(Model.) 2 Sheets—Sheet 1.

E. T. STARR.

Dental Engine.

No. 233,294. Patented Oct. 12, 1880.

Fig. 1.

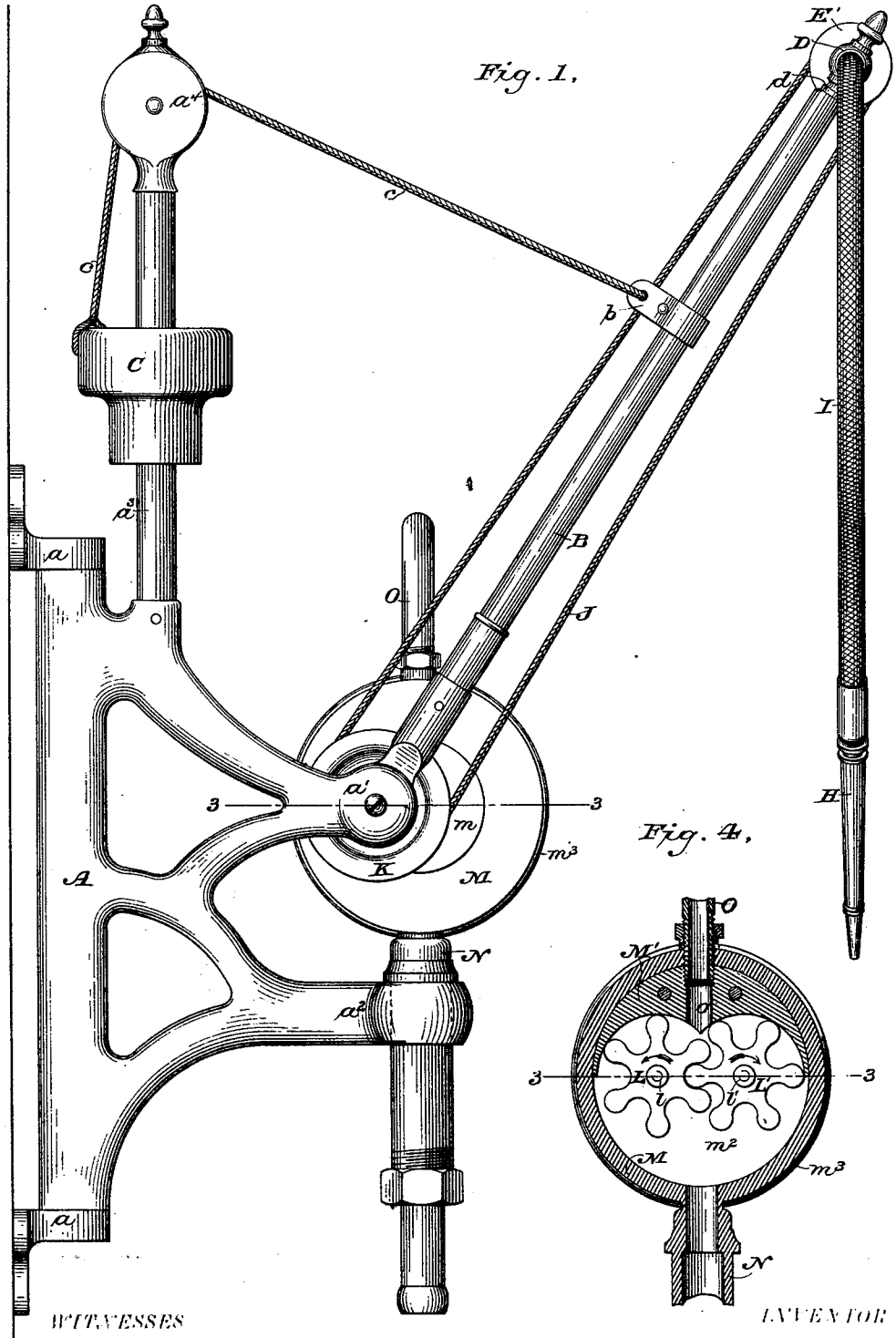


Fig. 4.

WITNESSES

Wm. A. Skinkle

Geo. W. Beck.

INVENTOR

Eli T. Starr,

By his Attorneys

Baldwin, Hopkins, & Peyton.

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

(Model.)

2 Sheets—Sheet 2.

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Dental Engine.

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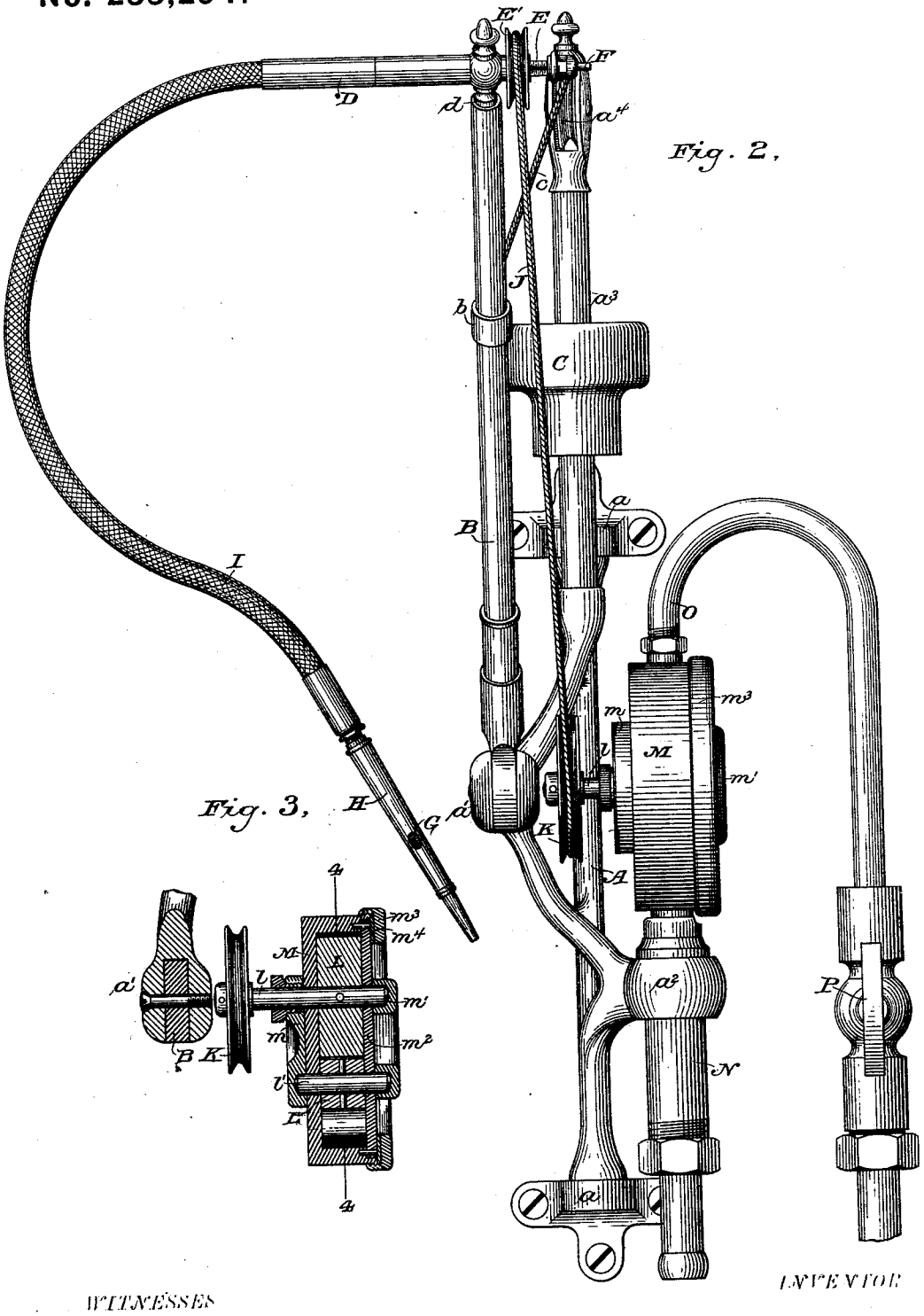


Fig. 2.

Fig. 3.

WITNESSES

Wm A. Skinkle

Geo W. Breck

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N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ELI T. STARR, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO JAMES W. WHITE, J. CLARENCE WHITE, AND H. M. LEWIS, OF SAME PLACE, AS TRUSTEES, UNDER THE WILL OF SAMUEL S. WHITE, DECEASED.

DENTAL ENGINE.

SPECIFICATION forming part of Letters Patent No. 233,294, dated October 12, 1880.

Application filed July 10, 1880. (Model.)

To all whom it may concern:

Be it known that I, ELI T. STARR, a citizen of the United States, 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 more particularly to dental engines of the class which embody as a motor an engine or wheel driven by a column of water from the usual service-pipes of a street-main. Such engines are exemplified in the reissued Letters Patent granted to W. W. Evans October 5, 1875, as No. 6,677, and in original Letters Patent granted to S. D. Engle, November 2, 1875, as No. 169,345, and to said Evans, November 2, 1875, as Nos. 169,346 and 169,347.

The object of my invention is to provide a dental engine having a wide range of movement, so as to enable the operating-tool, which is driven by a rotary tool-holder turning in bearings in a hand-piece casing, to be moved freely about and directed at the angle or point desired without interruption to the transmission of the driving-power, while avoiding the employment of a motor, such as a foot-treadle operated by the exertions of the operator or dentist.

My invention constitutes more especially an improvement upon the engine shown in the aforesaid Letters Patent No. 169,346, and consists of certain new combinations and organizations of devices, which are recited at the close of the specification.

In the accompanying drawings, which show my improvements as embodied in the best way now known to me, Figure 1 is a side elevation of the engine in condition for work. Fig. 2 is a front elevation thereof, showing clearly the feed or induction and the exit or waste pipes which supply water to the motor to drive it and permit the escape of the waste or spent fluid. Fig. 3 is a horizontal section, through the motor and the rocking joint, of the engine-arm on the line 3 3 of Fig. 1, showing the axes of the driving-pulley and engine-arm to be in line; and Fig. 4 is a vertical section through the motor on the line 4 4 of Fig. 3, to show more clearly the construction of the interior of the motor.

A back plate, bracket, or crane, A, is pivoted to swing horizontally in suitable bearings *a a*, fastened to the wall of the operating-room or to some other support. Said bracket A is provided with two arms, a' a^2, preferably, the bracket being represented as of skeleton form. The arm a' is forked, preferably, for the reception of the inner or lower end of an engine-standard, B. Said engine-standard is pivoted in the forks of the arm a', so as to be capable of rocking vertically freely, and inasmuch as the bracket to which the engine-standard is jointed is free to swing horizontally, the engine-standard has a wide range of movement. The engine-standard, when rocked downward, is automatically returned to a normal position by a weight, C, sliding vertically on an upright post, a^3, of the bracket A, and connected with said standard by a cord, *c*, one end of which is fastened to the weight and the other to a clip, *b*, on the standard, the cord passing over a pulley, a^4, on the upper end of the aforesaid post a^3 on its way from the weight to the standard.

Instead of the standard being returned to its normal position when the deflecting or rocking strain is removed, it may be counterbalanced merely, or be fixed positively at the angle of inclination desired, by means of any well-known and suitable device.

The upper end of the engine-standard is tubular, and is fitted with a pivotal shank, *d*, of a pulley-head or lateral arm, D, so that said lateral arm may turn freely on the standard. Said lateral arm is tubular, in this instance, and affords bearing for a tubular spindle, E, on which a pulley, E′, is keyed, so as to revolve said spindle. A flexible power-conveyer or torsion-shaft, F, is passed into or extended through said tubular spindle E, and is clamped or secured therein, so as to be driven by the spindle. The opposite or outer end of said flexible shaft is connected with the butt-end of a spindle tool-holder or chuck, G, so as to give said tool-holder a rapid revolving motion in its bearings in a hand-piece casing, H,

of any suitable or well-known construction, said hand-piece being grasped by the hand and movable freely about to operate with the tool inserted in and driven by the tool-holder at any desired point. Inasmuch as the shaft which drives the tool-holder is flexible, the tool may be turned and operated in all directions without interrupting the transmission of the driving-power. The hand-piece casing H and the tubular lateral arm or engine-head D are connected, in this example, by a flexible tube or sheath, I, which envelops the flexible driving-shaft to protect it. Said flexible shaft and flexible enveloping-sheath may be of the usual construction, and are preferably substantially the same as those shown in the Stow reissue of March 4, 1879, and as used with the well-known S. S. White dental engine, and therefore need not be particularly shown or elaborately described herein.

The hand-piece of the engine may be like those in common use adapted for a flexible shaft, and it, too, need not be shown or described in detail.

Instead of the lateral arm or engine-head D possessing the capacity of turning on the engine-standard only, it may be connected to said standard by crosswise pivotal connections, so that it may both turn around said standard and rock thereon.

Motion is communicated to the pulley E′, which is usually called the "driven pulley," by a belt-connection, J, passing from the driving-pulley K of the engine, the axis of which pulley K is in line with the axis of the pivot or joint around which the engine-standard B vibrates or rocks vertically, so as to avoid disturbance in the proper relation of the belt-connection to the pulleys when the standard is rocked or vibrated.

The driving-pulley K is keyed or fixed to the shaft *l* of one of two water-wheels, L L′, which are mounted in the casing M of the motor, and said motor, by the escape or waste pipe N, in this example, is mounted on the bracket A, so as to partake of its movements, said pipe N being passed through a vertical socket or opening in the arm a^2 of the bracket, a collar or annular shoulder, *n*, on the said pipe resting upon or fitting the walls of said socket, to limit the downward movement of the pipe.

The two water-wheels L L′ are alike in construction, and have their shafts or journals upon which they turn arranged in the same horizontal plane across the center of the casing, the shaft *l* of the wheel L being extended through the casing at one side and through an external ring or plate, *m*, on said casing for the reception of the driving-pulley, so as to revolve it. The end of the shaft *l*, which is extended through the casing and external plate, *m*, is suitably packed or bushed to prevent leakage, while the opposite end of said shaft is seated in an outwardly-closed socket in an external plate or ring, *m′*, on the side of the casing M opposite that to which the plate *m* is attached. The ends of the shaft *l′* of the wheel L′ are also passed through the flat sides of the casing M, and fitted in sockets in said plates *m m′*. By this method of fitting the ends of the shafts of the wheels in the external plates leakage is prevented, while firm bearings are obtained.

One of the side plates, m^2, constituting part of the motor-casing, is detachable, as shown in Fig. 3, and is held in place by being fitted in an annular seat in the edge of the circular rim of the casing, and clamped by a flanged screw-cap, m^3, a suitable packing-ring or gasket, m^4, being interposed between the cap and casing to insure a tight joint.

The wheels L L′ are provided on their peripheries with ribs and grooves, and interlock at one side, as clearly shown in Figs. 3 and 4. Above said wheels, inside the casing M, is a hood or plate, M′, having concave seats formed in its lower edge for the close fitting of the wheels, the flat sides of which wheels fit snugly the sides of the casing M.

The inlet-pipe O is at the top of the motor, and communicates with a feed-opening, *o*, passing centrally through the hood M′, the said inlet-pipe being bent over and extended downward a short distance, and connected with a hose or flexible pipe leading from the spigot of the service-pipe or from the water-supply, whereby, as the outlet or escape pipe, which is at the bottom of the motor, is likewise connected by a flexible pipe with the waste-pipe, the bracket may be freely moved horizontally while the motor is at work without interfering with the passage of the fluid to the wheels.

A stop-cock, P, is fitted in the inlet-pipe near the motor, so as to be within convenient reach of the operator at all times and enable him to have complete control and stop or start the engine at pleasure.

The operation of the engine is as follows: The cock is opened and the column of water passes into the feed-pipe O and through the feed-opening *o*, and strikes directly against the ribs of the wheels L L′, being thrown out laterally and turning the wheels in opposite directions, as indicated by the arrows thereon, the water flowing out in the direction of rotation of the wheels into the chamber formed below them, from which chamber it passes or escapes through the outlet-pipe N into the waste-pipe, and is conducted off, so as not to afford obstruction to the revolution of the wheels. The wheel L, as it is revolved by the water-column, turns the driving-pulley K, and the motion of said pulley is communicated by the belt-connection J to the driven pulley E′ and flexible shaft which drives the tool-holder and operating-tool.

The capacity of the engine-standard B and swinging bracket A has already been mentioned.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, of the horizontally-swinging

bracket or crane-plate, the vertically-rocking engine-standard, carried by said bracket, and the motor, also carried by said bracket, so as to partake of its movements.

2. The combination, substantially as herein-before set forth, of the horizontally-swinging bracket, the engine-standard rocking thereon, the driven pulley of said standard, the flexible shaft rotated by said pulley, and the motor mounted upon said bracket, so as to partake of its movements and drive the said pulley.

3. The combination, substantially as herein-before set forth, of the horizontally-movable bracket, the engine-standard rocking thereon, the device to return said standard to its normal position when the deflecting strain is removed, the driven pulley of said standard, the flexible shaft rotated by said pulley, the tool-holder rotated by said shaft, the motor mounted upon the bracket, so as to partake of its movements, the driving-pulley of the motor, and the belt-connection between the driving and driven pulleys.

In testimony whereof I have hereunto subscribed my name.

ELI T. STARR.

Witnesses:

GEORGE P. MORGAN,

WILLIAM H. GILBERT.