

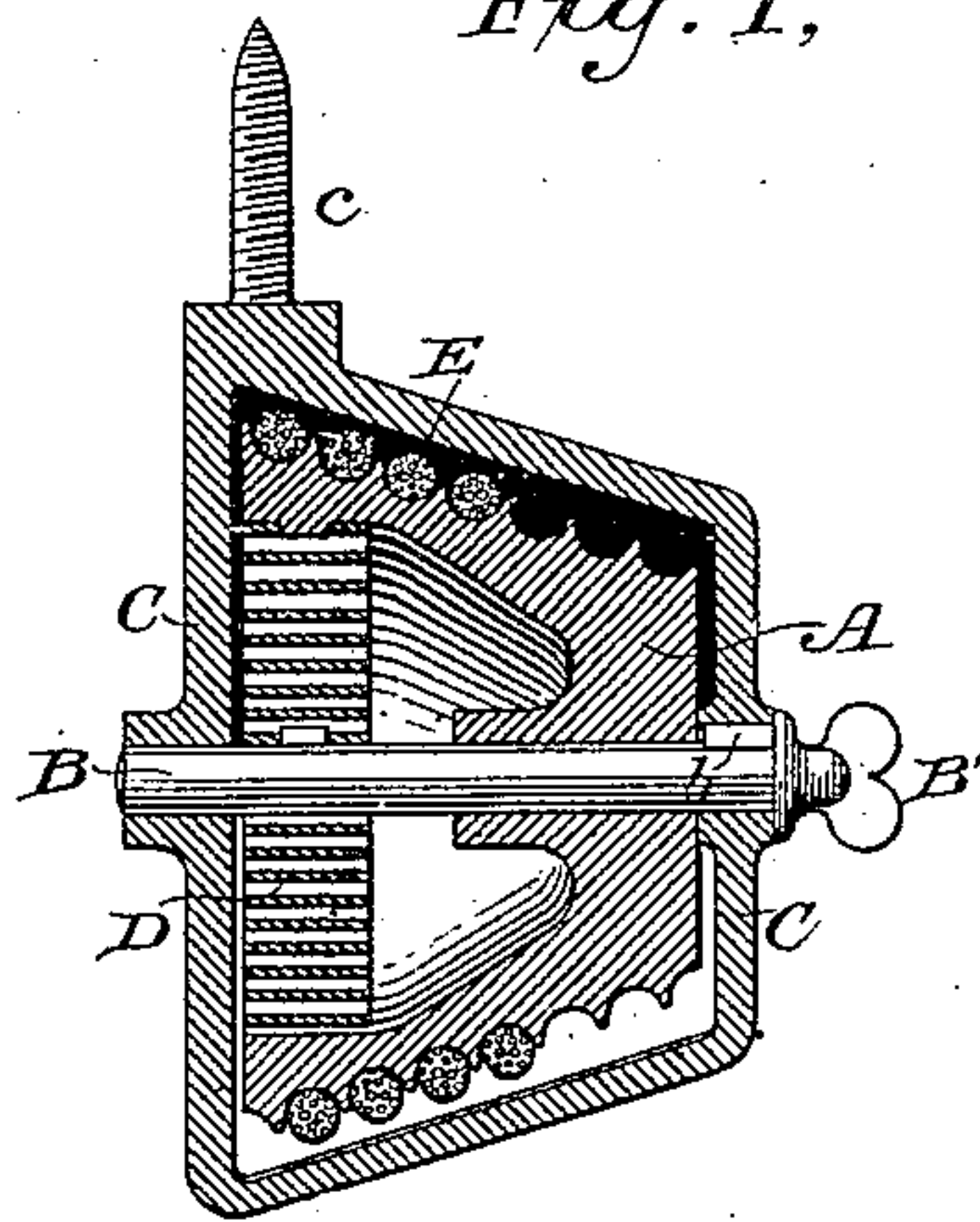
(No Model.)

E. T. STARR.  
SUSPENSION DENTAL ENGINE.

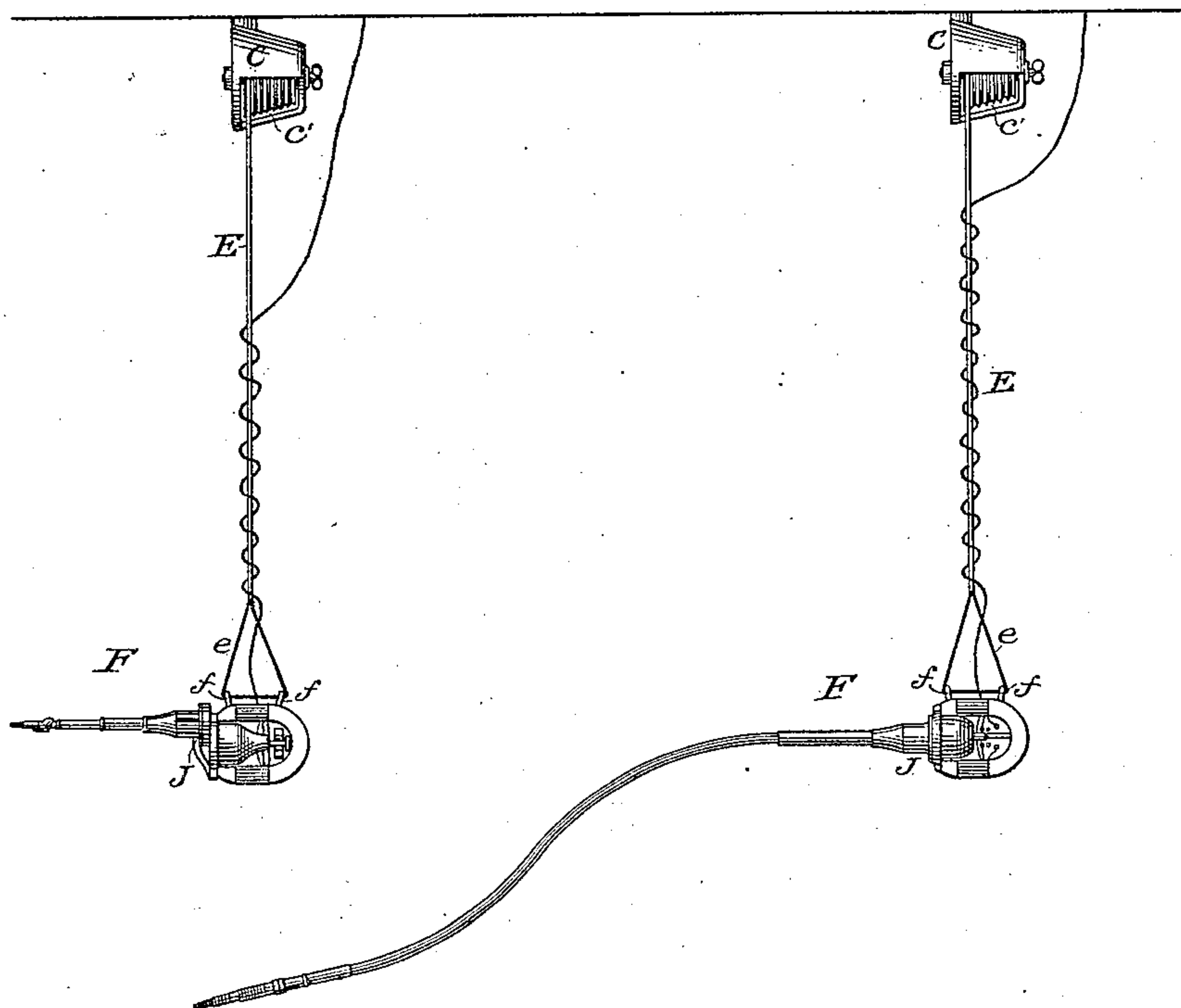
No. 248,809.

Patented Oct. 25, 1881.

*Fig. 1,*



*Fig. 2,*



WITNESSES

*Wm A Skinkley*  
*Geo W. Buck.*

INVENTOR

By his Attorneys  
*Eli T. Starr,*  
*Baldwin, Hopkins & Peyton.*

# UNITED STATES PATENT OFFICE.

ELI T. STARR, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO JAMES W. WHITE, JAMES CLARENCE WHITE, AND H. M. LEWIS, TRUSTEES, ALL OF SAME PLACE.

## SUSPENSION DENTAL ENGINE.

SPECIFICATION forming part of Letters Patent No. 248,809, dated October 25, 1881.

Application filed May 6, 1881. (No model.)

*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 Suspension-Engines for Dentists' Use, of which the following is a specification.

My invention relates to a dental engine suspended by a cord or chain from a counter-balance, fusee, or spring-pulley secured to the ceiling or some other overhead support.

The object of my invention is to provide a dental engine automatically driven without the aid of driving-belt connections or gearing, and freely suspended from an overhead pulley in such manner that the engine is completely within the control of the operator while the hand is relieved from its weight, the operator merely having to direct and hold the operating-tool to its work, whereby, owing to the wide range of movement and great freedom given to the engine by suspending it, in addition to its automatic capacity, a vastly superior engine for dentists' use is produced.

The subject-matter claimed is recited at the close of the specification.

In the accompanying drawings, which show my improvements as organized in the best way now known to me, Figure 1 is a view of the fusee or counterbalancing spring-pulley by which the engine is suspended from the ceiling or some other overhead support; and Fig. 2 shows two views, one view illustrating the engine as having a hand-piece mounted directly thereon, and as suspended by a cord from the overhead pulley, and the other view illustrating the suspended engine with a flexible shaft between it and the hand-piece.

A fusee or spirally-grooved cone-pulley, A, is mounted so as to turn around a non-rotating shaft, B, having its ends resting in the sides of the inclosing-case C of the pulley. Said casing is preferably made of metal, and has a screw, c, formed upon its upper end, so as to permit of the ready application of the pulley to the ceiling or some other suitable overhead support. The pulley is recessed at its enlarged end, and a coiled spring, D, somewhat like the mainspring of a clock, is inserted therein, one

end of said spring being secured to the pulley and the other end to the shaft B, so that when turned in one direction the pulley will wind up or compact the spring, while when the pulley is free the spring will unwind or expand and turn the pulley in the opposite direction. When the pulley is in its normal position with its spring fully expanded one end of a cord, E, is secured to the pulley at its larger end and wound around the pulley toward the smaller end, following the lines of the spiral grooves in the pulley. The cord E should be of such a length that after leaving the pulley through the opening c' in the case C its lower end will reach down to a point a short distance above the patient's head when seated in the operating-chair.

Suspended from the lower end of the cord E is the automatic engine F I prefer to employ. The connection between the suspending-cord and engine is formed by an endless cord or loop, e, passing through eyes ff in the upper edge of the engine-frame. The weight of the suspended engine will cause said cord e to assume the triangular form shown in Fig. 2. This cord e permits the engine to be rocked freely vertically, said cord slipping freely in its eyes ff to permit the movement, while still sustaining the weight of the engine.

The engine F is an electric engine, and is constructed substantially in accordance with the Letters Patent of George F. Green, No. 159,028, of January 26, 1875, and therefore need not be particularly described herein. The engine consists, generally speaking, of electromagnets forming part of the frame of the engine, a revolving armature interposed between said magnets, circuit-shifting or pole-changing connections, and a revolving spindle or shaft which imparts motion to the spindle-chuck, turning in bearings in the hand-piece casing J, either directly or indirectly, through the medium of a flexible shaft or power conveyer, such as those in common use with dental engines. The said shaft is preferably enveloped by a flexible sheath, which may also be like those in common use. The said flexible shaft and enveloping-sheath will preferably be constructed substantially in accordance with Nel-



son Stow's Letters Patent, reissued March 4, 1879, as No. 8,607.

The spindle-chuck of the hand-piece is socketed for the reception of the operating-tools, which may be locked in the chuck in any approved and suitable fashion.

Flexible connections of well-known construction (shown as coiled about the suspension-cord) convey the electric current from the battery or source of supply to the engine, so that the engine is not hampered in its freedom of movement by its battery-connections.

The operation of the engine is as follows: When in its normal position, with the cord wound upon the pulley from end to end, and with the spring of the pulley fully expanded, the engine is above the operating-chair. When an operation is to be performed the hand-piece is grasped by the operator in the usual way and freely turned so as to direct the operating-tool to the desired point and hold it to its work. If a greater range of movement is needed than is allowed with the cord fully wound upon the pulley, the engine is drawn downward so as to unwind the desired length of the suspending-cord from its pulley, which unwinding of the cord correspondingly contracts or winds up the spring of the suspending-pulley. The weight of the engine should be just about counterbalanced by the effective force of the spring, while the increased power of the spring, due to its winding up or compaction as the engine is drawn down and the cord unwound from the pulley, is compensated for by the increased leverage of the cord upon the pulley as it proceeds toward its larger end. The result is that to whatever extent the suspending-cord is unwound from the pulley the engine will still be merely suspended and its weight counterbalanced, and will remain in its adjusted position until moved by hand. When the dental operation is finished all that is necessary to carry the engine up out of the way is to lift the engine, the removal of the weight of which from the suspending-cord enables the spring to rapidly uncoil and wind up the cord, which then suspends the engine above the chair at the desired height until again drawn down.

The tension of the pulley-spring may be adjusted, when desirable or necessary, by means of the thumb or finger piece B' at the end of the shaft B, which permits the said shaft to

be readily drawn out endwise a distance sufficient to carry the lug or feather *b* of said shaft out of a corresponding groove in the casing C. The shaft is then turned to adjust the spring, and also moved endwise to carry the lug *b* into its groove, which securely locks the shaft from turning. The spring readily yields laterally at its center, where it is connected with the shaft B, to permit the endwise movement of said shaft.

It will readily be perceived by those skilled in the art, from the foregoing description of my improvements, that a superior suspension-engine is produced. It is very simple in its organization. The engine is suspended from a fusee or spring-pulley by means of a single cord. There are no driving belt connections to keep taut and in condition to transmit power by a superweighted hand-piece. The weight of the engine or of the hand-piece does not come upon the hand of the operator to fatigue it and render almost impossible the performance of nice and delicate dental operations. Not only is the great freedom and wide range of movement due to a suspending-cord attained, but the rocking of the engine upon its loop or angle-cord is also permitted to still further increase the freedom of the hand-piece and manipulation of the operating-tool.

I claim herein as my invention—

1. The combination, substantially as hereinbefore set forth, of the counterbalance or spring pulley with the automatically-driven dental engine suspended from said pulley by a cord or chain.

2. The combination, substantially as hereinbefore set forth, of the fusee or spring cone-pulley, the suspending-cord wound upon said pulley, the looped or endless cord at the lower end of the suspending-cord, and the engine connected with said looped cord by eyes, which permit the cord to slip or shift in them as the engine is rocked vertically in operation, whereby great freedom of movement and ease in manipulation is given to the hand-piece and operating-tool of the engine.

In testimony whereof I have hereunto subscribed my name.

ELI T. STARR.

Witnesses:

WM. J. PEYTON,  
NELLIE HOLMES.