2 Sheets—Sheet 1.

W. A. JOHNSTON.

DENTAL ENGINE.

No. 301,722. Patented July 8, 1884.

Fig. 1.

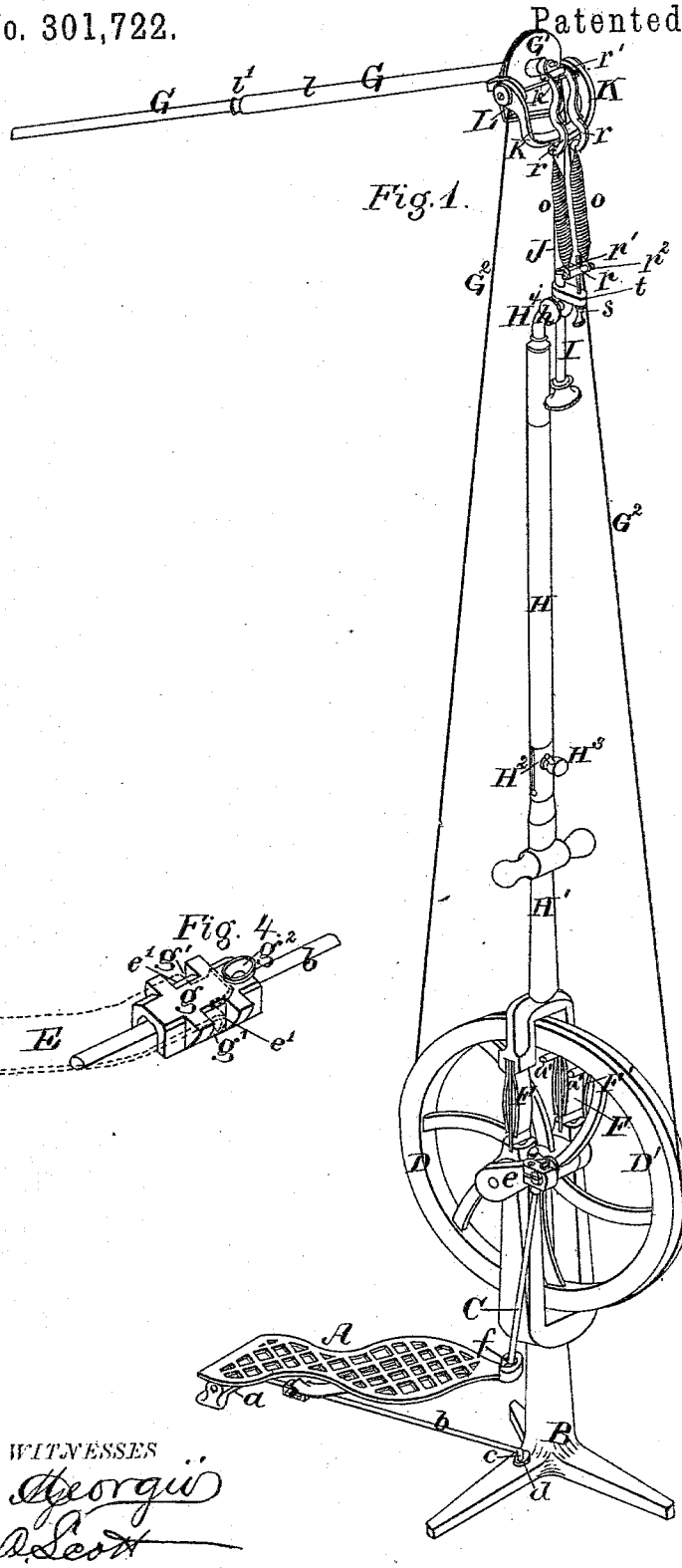

Fig. 4.

WITNESSES

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No. 301,722.

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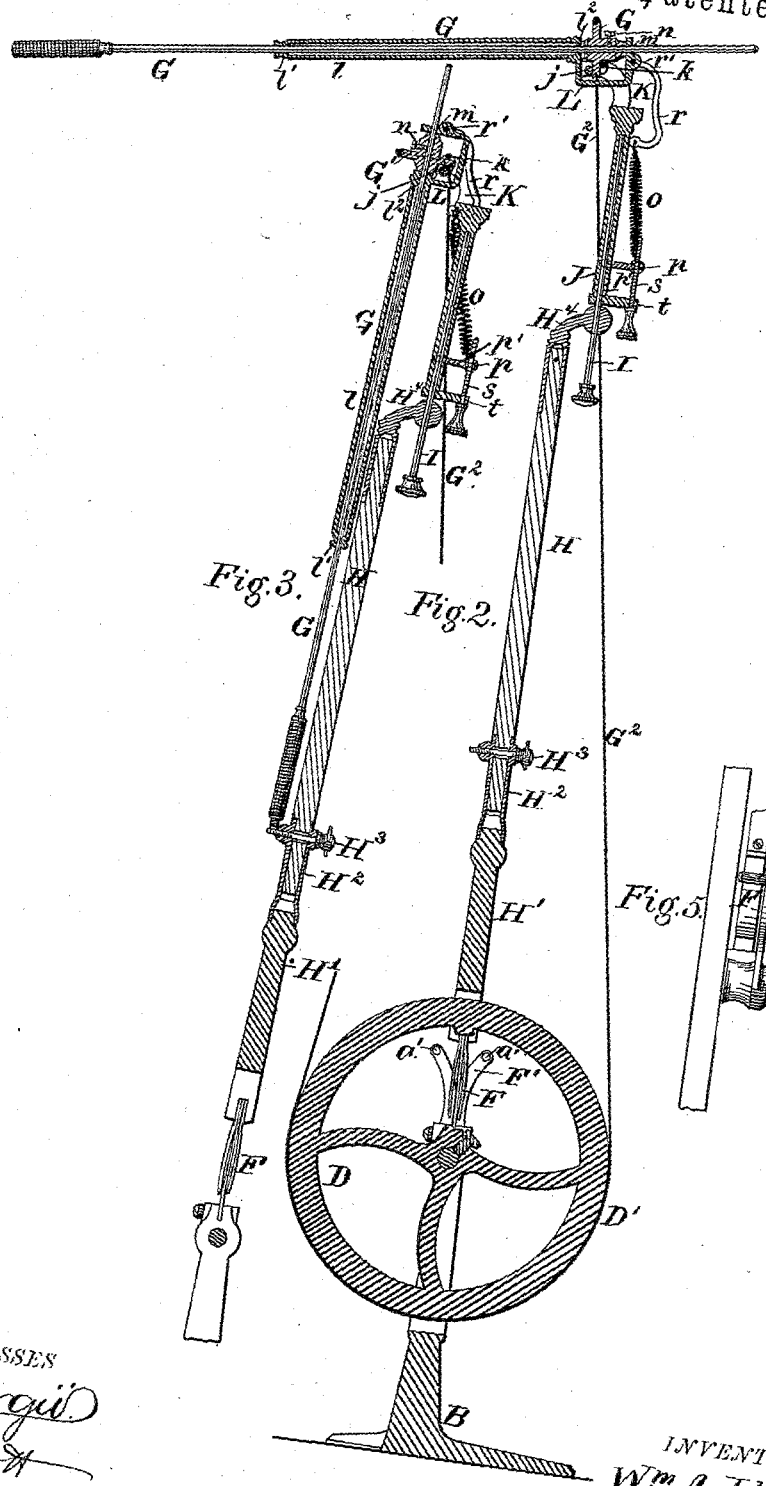

Fig. 3.

Fig. 2.

Fig. 5.

WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM A. JOHNSTON, OF CLIFTON, NEW YORK, ASSIGNOR TO THE S. S. WHITE DENTAL MANUFACTURING COMPANY, OF PHILADELPHIA, PA.

DENTAL ENGINE.

SPECIFICATION forming part of Letters Patent No. 301,722, dated July 8, 1884.

Application filed July 15, 1879.

To all whom it may concern:

Be it known that I, WILLIAM A. JOHNSTON, of Clifton, in the county of Richmond and State of New York, have invented certain new and useful Improvements in Dental Engines, of which the following is a specification.

These improvements are directed to the various parts—such as the standard and the revolving shaft or arm carried by said standard—which go to make up a dental engine or lathe.

The improvements in the standard consist in means, hereinafter described, whereby the stem or main part may be made of wood, (which is to be preferred for many reasons,) and may be readily and tightly connected in a detachable way to the base or lower part of the standard; also, in combining with the standard supporting or connecting springs having a slight set or bend backward, in order to partially or wholly balance the weight of the revolving arm or shaft when the latter is raised to a horizontal position.

The improvements further consist in means whereby the working length of the standard may be varied, and whereby the revolving arm or shaft, when not in use, may be turned or folded down, so as to lie closely alongside of the standard.

They also consist in combining with the revolving arm or shaft counterbalancing-springs, whose tension is adjustable, to regulate their action on the shaft, with a view to counteracting the weight of the same when extended or raised, and also in so combining said springs with said shaft that they shall serve, when the shaft is turned down, to hold it firmly against or alongside of the standard.

The foregoing constitute the more prominent features of these improvements. They and other features of invention can best be explained and understood by reference to the accompanying drawings, in which—

Figure 1 is an isometrical perspective view of a dental engine embodying the invention in its preferred form. Fig. 2 is a vertical central section of the engine with the revolving extension arm or shaft raised. Fig. 3 is a like section of the upper part of the engine above the fly-wheel, with the said arm turned down against or alongside of the standard. Figs. 4 and 5 are views of details which will be referred to in the course of this specification.

The treadle mechanism consists of a treadle, A, jointed to a base-plate, *a*, attached to or forming part of a bar, *b*, which at its forward end is provided with a vertical pivot-pin, *c*, entering a socket, *d*, in the pedestal B of the engine. The pitman-rod C is jointed at one end to the crank *e* of the fly-wheel D, and at its other end is connected by a universal or ball-and-socket joint, *f*, with the treadle. The center of motion of the crank and the joints *d* and *f* are in line, so that the treadle may be swung around in any direction on its pivot *c* and still maintain its proper position with respect to the pitman and crank. The treadle thus far is substantially the same as that of the well-known Morrison engine.

The treadle mechanism contains in addition features, which, while shown in a general way in the drawings, are not, however, here described, inasmuch as I have made them the subject of a separate application for Letters Patent filed by me in the United States Patent Office on or about March 30, 1880. The fly-wheel has its bearings in a yoke formed in the pedestal, as shown, and is straddled by the forked lower part of the standard, which is connected to the pedestal by supporting-springs F. Each leg of the fork is attached to the pedestal-yoke by its own spring F, thus permitting the standard to vibrate or move back and forth to the extent permitted by the flexible or spring connection, which in effect forms a part of the engine standard or upright. In the present instance the springs have a slight set or bend backward, or to the side opposite that on which the extension arm or shaft G is situated. The result of this is that when the arm is turned down against the standard, the latter, owing to the set of the springs, will incline somewhat from the perpendicular and to the rear, as shown in Fig. 3. When, however, the arm is raised, its weight, in its horizontal or nearly horizontal position, will overcome the set or bend of the springs to the extent of bringing the standard to a perpendicular position, as shown in Fig. 2. The effect of this arrangement is that the standard, when the shaft is in operative po-

sition, is perpendicular, the set of the spring counteracting the weight of the extended shaft, and vibrates with ease to each side of that central position. Each spring F, in the present instance, is a compound spring consisting of three leaves—the center one attached at one end to the standard and at the other end to the pedestal, while the outer ones are shorter and are attached only to the standard, their lower ends, which bear against the center spring on opposite sides, being loose and free to move on the center spring when the standard is moved to one side or the other.

To limit the extent to which the springs may bend, a stop-yoke, F′, is provided. This is shown plainly in Fig. 2, and detached in side elevation on an enlarged scale in Fig. 5. It consists of a forked piece provided at its upper end with two laterally-projecting horizontal stop-pins or fingers, a', between which one of the springs, F, may move to an extent determined by the distance between the pins. A stop-yoke may be provided for each spring; but one in practice will be found to suffice.

It is desirable, in order to reduce weight to obtain increased capacity for delicate or nice adjustments, and for other reasons, to make the body of the standard of a light material—such, for instance, as wood—hickory being the preferred kind of wood. This is carried out in the machine shown in the drawings, the body or main length H of the standard being of wood.

To provide a convenient and secure joint between the part H and the metal lower part, H′, of the standard, which will permit them to be readily connected or disconnected, I provide the upper end of the lower part of the standard with a split ferrule, H^2. The lower end of the part H fits in this ferrule, and the two parts, thus fitted together, are clamped tightly by a binding-screw, H^3, which enters the ferrule at one side, screws into a screw-threaded socket or hole in the opposite side of the ferrule, and passes through a hole or slot in the intervening stem of the part H. By tightening the screw the two jaws of the split ferrule are drawn together and clasp the body H, and the two parts are thus clamped together firmly and immovably. On the other hand, if the screw be loosened or removed, the two parts can readily be separated. The standard H at its upper end is provided with a tubular offset, H^4, through which passes the vertical standard-extension I, which may be vertically adjustable in said offset, in order to tighten the belt or vary the working length of the standard, or for other purposes, being held in any required position by the screw h. The standard-extension supports the arm or shaft G and its adjuncts, and constitutes the vertical axis around which the same may turn.

On the standard-extension I is mounted the swivel-sleeve J, whose closed upper end bears upon the top of the part I, and which carries the yoke K, that supports the frame L, (shown detached in Fig. 4,) in which is mounted the extension shaft or arm G and its driving-pulley G′. The frame L is jointed or hinged to the yoke K at the points marked i, the joints being vertically over and in line with the standard H, and also being horizontally in a line which passes through the points at which the driving-belt G^2 leaves the pulley G′. By this arrangement the extension-arm can be turned down without tendency to stretch the belt, the latter, when the arm is in such position, being bent over a bar, j, extending between the sides of the frame at a point corresponding, practically, to the point at which the belt leaves the pulley; and the shaft, when so turned down, is, by reason of the offset arrangement and the situation of the joints, permitted to lie closely alongside of the standard, as shown in Fig. 3. The pulley itself occupies a place in the frame intermediate between the rear brace-bar, k, and the front bar, j, (which also serves as a brace-bar,) and is mounted on the shaft or arm G, which has its bearing in a sleeve, l, on the front of the frame, and extends rearwardly through an aperture, m, in the rear of the frame, which portion of the frame may also constitute a bearing for said shaft. The pulley is fixed to the shaft by a set-screw, n, which can be loosened to permit the shaft to be moved back and forth longitudinally for the purpose of increasing or decreasing its working length. The sleeve may cover more or less of the length of the shaft, as desired, and is provided at its front end with a bearing, l', for the shaft. There is another shaft-bearing, l^2, at the rear.

In order that the arm or shaft, when extended or raised, may be balanced in substantially a horizontal position, while at the same time in condition to vibrate freely above and below that position, springs or their equivalents are employed. The preferred arrangements for this purpose are shown in the drawings. There are two spirally-coiled springs, o, attached at their lower ends to a bar, p, which is provided with a horizontal extension, p', that bears against and partly encircles the swivel-sleeve J. The springs are attached above to curved links r, jointed at their upper ends at r' to the rear of the frame L. These springs thus connected to the pivoted frame L serve to keep it and the shaft which it carries in substantially a horizontal position when the shaft is raised. It is desirable at times to adjust the tension of the springs for this purpose; and to this end an adjusting-screw, s, is provided, which passes through a boss or bearing-piece, t, on the lower part of the standard-extension, and screws up through the bar p. By turning the screw in one direction or the other, the bar p can be raised or lowered, and the tension of the springs correspondingly adjusted. The joints r' are so situated that when the shaft is turned down against the standard the line of tension of the springs—or, in other words, a straight line drawn between r' and the lower point of attachment, p^2, of the springs—

will pass a little to the front of the axis *i* of the frame. Under these conditions the springs, which, when the arm was raised, held it extended, will, now that the arm is turned down, hold it in that position also, keeping it close against the standard.

I have described what I deem to be on the whole the best way of carrying my improvements into practical effect. It is manifest, however, that the construction and arrangement of the apparatus may be varied in many particulars without departure from my invention. I do not, therefore, limit myself to the particular details herein shown and specified; but

What I claim, and desire to secure by Letters Patent, is as follows:

1. A dental-engine standard or upright a portion of whose length consists of a spring or springs arranged and operating to permit that portion of the standard above said spring or springs to bend or incline from the perpendicular, substantially as set forth, whereby the usual pivotal or trunnion connection between the standard and pedestal is dispensed with.

2. The combination, with the pedestal or lower part of a dental engine, of a standard and a spring connection or support, forming in effect a continuation of the standard, and attached to the pedestal at a point in line, or nearly so, with the axis of the fly or driving wheel, substantially as set forth, whereby the usual pivotal or trunnion connection at or near the axis of the fly or driving wheel, to permit the rocking or bending of the standard, is dispensed with, while said standard is free to rock or bend without disturbing the working condition of the driving-belt.

3. The combination, with the standard and the pedestal or lower part of the engine, of an intermediate spring or springs connecting the two, and having a set or bend to the rear, substantially as and for the purpose set forth.

4. The combination, substantially as hereinbefore set forth, of the standard and the spring or springs which connect it to the pedestal, and upon which it rocks or bends, with a yoke or stop by which the movement of the standard is limited.

5. The divided dental-engine standard, in combination with the split ferrule and the binding-screw, substantially as set forth.

6. A dental-engine standard provided at its upper end with an offset, in combination with a standard-extension mounted in or on said offset, and supporting the jointed shaft-carrying frame, substantially as set forth.

7. In combination with the standard proper and its offset, the standard-extension vertically adjustable in said offset, substantially as set forth.

8. The adjustable standard-extension, in combination with the swivel-sleeve and yoke, substantially as set forth.

9. The standard proper and the offset standard-extension, in combination with the tool-shaft, and the shaft-carrying frame jointed to its support vertically over or above the standard, whereby the shaft, when turned down, may lie closely against or alongside the standard.

10. The combination, with the upright or standard of a dental engine, of the rocking-shaft-carrying frame, the driven shaft thereof, the pivots of said frame which permit the driven shaft to be brought down so as to lie close to and parallel with said standard, and one or more springs to maintain the driven shaft in a substantially horizontal position when raised to its operative position, while permitting it to be freely vibrated in the manipulation of the engine, substantially as described.

11. The combination, with the standard of a dental engine, of the shaft-carrying frame, the driven shaft thereof, the hinge or pivots of said frame which permit the driven shaft to be brought down parallel with said standard, and to be raised so as to bring said shaft to a substantially horizontal position, and the spring or springs which maintain said shaft in either its substantially horizontal operative position or when folded down out of the way, substantially as described.

12. The combination of the pedestal, the rocking standard, the rocking-shaft-carrying frame at the upper end of said standard, and independent controlling-springs for said standard and said shaft-carrying frame, substantially as described.

13. The combination, with the shaft and the hinged shaft-carrying frame, of a counterbalancing spring or springs for holding in horizontal position the raised or extended shaft, and means for adjusting the tension of said springs, substantially as set forth.

14. The combination, with the standard-extension, the swivel-sleeve and yoke, and the hinged shaft-carrying frame, of the counterbalancing-springs, the links connecting the same with the frame, the adjustable bar, and its adjusting-screw, substantially as set forth.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WM. A. JOHNSTON.

Witnesses:
E. M. WHITE,
IRVING E. BOND.