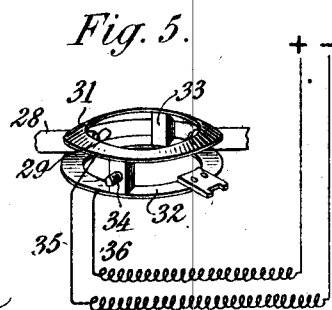
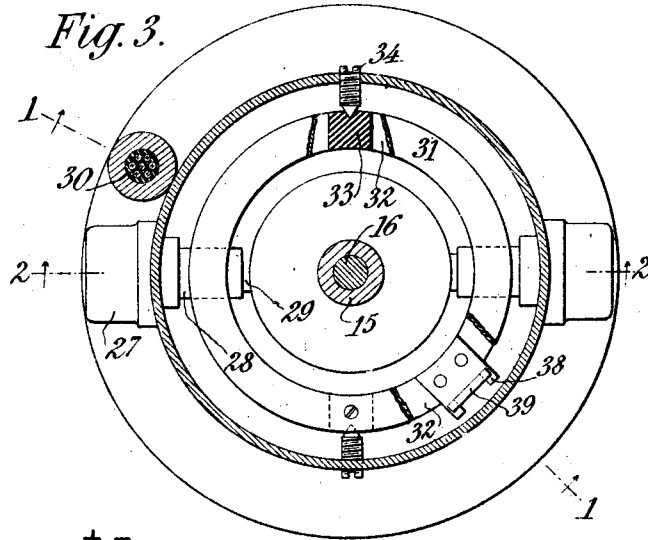
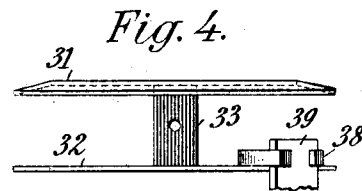
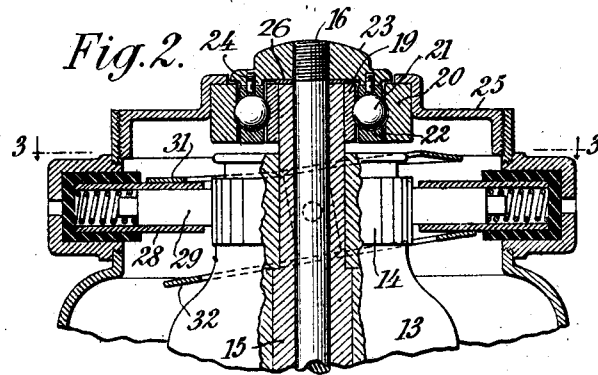
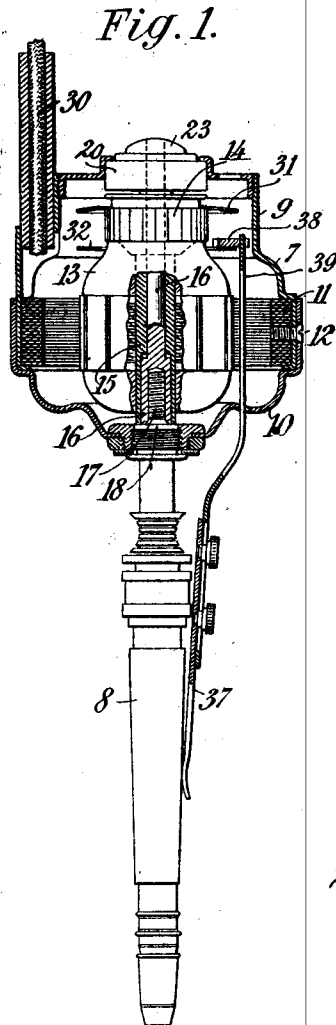


W. G. SHELTON.
DENTAL HAND ENGINE.
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1,201,365.

Patented Oct. 17, 1916.



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UNITED STATES PATENT OFFICE.

WILLIAM GENTRY SHELTON, OF NEW YORK, N. Y.

DENTAL HAND-ENGINE.

1,201,365.

Specification of Letters Patent.

Patented Oct. 17, 1916.

Application filed April 4, 1914. Serial No. 829,456.

To all whom it may concern:

Be it known that I, WILLIAM GENTRY SHELTON, a citizen of the United States of America, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Dental Hand-Engines, of which the following is a specification.

This invention relates to dental hand-engines and has for an object to provide a compact and well balanced hand tool having an electric motor within it and which rests securely in the hand of the operator, and which the hand can hold comfortably and at the same time control with dexterity. Among the improved features embodied in this engine is a combined radial and thrust ball bearing for both shafts, both shafts extending to the back of the engine, one of which is mounted within the other and the transmission reducing gearing being disposed at the rear, the two shafts in the present illustration being the armature shaft and the tool spindle. A single row or set of balls affords the plurality of mentioned functions, radial and thrust bearing for the armature shaft and tool spindle, and in addition to this serving as a transmission gear preferably of the reduction type between the said shaft and spindle.

The invention also embodies a normally open reversing switch for the electric motor, such switch being capable upon the release of the finger piece by the operator of bringing the motor to rest. Upon engaging the finger piece the operator can start the motor in either direction. The motor being at rest there are open to the operator two conditions of motor action,—forward drive and reverse, and he can bring about either independently of the other. This reversing switch or circuit closer, or in its function of bringing the motor to rest when the finger piece is released or the engine laid aside by the operator, a circuit breaker, is located at the rear of the engine. The switch is shown made up annular in form and surrounding the commutator, which is also located at the rear of the engine. The pair of rings constituting the switch are spaced apart by suitable insulation blocks which act as trunnions and between such rings are disposed the brushes, one of the rings being resilient and of such form and location relatively to the brushes that it normally engages both brushes and holds its companion ring out

of engagement with both brushes. The switch is shown controlled by a finger piece extending forwardly of the motor housing and having a portion disposed along the dental hand-piece which is shown of conventional construction and in position for the engagement of the finger of the hand supporting the engine.

An illustrative embodiment of the invention is shown in the drawings.

Figure 1 is a view partly in elevation and partly in central longitudinal section, the plane of such section being indicated by the line 1—1 in Fig. 3. Fig. 2 is an enlarged section of the rear of the device, the plane of such section being indicated by the line 2—2 in Fig. 3. Fig. 3 is partly a rear elevation and partly a section, taken transversely, the plane of such section being indicated by the line 3—3, Fig. 2. Fig. 4 is a detail of the switch disassembled from the structure; and Fig. 5 is a perspective view of the switch and brushes on the scale of Fig. 1, this view illustrating diagrammatically the circuit.

There is illustrated an engine or motor-casing 7 of convenient form to be held in the hand of the operator. Such casing carries a dental hand-piece 8 illustrated of conventional form. The shape and dimensions of the casing and the parts inclosed therein are such that the operator may hold the tool with facility and perform his operations with delicate dexterity. The motor is of light construction and wound and constructed for high speed, a speed in excess of that which is available for dental operations. The casing is shown formed in two parts, 9 and 10, overlapping at the central portion and provided with a recess for engaging the field windings and housing the same, such windings being indicated by the reference character 11. A single fastening device for holding together the casing sections 9 and 10 and holding to these the windings is illustrated in the form of a screw 12. The armature 13 carried within the housing or casing is shown provided at its rear end with a commutator ring 14. The armature shaft 15 is shown of hollow or sleeve-like construction through which extends the driven shaft or spindle 16, which portion 16 is shown having screw-threaded connection with the tool spindle 17 which extends through the dental hand-piece which is at the front of the engine.

The front end of the armature shaft and the front end of the driven spindle 16 are shown provided with a thrust bearing 18.

The practicability of this hand tool resides largely in the fact that the transmission gearings constitute a radial and thrust bearing for the driving and driven spindles and is located at the rear of the engine casing. The transmission gearing is formed after the analogy of a self-contained ball bearing comprising a single set or series of balls. The inner bearing member or ring of the ball bearing and transmission gear is illustrated at 19, and is shown secured to the armature shaft by means of a driven fit. The outer bearing member or ring is illustrated at 20, between which rings there is shown a single series or set of balls 21. Each of the rings 19 and 20 is provided with a groove constituting the track for the set of balls. The balls are shown mounted in a suitable cage 22. The driven spindle 16 is shown extended rearwardly of the casing and there provided with a clutch 23 for engaging the cage member 22. In the present illustration the clutch is provided with a series of pins 24 entering suitable sockets or recesses in the cage.

The back closure for the casing is illustrated at 25 and is shown having a screw-threaded connection with a rearward flange of the casing or housing member 9. The back closure is provided with a socket for housing the ring 20 and has sufficient resiliency to hold such ring against rotation. By adjusting the back closure forwardly or backwardly upon its screw-thread, the amount of pressure of the balls upon the respective rings is adjusted, thereby controlling the amount of slippage.

The transmission gearing constitutes not only a transmission device but also, as it is stated above, a bearing for supporting both the driving and driven spindles or shafts at the rear end of the motor or engine-casing. In some instances it will be desirable to place a washer 26 between the clutch 23 and the ring 19.

Brush holding caps 27 are shown having screw-threaded connections with the housing member 9. Within each of these caps and suitably insulated therefrom is a metallic brush holder 28, in which the brush 29 is mounted and elastically pressed against the commutator. The current for operating the motor is preferably led in by means of a cable 30 at the portion of the housing which will be the normal lower position when the tool is in the hand of the operator.

The brush-holders in the switch herein illustrated constitute the contact points co-operating with the contact points of the movable member of the switch. Such movable switch member is shown comprising two rings 31 and 32 mounted upon a pair of

trunnion blocks 33 which are supported by suitable screws in the form of pivots 34 carried by the housing member 9. These blocks and pivot screws are shown quartering with the brushes. The relative location and form of the rings and brush-holders is such that the resiliency of the ring 31 will normally hold such ring in engagement with both brush-holders and at the same time will hold its companion ring 32 out of engagement with both brush holders. The wires 35 and 36 are shown connected to the respective rings 31 and 32. It will thus be seen that the normal position of the switch is open and that if rocked in either direction sufficiently to bring one side of the ring 31 out of engagement with one of the brush-holders the same side of the other ring will be brought into engagement with the other brush-holder.

As before stated, the commutator ring, the brush-holders and the switch are located at the back of the engine and are located adjacent the transmission gearing. A suitable finger-piece 37 is shown extending forwardly of the device and along the dental hand-piece in position for the engagement of the finger of the hand holding the tool. This finger-piece projects backwardly through the casing past the field-windings and armature and into position to be connected to the movable portion of the switch. The connection afforded is shown in the form of a block 38 of insulation material suitably secured to the ring 32 and having a pair of upstanding fingers engaging notches in the end 39 of the finger-piece. By this means the movable member of the switch may be moved either forwardly or backwardly from its normal position of rest for causing the motor and through it the driven spindle by means of the transmission gearing to rotate in the desired direction.

Although the foregoing description embodies certain statements as to the operation of the device, the operation as a whole will be briefly described. Assuming that the cable 31 is connected with some suitable source of electrical supply and that the parts are in the position illustrated in Fig. 1, the operator will take the tool in his hand and place his finger upon the finger-piece 37. It is now in his power to start the rotation of the tool spindle at full speed in either direction from a position of rest which is effected by moving the finger-piece either forwardly or backwardly as the case may be. A backward movement of the finger-piece will bring the movable switch members into the position illustrated in Fig. 2, wherein the ring 31 is engaged with one of the brush-holders and the ring 32 is engaged with the other brush-holder, whereupon the armature will revolve and transmit by means of the ring 19 and balls 21 rotation to the cage

member 22 and through the clutch 23 to the driven spindle 16 which as was before stated is a continuation of the tool spindle which passes from its point of engagement with the transmission gearing at the rear of the engine to the front thereof. By holding the ring 20 from rotation the cage member 22 is driven or rotated at a reduced rate of speed and the otherwise too high velocity of the motor is reduced to a workable speed. The required power is had by providing a very high speed light-weight motor and gearing this down to the workable speed.

It will be apparent that the illustrated example of the invention is a practicable embodiment thereof suitable for certain classes of work and that changes of construction may be made within the terms of the claims without departing from the spirit of the invention.

What I claim is:—

1. In a dental engine hand tool, the combination with a casing and a motor therein, of a dental hand piece carried by the front of the casing at one side of the motor, the motor being arranged adjacent the hand-piece, an armature shaft and a tool spindle mounted one within the other and extending to the back of the casing at the other side of the motor, and a ball bearing carried by the back of the casing and having one member attached to the shaft, the spindle being connected to another member of such ball bearing, whereby the said ball bearing supports the motor and affords a reduction transmission mechanism between the shaft and spindle, said transmission mechanism being of light weight relatively to the weight of the motor.

2. In a dental engine hand tool, the combination with a casing and a motor therein, of a dental hand piece carried by the front of the casing at one side of the motor, the motor being arranged adjacent the hand-piece, an armature shaft and a tool spindle mounted one within the other and extending to the back of the casing at the other side of the motor, and a combined radial and thrust ball bearing carried by the back of the casing and having one member attached to the shaft, the spindle being connected to another member of such ball bearing, whereby the said ball bearing supports the motor and affords a reduction transmission mechanism between the shaft and spindle, said transmission mechanism being of light weight relatively to the weight of the motor.

3. In a dental engine hand tool, the combination with a casing and a motor therein, of a dental hand piece carried by the front of the casing at one side of the motor, the motor being arranged adjacent the hand-piece, an armature shaft and a tool spindle mounted one within the other and extending to the back of the casing at the other side of

the motor, and a reduction transmission between the shaft and spindle and comprising a ball bearing carried by the back of the casing, means for preventing the rotation of one member of such ball bearing, another member of the ball bearing being attached to the shaft, and the spindle being connected to a third member of such ball bearing, whereby the said ball bearing supports the motor and affords a reduction transmission mechanism between the shaft and spindle, the said transmission mechanism being of light weight relatively to the weight of the motor.

4. In a dental hand-engine, the combination with a dental hand piece, of a motor casing carried thereby, an armature mounted within the casing and provided with a commutator ring at the side opposite the hand-piece, a switch at the same side of the armature, and a switch actuator extending from such switch forwardly and along the dental hand-piece.

5. In a dental hand-engine, the combination with a dental hand piece, of a motor casing carried thereby, an armature mounted within the casing and provided with a commutator ring at the side opposite the hand piece, a reversing switch at the same side of the armature, and a switch actuator extending from such switch forwardly to the other side of the armature.

6. In a dental hand-engine, the combination with a motor casing of a dental hand-piece carried by the front side thereof, an armature mounted in said casing and provided at the rear with a commutator ring, brush-holders mounted in the casing adjacent said armature ring, and a switch in the form of a pair of rings surrounding said armature ring and located upon the respective sides of the brushes.

7. In a dental hand-engine, the combination with a motor casing of a dental hand-piece carried by the front side thereof, an armature mounted in said casing and provided at the rear with a commutator ring, brush-holders mounted in the casing adjacent said armature ring, and a switch in the form of a pair of rings surrounding said armature ring and located upon the respective sides of the brush-holders, one of said rings being resilient and normally bearing against said brush-holders and adapted to maintain the other ring out of engagement with both brushes, and means for flexing said resilient ring for placing one ring into engagement with one brush-holder and the other ring into engagement with the other brush-holder.

8. In a device of the character specified, the combination with a commutator ring of a switch therefor, comprising a pair of brush-holders and a pair of rings surrounding the commutator ring and located upon the re-

spective sides of the brush-holders, one of said switch rings being resilient and normally bearing against said brush-holders and adapted to maintain the other ring out of engagement with both brushes, and means for flexing said resilient ring for placing one ring into engagement with one brush-holder and the other ring into engagement with the other brush-holder.

10 9. In a dental hand-engine, the combination with a motor casing comprising two portions overlapping at their edges and shaped at such overlapping to form a recess for housing the field winding, a dental hand-
15 piece carried by the front of the casing, an armature in said casing provided with a hollow shaft, a spindle disposed in the

dental hand-piece and extending through said hollow shaft to the back of the casing, the back of the casing being provided with 20 a closure having screw-threaded engagement therewith, a transmission device after the analogy of a ball bearing, having the inner bearing member mounted on the armature shaft, the outer bearing member carried by 25 the said closure, and a clutch carried by the said spindle and engaging the ball cage.

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

WILLIAM GENTRY SHELTON.

Witnesses:

CHAS. LYON RUSSELL,
GUSTAVE R. THOMPSON.