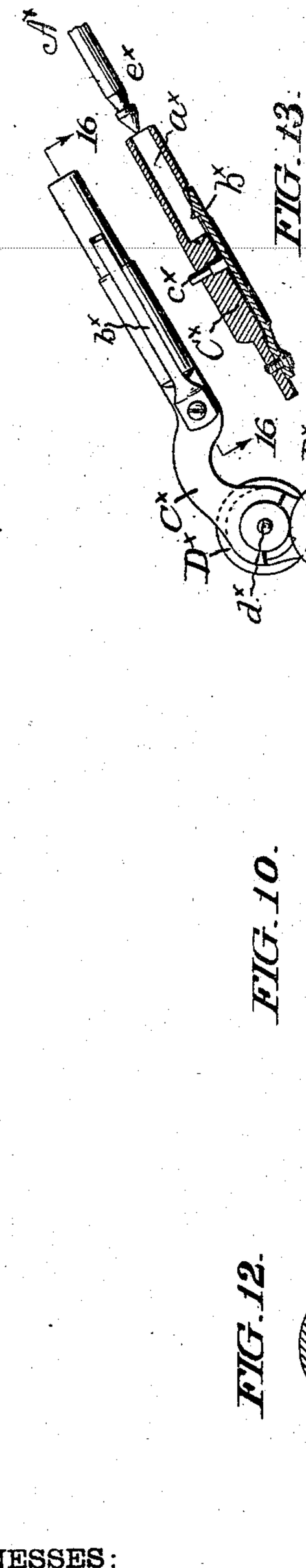

FIG. 1.

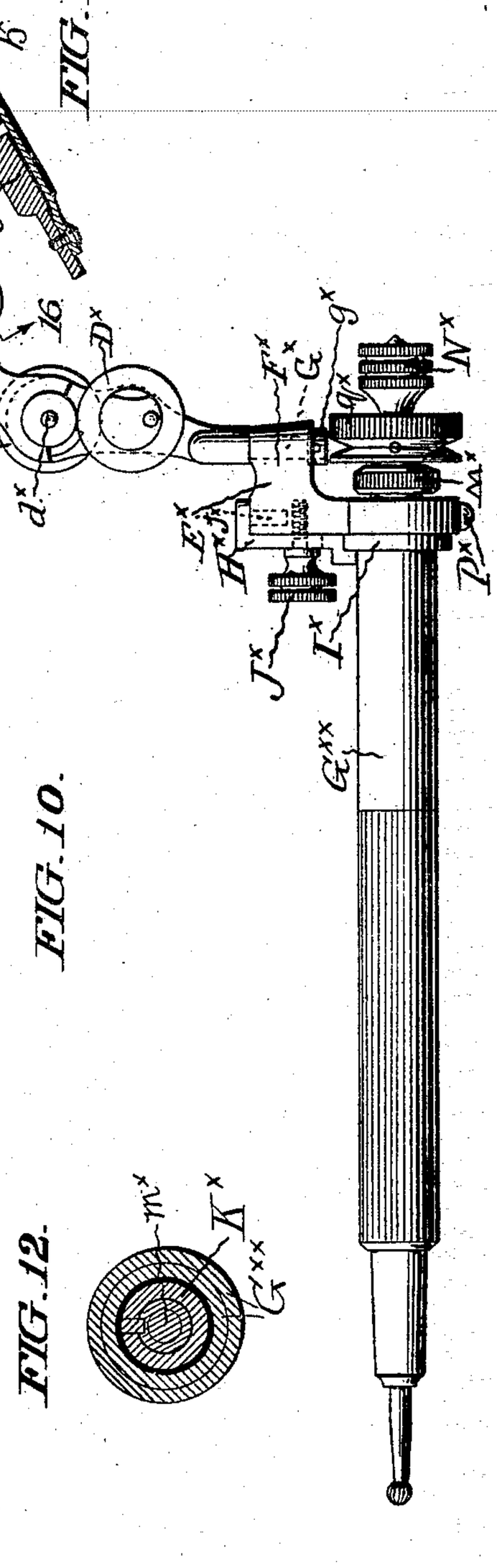

FIG. 11.

FIG. 10.

FIG. 12.

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UNITED STATES PATENT OFFICE.

CONSTANT DORIOT, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE S. S. WHITE DENTAL MANUFACTURING COMPANY, OF SAME PLACE.

DENTAL ENGINE.

SPECIFICATION forming part of Letters Patent No. 503,740, dated August 22, 1893.

Application filed March 2, 1893. Serial No. 464,407. (No model.)

To all whom it may concern:

Be it known that I, CONSTANT DORIOT, a citizen of the Republic of France, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Dental Engines, of which the following is a specification.

My invention relates to certain improvements as hereinafter claimed applicable to dental engines.

In the accompanying drawings which show a preferred organization of my improvements, Figure 1 is a view in perspective. Fig. 2 is a view in side elevation, showing portions only of the engine. Fig. 3 is a view partly in plan and partly in horizontal section on the line 3 of Fig. 2. Fig. 4 is a view in elevation showing a portion of the sectional upright standard of the engine, the pulley head carried thereby, and adjacent parts. Fig. 5 is a view showing details of the upper portion of the sectional upright standard. Fig. 6 is a view partly in central vertical section and partly in elevation of a portion of the upright standard, the pulley head, its adjusting devices, and adjacent parts. Fig. 7 is a view partly in elevation and partly in vertical central section showing portions of the upright standard, and its attachments. Fig. 8 is a section on the line 8 of Fig. 7; and Fig. 9 a section on the line 9 of Fig. 7. Fig. 10 is a view showing the hand-piece, its wrist-joint connection, and the forearm coupling. Fig. 11 is a longitudinal central section through the hand-piece. Fig. 12 is a transverse section, on an enlarged scale, on the line 12 of Fig. 11; and Fig. 13 a section on the line 13 of Fig. 10. Fig. 14 is a perspective view of cord guides.

The engine base A, frame standard A′, driving wheel B, and off-center spring B′ may be of any suitable construction, and motion is communicated by way of a pitman C to the driving wheel from a treadle C′.

A suitable telescoping upright standard has its lower section L′ detachably secured to the top of the frame standard A′ by a supporting bracket M. This supporting bracket extends over the driving wheel at or about at a right angle with the shaft thereof, to one side of the frame standard, and in a direction the opposite to that in which the treadle projects from the frame standard. A hand screw M′ and a dowel or centering pin *m* serve to firmly secure the supporting bracket to its seat formed by the top *n* of the frame standard which is made with a bend to overhang the driving wheel. The bracket for the upright standard, thus secured in position so as to project laterally to the frame standard, at about a right angle with the driving wheel shaft, serves also as a support for mounting a a guide pulley N for the driving cord N′, and provides for having the driving cord pass almost entirely about the driving wheel, to give a desirable pull upon the cord and prevent its slipping.

Between forks O, O′, rigid with the upper section O^2 of the upright standard, there is mounted a rocking pulley head O^3 on a shaft *o*. A screw *o′* serves to rigidly but detachably connect the pulley head, by way of its hub with the shaft *o*. The upper section O^2 of the upright standard is tubular for a portion of its length, is attached to a solid portion or pin P by a screw *p*, and is provided with an external screw thread P′. Near its lower end this standard section O^2 is provided with diametrically opposite slats *p′ p′*, and a pin p^2 passes through the slots and through an adjustable block *q* inside the standard section. An adjusting nut Q engages the threaded portion P′ of the standard section beneath the cross pin p^2. A coiled spring Q′ bears at one end upon the adjustable block *q*, and at its opposite end against a thrust pin R which bears by a shoulder *r* upon a brake shoe or block S, passes through this block and at its end, above a second shoulder *s*, engages with a facing S′ of rubber, leather or equivalent yielding, frictional material in a groove in the upper surface of the brake block.

The pulley head as shown is in the form of the segment of a circle—almost a complete circle—but the segment may be lessened, or the head be in the form of complete circle. It is only necessary that it have a periphery which for a sufficient extent is properly curved in the arc of a regular circle—so as to adapt it to be operated upon by the brake. It will be seen that by means of the nut Q the ten-

sion of the spring Q′ may be varied as desired to cause the brake to exert more or less resistance to the turning of the pulley head, so as to guard against accidental rocking of the head.

The inner section of the jointed engine arm instead of being made of a single rod or tube as usual, is formed of three rods, the central or main rod T being considerably larger than the other rods T′ T′, and tubular. The rods T′ T′ act as braces, and are rigidly connected at their outer ends with the main or central rod, at opposite sides thereof, that is above and below it, by means of a cross head *t*, while at their inner ends the three rods screw into a block U of a carrier mounted to rock about the hub of the pulley head. The brace rods diverge from their outer ends inward; their distance from the central rod being greater at their inner ends than at their outer ends. The carrier of the engine arm consists of two similar arms or plates U′ U² in connection with the block U which is secured by screws between the outer ends of the carrier arms. Two corresponding springs V V′ are coiled about the hub of the pulley head, one by the side of each carrier arm. One end of each spring is engaged with the pulley head hub, and at their opposite ends these springs engage the one with the carrier arm U′ at *u*, and the other with the carrier arm U² at *u′*. The springs exert upward pressure on the carrier and act with a tendency to lift the engine arm and yieldingly uphold it. The extent to which the arm may be lifted by the action of the springs is limited by means of curved slots U³ in the respective carrier arms, and stop pins *u²* on the pulley head entering these slots. Obviously, but one carrier arm, with its slot, and a single stop pin might be used.

Grooved pulleys V² V³ for the driving cord are mounted upon the pulley head shaft *o*, one at either side of the pulley head; and additional jointed sections of the engine arm, and other pulleys are provided, as farther on to be referred to, to convey motion to a hand piece spindle.

In order that the engine arm may normally be held in desirable inoperative position by the action of a spring and be automatically returned to this position when released after having been moved away from it by swinging it horizontally against the force exerted by the spring, the solid portion or pin P of the standard section O² is surrounded by an incased coiled spring W, one end of which is fastened to this pin P, while the other end has connection with a section of the standard into which the pin P is fitted so that it may turn, by means as follows: A loose sleeve W′ of the standard, to which sleeve the lower end of the spring is secured, is provided with a longitudinal slot *w* by which, to prevent its turning, it is engaged with a pin *x* on the section of the standard into which the pin P fits; and the spring casing is provided with a slot *y* extending about half way around it, into which projects a pin Y secured to the sleeve W′. Normally the engine arm is held so as to project in a direction opposite to that in which the treadle projects, and out of the way of the dentist when the engine is not in use. When the engine is to be used a slight pull on the engine arm overcomes the force of the spring W and so turns the pin P in its socket in the standard to allow the engine arm to be brought around toward the treadle, into operative position.

Cord guides Z for preventing the driving cord from running off the driving wheel and the pulleys N, V² V³ are provided. See Figs. 1, 2, 4, 6 and 14. These cord guides are suitably secured in position in proper relation to the driving wheel and pulleys and the driving cord, and consist each of wire bent to form at least one coil, forming an eye through which the cord passes. The cord is easily inserted in position in the guide beneath the free end of the wire and may be as readily removed, while accidental displacement of the cord is guarded against.

A second section A× of the engine arm is jointed to the inner or main section thereof, and cord guide pulleys B× B× are mounted at the joint, in usual way. The outer or wrist joint section C× of the engine arm is provided with suitable cord guide pulleys D× D× one of which is journaled at the joint *d*× connecting the two sections of the wrist-joint, and this wrist-joint section has a socket *a*× and a spring catch *b*× which is actuated by a push-pin *c*×. The pointed and annularly shouldered end *e*× of the engine arm section A× enters the socket of the wristjoint section and is engaged by the catch. Pressure on the push-pin serves to disengage the catch from the section A× as will be obvious.

Connection between a hand-piece frame E× and the wrist-joint section of the engine arm is made as follows: The hand-piece frame has a socket in its arm F× into which fits, so as to turn freely, a round pin G× formed with the wrist-joint. The pin is shouldered above the frame socket and has a collar *g*× removably fastened upon it below the socket, thus keeping it in place without interfering with its swiveling action. The long externally unthreaded sleeve portion *f*× of the hand piece frame enters the hand piece casing G×× about to an internal shoulder *h*× thereof and is held in place by means of a locking piece H× which engages an annular shoulder or collar I× on the casing. This locking piece is adapted to slide on that portion of the hand piece frame between its sleeve *f*× and arm F×. A securing screw J× passes through a longitudinal slot in the locking piece and engages the hand-piece frame, and a pin *j*× projecting downwardly from the flanged top of the locking piece enters a hole in the hand piece frame. See Fig. 10. By loosening the securing screw the locking piece may be slid away from the hand piece casing until the hook or flange of the locking piece which

normally engages the shoulder of the casing is disengaged therefrom leaving the frame free to be withdrawn from the casing.

The rotary tubular spindle $K^{\times}$ of the hand piece has inclined shoulders $k^{\times}$ $k^{\times}$ near its front and rear ends having bearing respectively against the inclined shoulder $L^{\times}$ of the hand-piece casing, and the internally inclined end $l^{\times}$ of a threaded adjusting sleeve $M^{\times}$ provided with a milled nut by which to screw it into the hand-piece frame. Obviously, by adjustment of this sleeve the spindle may be properly held to its bearings. A screw $P^{\times}$ passing through the handpiece frame serves to hold the sleeve in its adjusted position.

A split-ended chuck or tool holder $m^{\times}$ of greater diameter at and near its front end than for the remainder of its length fits within the spindle, and is threaded at its rear end which projects beyond the spindle, so as to be drawn back by means of a nut $N^{\times}$, bearing against the rear end of the spindle, after a tool is inserted. The inclined shoulder $n^{\times}$ at the split front end of the chuck is drawn against the internally inclined front end of the spindle with sufficient force to compress the chuck upon the tool and grip it fast. A pin $o^{\times}$ secured to the spindle near its front end and projecting inwardly therefrom engages a groove in the chuck and thus prevents turning of the chuck in the spindle. The end of the tool shank is beveled and the inner end of the socket in the chuck is correspondingly shaped to receive it, as shown at $p^{\times}$, Fig. 11, thus guarding against the possibility of the tool turning when clamped in the chuck.

A pulley $q^{\times}$ fast on the rear end of the rotary spindle receives motion from the driving cord. This pulley is located between the nut of the adjusting sleeve $M^{\times}$ and the nut $N^{\times}$ of the chuck shank.

Although the chuck made with two diameters—larger at and near its front end than elsewhere is preferable, it may be made of the same diameter throughout when such construction is desired.

From the foregoing description it will be seen that the handle of the hand screw which connects the supporting bracket with the frame standard affords a ready means for moving the engine about, and that when lifted by this handle its weight upheld is nicely balanced; that by means of the supporting bracket the upright standard is offset from the frame standard to counterbalance the weight of the treadle, be out of the way of the dentist, and admit of the pull upon the driving cord being in a line parallel or nearly so with the upright standard, while by means of the guide pulley located between the peripheral portion of the driving wheel to which the pull side of the driving cord passes, and a line passing vertically through the axis of the driving wheel, an almost complete encircling of the driving wheel by the driving cord is insured, thus enabling a driving cord slack on the return side to be used and lessening friction on the journals of the driving wheel and the pulleys; and that the engine arm has a wide range of movement imparted to it; is automatically moved out of the way of the dentist when released, and may be adjusted into a vertical position so that but little space is occupied by the engine when not in use. It will also be seen that a strong and quickly operated spring catch connection is provided between the second section and the wrist joint section of the engine arm; that great freedom of movement of the hand piece is given by means of the swiveling connection between the second section of the engine arm and the wrist joint thereof, between this wrist joint section and the hand piece frame, and between this frame and the hand piece casing; that a secure and readily separable connection between the hand-piece frame and casing is provided; that the long externally unthreaded sleeve of the hand-piece frame entering the hand piece casing insures perfect alignment of parts; and that a secure and quickly operated tool clamp is provided.

I claim as my invention—

1. The combination, in a dental engine, of the driving wheel, the frame standard, the upright standard having supporting connection with the frame standard, the driving cord, pulleys at the top of the upright standard, and the cord guide pulley supported over the driving wheel and between the peripheral portion thereof to which the pull side of the driving cord passes, and a line passing vertically through the axis of the driving wheel, substantially as set forth.

2. The combination, in a dental engine, of the driving wheel, the frame standard, the supporting bracket attached to the frame standard and projecting laterally thereto at a right angle or nearly so with the shaft of the driving wheel, the upright standard carried by the supporting bracket, the cord guide pulley mounted on the supporting bracket between the frame standard and upright standard, pulleys at the top of the upright standard, and the driving cord, substantially as set forth.

3. The combination, in a dental engine of the frame standard, the driving wheel, the supporting bracket projecting laterally to the frame standard and at a right angle or nearly so with the shaft of the driving wheel, the upright standard secured to the supporting bracket, and the hand screw securing the supporting bracket to the frame standard centrally over the driving wheel and serving as a means to lift and move the engine, substantially as set forth.

4. The combination, in a dental engine, of the upright standard, the pulley head at the upper end thereof, the engine arm, the rocking carrier therefor provided with the slot, the stop pin on the pulley head engaging said slot, and the spring acting upon the carrier to yieldingly uphold the engine arm, substantially as set forth.

5. The combination, in a dental engine, of the upright standard, the rocking pulley head at the upper end thereof, the engine arm having supporting connection with the pulley head, and the spring-actuated brake bearing upward against the rocking pulley head, substantially as set forth.

6. The combination, in a dental engine, of the upright standard, the rocking pulley head at the upper end thereof, the engine arm having supporting connection with the rocking pulley head, the brake bearing upward against the pulley head, the thrust pin acting upon the brake, and the adjustable spring within the upright standard and acting upon the thrust pin, substantially as set forth.

7. The combination, in a dental engine, of the upright standard, the rocking pulley head at the upper end thereof, the slotted rocking carrier, the engine arm secured thereto, the pin on the pulley head entering the slot in the rocking carrier, the spring acting upon the carrier to yieldingly uphold the engine arm, the brake acting upon the pulley head to yieldingly hold it against rocking, the thrust pin acting upon the brake, and the adjustable spring within the upright standard and acting upon the thrust pin, substantially as set forth.

8. The combination, in a dental engine, of the upright standard having a turning upper section, the engine arm having supporting connection with said turning section, and the incased spring of the upright standard having connection with the turning upper section and a non-turning section of the standard and acting upon the turning section with a tendency to hold it against turning so as to normally maintain the engine arm in inoperative position out of the way, while allowing it to be swung horizontally into operative position, and restoring it to its normal position when released after having been swung into operative position, substantially as set forth.

9. The combination, in a dental engine, of the upright standard, the engine arm having supporting connection therewith, the coiled spring, its slotted casing carried by the upright standard, the turning pin of said standard to which one end of said spring is secured, the loose sleeve provided with the longitudinal slot engaging a pin of the section of the upright standard in which the turning pin fits, and the pin of the loose sleeve engaging the slot of the spring casing, substantially as set forth.

10. The combination, in a dental engine, of the second section of the engine arm provided with the pointed and annularly shouldered end, the wrist-joint section provided with the socket to receive said end, the shouldered spring catch of the wrist joint section, and its push pin, substantially as set forth.

11. The combination, in a dental engine, of the wrist-joint section of the engine arm terminating in the shouldered pin, the hand-piece frame provided with the arm having the socket to receive said pin, and the detachable collar on the wrist-joint pin below said socket, substantially as set forth.

12. The cord guide consisting of the wire coiled to form an eye through which the cord passes, substantially as set forth.

13. The combination, in a dental engine, of the hand-piece casing provided with the annular shoulder, the hand-piece frame having the sleeve about which the hand-piece casing turns freely, and means carried by the hand-piece frame for engaging the shoulder of the hand-piece casing to lock the hand-piece against endwise movement on said sleeve, substantially as set forth.

14. The combination, in a dental engine, of the hand-piece casing provided with the annular shoulder, the hand-piece frame having the long externally unthreaded sleeve entering said casing, the slotted locking piece engaging the shoulder of the hand-piece casing, and the securing screw passing through the slot of the locking piece and engaging the hand-piece frame, substantially as set forth.

15. The combination, in a dental engine, of the hand-piece casing, the rotary tubular spindle therein, the split-ended tool chuck passing entirely through said spindle, projecting therefrom at its rear end and threaded, the clamping nut engaging said threaded rear end of the chuck, and the pulley fast on the rear end of the rotary tubular spindle, substantially as set forth.

16. The combination, in a dental engine, of the hand-piece casing, the rotary tubular spindle having its front bearing in said casing and provided with the inclined shoulders near its front and rear ends, the hand-piece frame having the sleeve entering said casing, and the adjusting sleeve provided with the nut having the internally inclined end acting against the inclined rear shoulder of the spindle and having threaded engagement with the sleeve of the hand-piece frame, substantially as set forth.

In testimony whereof I have hereunto subscribed my name.

CONSTANT DORIOT.

Witnesses:
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J. A. B. WILLIAMS.