S. D. ENGLE.

DENTAL-ENGINE.

No. 169,345. Patented Nov. 2, 1875.

Fig. 1.

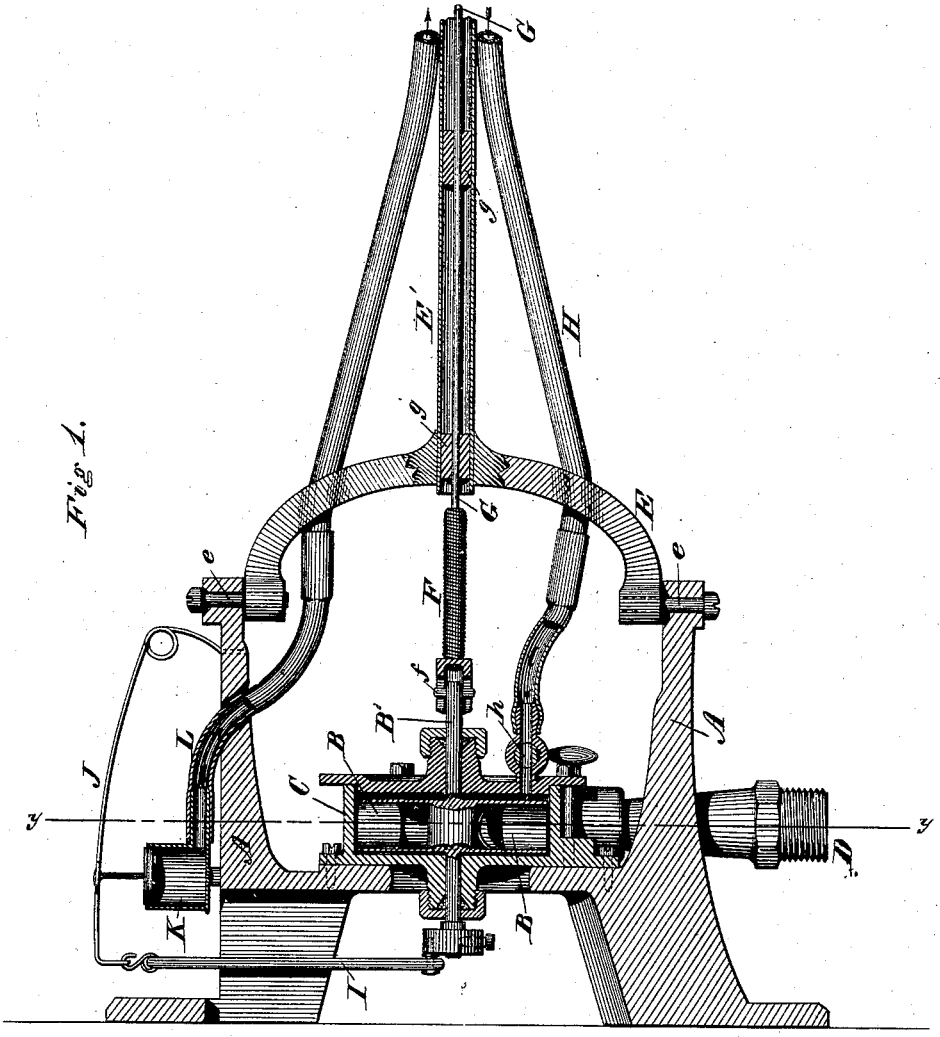
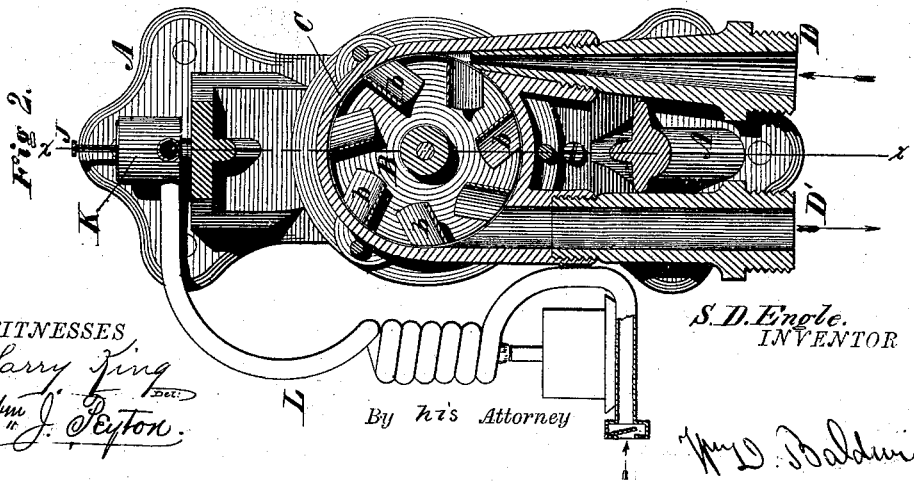


Fig. 2.



WITNESSES

Harry King

Wm. J. Peyton.

S. D. Engle.
INVENTOR

By his Attorney

Wm D. Baldwin

UNITED STATES PATENT OFFICE.

STEPHEN D. ENGLE, OF HAZLETON, ASSIGNOR TO SAMUEL STOCKTON WHITE, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN DENTAL ENGINES.

Specification forming part of Letters Patent No. **169,345**, dated November 2, 1875; application filed July 6, 1875.

To all whom it may concern:

Be it known that I, STEPHEN D. ENGLE, of Hazleton, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Dental Engines, of which the following is a specification:

My invention relates to a water-motor of that class more especially designed for driving dental engines, and for other analogous purposes, requiring high speed and small power.

The objects of the first part of my invention are, to secure great freedom of movement in the operating-tool while driving it from an engine or motor firmly fixed in position, which ends I attain by mounting the driven shaft, or that which imparts motion to the tool, in bearings in a rocking frame pivoted to the engine-frame, and connecting said shaft and that of the motor by a flexible joint.

I do not, however, broadly claim the combination of a water-motor and a flexible shaft, as such combination is shown in the patent of W. W. Evans, dated June 2, 1874.

The object of the next part of my invention is to remove dust, chips, or moisture from the point at which the tool is operating, which end I attain by combining with the motor an operating-tool and an exhaust apparatus suitably arranged for this purpose.

The object of the next part of my invention is to apply a jet of air or liquid at or near the point upon which the tool is operating, which I do by combining with the motor and operating-tool a pump and connecting-pipe to eject the fluid at the point desired.

The object of the next part of my invention is to supply liquid to the substance upon which the tool is operating, and simultaneously to remove the liquid thus supplied, together with dust, chips, or borings of the tool, which ends I attain by combining with a motor and its operating-shaft an ejector-pump and an exhaust apparatus.

The object of the next part of my invention is to regulate the temperature of the fluid ejected, as above set forth, which end I attain by combining with the motor a coil of pipe or other equivalent apparatus and a lamp or other apparatus, for heating or cooling the fluid passing through the pump.

The object of the next part of my invention is to prevent the trembling of the driven shaft, which end I attain by mounting the shaft in bearings of rubber or other equivalent elastic material in a tube supported upon the rocking frame of the engine.

The object of the next part of my invention is to increase the efficiency of the driving-wheel itself, which end I attain by combining with the frame of the motor a percussion-wheel, revolving in a tight case, a tapering injection-nozzle, delivering the water tangentially upon the wheel, and a tangential discharge-pipe, which insures the discharge of the water without choking.

The subject-matter claimed will hereinafter specifically be designated.

The accompanying drawings show all my improvements as embodied in a single apparatus in the best way now known to me; obviously, however, some of the parts may be used without the others, and in machines differing somewhat in the details of their construction from those of the one herein shown and described.

Figure 1 represents a vertical transverse section through the apparatus on the line *x x* of Fig. 2, and Fig. 2 represents a horizontal transverse section therethrough on the line *y y* of Fig. 1.

The mechanism is mounted in a strong frame or bracket, A, preferably of metal, adapted to be secured firmly in position by screws, or other well-known fastenings, upon the floor or wall, an operating-chair, an operator's table, or a work-bench. A percussion water-wheel, B, provided, by preference, with buckets *b*, of the form shown in the drawings, is mounted, in suitable bearings, in a tight case, C, firmly bolted to, or forming part of, the frame. The shaft B′ of the wheel projects through the casing at each side, the bearings of the shaft being securely packed to prevent leakage. The induction-pipe D tapers gradually toward the wheel, its nozzle being made square at the end and directed slightly inward, so as to cause the water to impinge with its full force and in a solid stream against the bucket before striking the casing. After passing around about two-thirds of the circumference of the

wheel the water is discharged through the exit-pipe D′, parallel, or nearly so, with the induction-pipe, but tangential to the wheel. This pipe, it will be observed, is larger than the induction-pipe, so as to prevent back-water.

A bail, E, rocking in trunnions *e* on the frame A, supports a frame, made, by preference, in the form of a tube, E′, of any desired length. The driven shaft G of the engine turns in bearings or boxes *g* of rubber, papier-maché, vulcanized fiber, or other well-known material possessing sufficient firmness and elasticity, and arranged at short intervals within the tube. The shaft is thus prevented from trembling. The lower end of this shaft G is connected with a flexible wire-coil shaft, F, of well-known construction, which latter is connected by a slip-coupling, *f*, with the shaft B′ of the water-wheel. By this mode of connection the shaft F can be turned at various angles to its driving-shaft without interrupting the transmission of the driving-power. A swinging joint or flexible driving-shaft may be used at the opposite end of the shaft G, the operating-tool being mounted in a suitable hand-piece connected with said post or shaft, as is common in dental engines. To remove moisture, chips, or dust from the point at which the operation is being performed, I employ a pipe, H, having a suitable mouth, and passing through the rocking bail E to the casings of the motor, and provided with a suitable stop-cock or valve, *h*. The main portion of this pipe is, by preference, made rigid, but that part between the bail and water-wheel is made flexible, in order to accommodate itself to the movements of the other parts. By this means the vacuum produced by the motion of the wheel creates a steady exhaust or draft through the pipe H, sufficient to draw off saliva from the mouth of the patient, or even fine borings or filings. A similar pipe, L, provided with a suitable nozzle, is arranged near the point of operation, to discharge a jet of air or liquid at the point being operated upon. This pipe, like the other, H, is secured to the bail, and is made flexible between the bail and the motor, so as to conform to the movements of the operating-tool, and is connected with the cylinder K of a pump. In this instance, the piston of the pump is shown as connected with a spring-arm, J, operated by a crank and pitman, I, from the shaft of the water-wheel; but other well-known forms of pumps may be used with good effect, such, for instance, as a rotary pump attached directly to the shaft of the water-wheel, or driven therefrom by a belt and pulley. To heat the fluid, a lamp or gas-jet may be applied to the coils of the pipe L, as shown in Fig. 2, or the fluid could be cooled by employing a refrigerating mixture instead of a heater.

I am thus enabled, by my improvements, to secure a simple and effective motor, to impart a wide range of motion to the tool, and to combine in one engine an operative instrument, a device for removing from the point operated upon moisture or the filings produced by the instruments, and at the same time to apply, in regulated quantities, a jet or stream of air, gas, or liquid of any desired temperature.

I claim—

1. The combination of the frame, the water-wheel mounted therein, the rocking bail pivoted on the frame, the tubular shaft-supporting frame mounted on the bail, the driven shaft mounted in bearings in said tubular frame, and a flexible shaft connecting the water-wheel and driven shafts, these members being constructed and operating in combination substantially as hereinbefore set forth.

2. The combination, substantially as hereinbefore set forth, of the water-motor, the driven shaft by which the tool is operated, and the exhaust apparatus for removing moisture, filings, &c., from the point of operation.

3. The combination, substantially as hereinbefore set forth, of the water-motor, the shaft for operating the tool, and the pump for discharging air or fluid at the point of operation.

4. The dental engine hereinbefore set forth, consisting of the combination of the water-motor, the operating-shaft, the ejector-pump, and the exhaust apparatus.

5. The combination, substantially as hereinbefore set forth, with the pump, of the apparatus for varying the temperature of the fluid ejected by it.

6. The combination, substantially as hereinbefore set forth, of the tube, the bearings of elastic material arranged at short intervals therein, and the driven shaft.

7. In a dental engine, the combination of the frame, the casing, the percussion-wheel, the tapering injection-pipe, and the discharge-pipe, both arranged tangentially to the wheel, as and for the purposes set forth.

In testimony whereof I have hereunto subscribed my name.

STEPHEN D. ENGLE.

Witnesses:

ERASTUS S. DOUD,

EDWARD F. STRAU.