No. 648,106. Patented Apr. 24, 1900.

H. W. HEINZ.

DENTAL ENGINE.

(Application filed Feb. 11, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

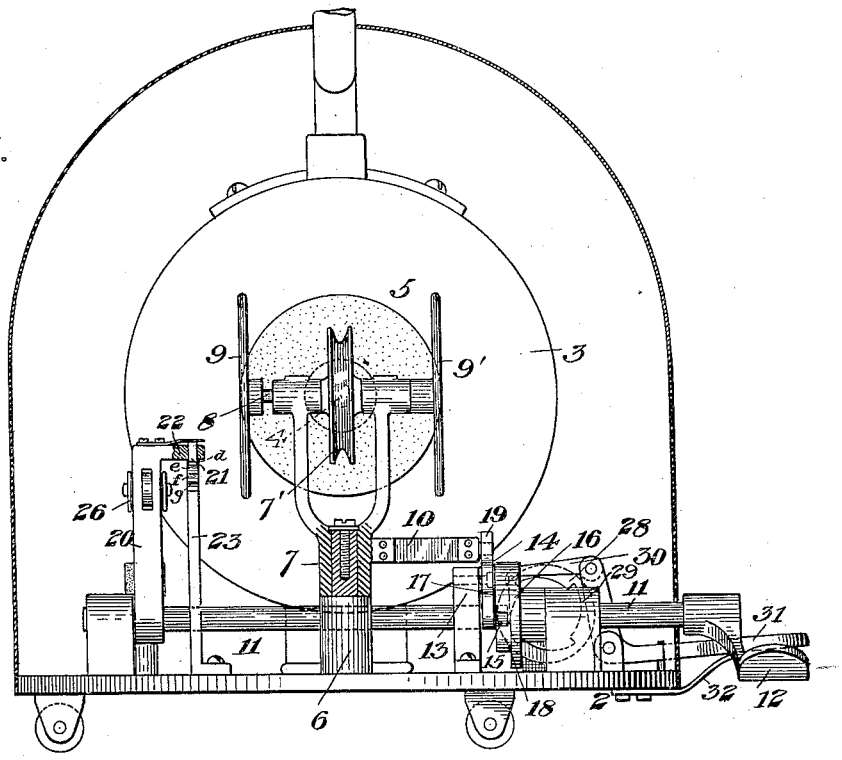
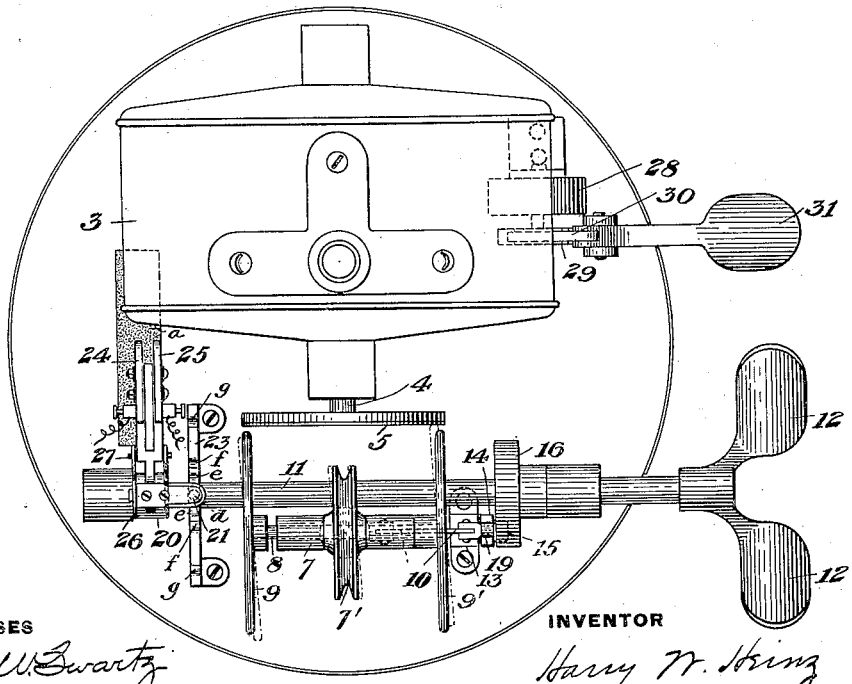


Fig. 2.



WITNESSES

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Fig. 3.

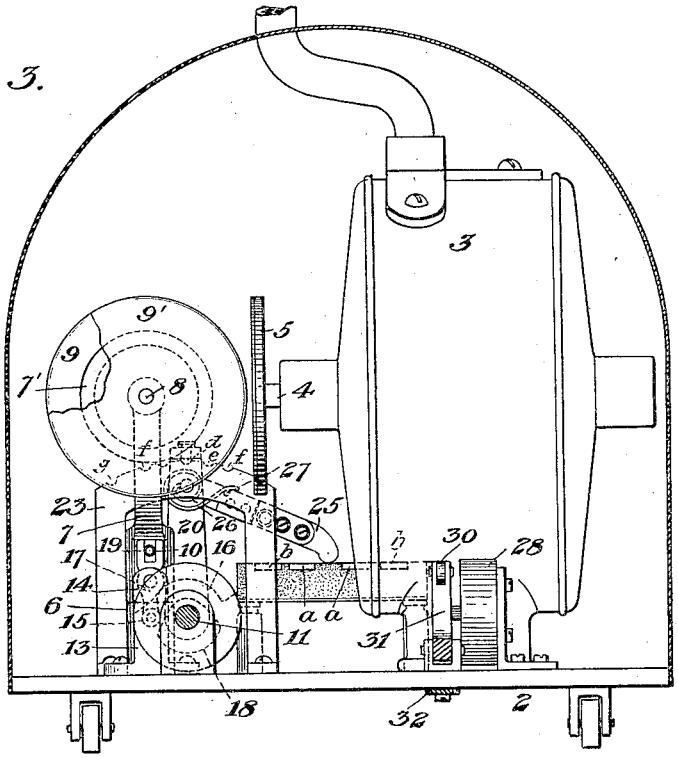


Fig. 8.

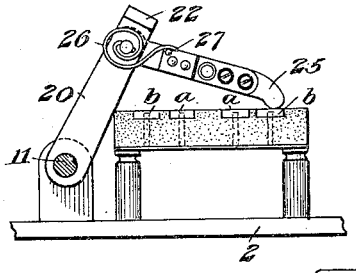


Fig. 6

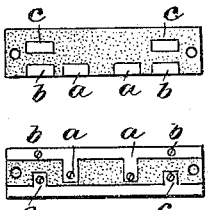


Fig. 7.

Fig. 4.

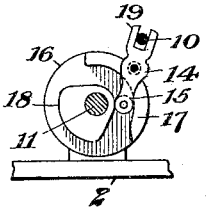


Fig. 5.

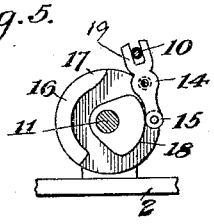
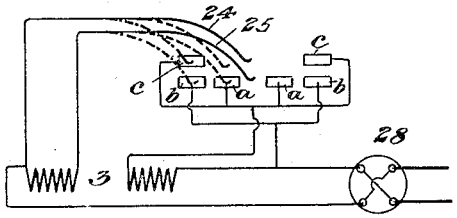


Fig. 9.



WITNESSES

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DENTAL ENGINE.

(Application filed Feb. 11, 1899.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 10.

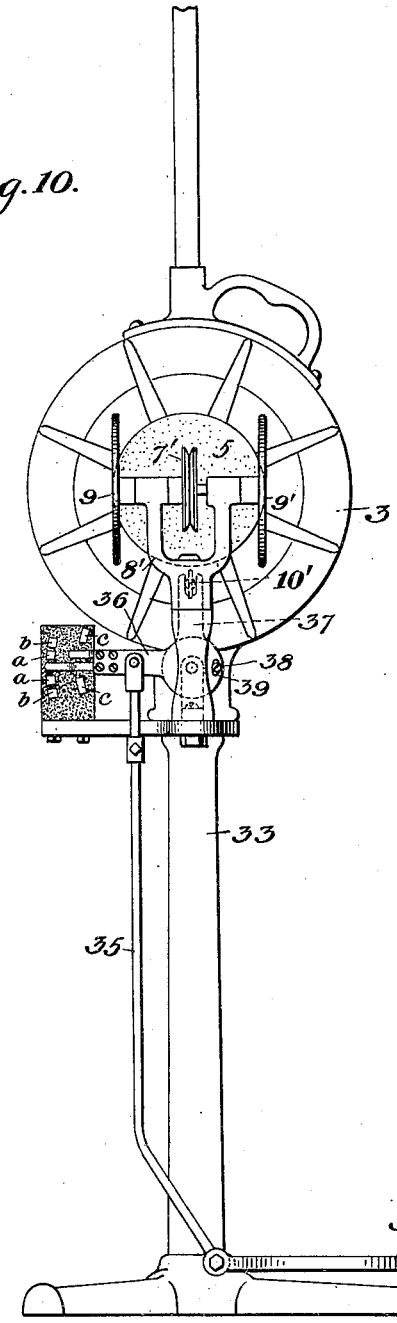
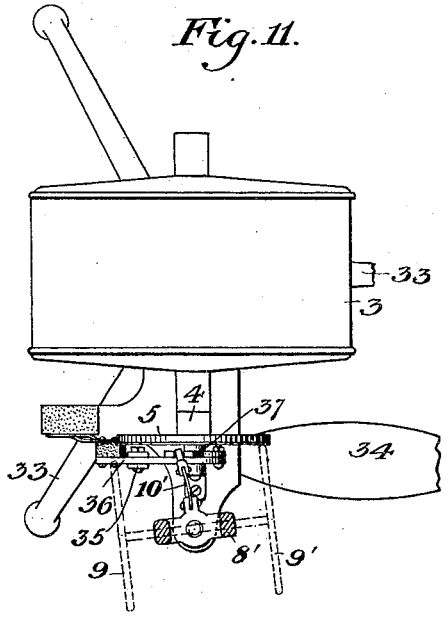


Fig. 11.



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UNITED STATES PATENT OFFICE.

HARRY W. HEINZ, OF PITTSBURG, PENNSYLVANIA.

DENTAL ENGINE.

SPECIFICATION forming part of Letters Patent No. 648,106, dated April 24, 1900.

Application filed February 11, 1899. Serial No. 705,300. (No model.)

To all whom it may concern:

Be it known that I, HARRY W. HEINZ, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Dental Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation, partly in section, of one form of my apparatus. Fig. 2 is a plan view showing the casing in section. Fig. 3 is a front elevation, partly in section. Figs. 4 and 5 are details of the cams for operating the driven wheels. Fig. 6 is a top plan view of the fixed contacts. Fig. 7 is a bottom plan thereof. Fig. 8 is a detail side elevation of the switch. Fig. 9 is a diagram of the electrical connections. Fig. 10 is a side elevation of a modified form of my invention. Fig. 11 is a horizontal section.

My invention relates to improvements in dental engines, and particularly to that class wherein friction-gearing is employed to drive the tool or instrument.

One object of my invention is to provide an apparatus for this purpose that permits the motor to be started before contact is made between the driving and driven wheels and means whereby the maximum pressure of the driven wheel upon the driving wheel or disk may be made and retained, while the speed of the motor may be increased or decreased within certain limits without affecting the contact established between the driving and the driven wheels.

A further object is to provide a dental engine that can be practically instantaneously reversed while running at high speed without injury or jar to the driven parts or the change of the direction of rotation of the driving-shaft.

My invention further consists in certain features of construction and combination of parts, as will more fully hereinafter appear and be pointed out in the claims.

In the drawings, 2 represents the base of the machine, and 3 is the motor. I have shown in the drawings a motor of the induction type, a diagram of which, together with the electrical connections of the apparatus, is shown in Fig. 9. I have found that a motor of this type gives in practice very satisfactory results.

4 is the driving-shaft of the motor, and to this is secured a driving-disk 5, having its face preferably covered with some suitable yielding material, such as rubber. Upon a standard 6, secured to the base 2, is secured a swiveled support 7 for the driven shaft 8. To the outer ends of this shaft are secured the friction-wheels 9 9′, which are adapted to engage the diametrically-opposite sides of the face of the driving-gear. I preferably arrange these wheels so that the periphery of the wheels 9 9′ will contact with said driving-disk near the circumference. The shaft 8 is also provided with a pulley 7′, adapted to drive a belt to operate the instrument or tool. An arm 10, provided with a roller at its outer extremity, is secured to the swiveled support 7 and is preferably composed of spring metal, so as to afford a means of easy and gradual contact with the driving-disk. In the form of apparatus shown in Figs. 1 to 9 I employ a horizontal rock-shaft 11, having winged extensions 12, which may be engaged by the foot of the operator, so as to operate said rock-shaft in the desired direction. On a standard 13 is mounted a lever 14, having at one end a roller 15, adapted to engage a cam-disk 16, having a cam 17 and a face-cam 18. The other end of said lever is provided with a fork or a slotted portion 19, adapted to engage the roller upon the end of the flexible arm 10. The rock-shaft 11 is provided with an arm 20, which has at its upper end a detent 21, secured in an outwardly-extending portion 22, said detent being adapted to engage notches *d*, *e*, *f*, and *g* in an arc-shaped plate 23, so as to retain the rock-shaft in the desired position. This arm 20 operates the electric switch and carries sliding contact-fingers 24 25, suitably insulated from each other and provided with suitable electrical connections. The fixed contacts are secured to a suitable insulated base and are so connected that when the arm carrying the sliding contacts is moved from one of said contacts to another the motor is put in series or multiple, and the speed of the motor is thereby increased or diminished. The fingers 24 25 are held in contact with the fixed contacts by means of a spring 26, secured to the arm 20, and the free end thereof bears

upon a pin or projection upon the arm 27, to which the fingers 24 25 are secured. The fixed contacts *a c* are connected together electrically, and the contacts *b* are connected together electrically, so that when the sliding contacts 24 25 are in the position shown in full lines in the diagram Fig. 9 the motor is at rest, when moved so as to contact with the fixed contacts *a* the motor is in series, and when moved so that the sliding contacts connect *b* and *c* the motor is in multiple and the motor is running at full speed.

In order to cut in or out all current from the apparatus, I provide a double-pole switch 28 of ordinary construction, and in place of the usual key I place a ratchet-wheel 29, which is engaged by a pawl 30, secured to the end of a bell-crank lever 31, provided with a foot-pedal. A spring 32 returns the lever to its normal position. If the first downward pressure of lever 31 makes the circuit through the switch 28, the next downward pressure after the lever has returned to the normal position will break the circuit.

The operation of my device as shown in Figs. 1 to 9 is as follows: Supposing the parts to be at rest and all current being cut off therefrom, the operator presses down upon the lever 31, which operates the double-pole switch 28 and completes the circuit through the switch. The desired movement to rock-shaft 11 is given by pressing upon one or the other of the winged extensions 12 downwardly until the detent 21, carried by arm 20, is forced out of the notch *d* and engages the notch *e* in the arc-shaped plate 23. When in this position, the sliding contacts carried by the arm 27, pivoted to the arm 20, are in contact with the fixed contacts, so as to start the motor. When these parts are in this position just described, the movement of the cam 17 or 18 is not sufficient to move the lever 14, so as to cause the arm 10 to turn the swiveled support for the friction-wheels 9 9', so that one or the other of said wheels is in contact with the driving-disk 4. By continued downward pressure upon the same winged extension 12 the detent is moved out of the notch *e* into notch *f*. The cam 17 or 18 acts upon the lever 14, arm 10, and swiveled support 7, so as to put one or the other of the friction-wheels 9 9' in contact with the driving-disk, the friction-wheel that is in contact exerting its maximum pressure upon the driving-wheel. The resiliency of the arm 10 enables this pressure to be applied gradually to said driving-disk. The motor is still in series when the parts are in this position. A further downward pressure on the same winged extension 12 causes the arm 20 to move the detent out of notch *f* and to engage notch *g*. This further movement does not cause either cam 17 or 18 to exert any further pressure upon the driven friction-wheel than that already applied; but said cams permit this further movement of the sliding contacts, so as to increase the speed of the motor to the maximum, while the maximum pressure of the friction-wheel is retained undisturbed by said movement. The motor is then in multiple.

The advantages derived from such a construction as this are many and arise from the fact that the parts may be quickly put in operation or reversed while running at full speed without jar or shock to the mechanism or the tool operated thereby. The motor being started in advance of the friction-wheel, the yielding connection enabling the pressure of the driven wheel to be applied gradually until the maximum is reached and so constructing the parts controlling the application of this pressure so that the maximum pressure is retained upon the driving-wheel while the maximum of speed of the motor is being attained.

In the modification shown in Figs. 10 and 11 I show my apparatus applied to a standard 33 of the ordinary type, provided with a pedal 34, having a rod 35 secured thereto and connected to a bell-crank lever 36. The long arm of this bell-crank lever is provided with sliding spring-contacts, preferably of spring metal, which engage fixed contacts arranged as heretofore described, with the exception that the insulated base is arc-shaped and stands vertically. A slip connection consisting of arc-shaped slots 38 and screws 39 in the long and short arms of the bell-crank lever 36 permits the motor to be started without putting the friction-wheel in contact. The short arm of the bell-crank lever 36 engages an arm 10' in the swiveled support 8', and said support carries the driven shaft, to which are secured the friction-wheels and the driving-pulley, arranged as previously described. The spring-arm 10' acts in the same manner as heretofore described, and the slip connection between the long and short arms of the bell-crank 36 moves the sliding contact attached to the long arm of said lever either upwardly or downwardly, as desired, to throw the wheels into contact, change speed of motor, or to reverse. This construction is particularly adapted to reconstruction of apparatus now employing foot-power or other motors. The principal advantages of my preferred construction are present in this form of apparatus. From the operation of my preferred form the operation of this type will be understood by those skilled in the art.

While I have shown my device as constructed in accordance with what has proved to be desirable in practice, I do not desire to limit myself to the exact form of apparatus shown or to the use of a motor of the special type illustrated in the drawings, as many changes will suggest themselves to the skilled mechanic.

While I have described this apparatus as applied to dental engines, I do not desire to limit myself thereto.

I claim—

1. A driving-gear, comprising a motor and

a driving-shaft, a driving-wheel, a driven shaft, wheels mounted thereon, a support therefor, said wheels being adapted to engage diametrically-opposite portions of the driving-disk, and means whereby the contact with said driving-disk is made, and said driving-wheel set in motion, substantially as described.

2. A driving-gear comprising a motor, a driving-shaft, a driving-disk, a driven shaft, a swiveled support therefor, friction-wheels mounted thereon, said wheels being adapted to engage diametrically-opposite portions of the face of said driving-disk, and means whereby the desired friction-wheel is put in contact with said driving-disk, substantially as described.

3. A driving-gear comprising a motor, a driving-shaft, a driving-disk, a driven shaft, a swiveled support therefor, friction-wheels mounted thereon, said wheels being adapted to engage diametrically-opposite portions of the face of said driving-disk, a flexible arm secured to said swiveled support, and means adapted to engage said arm whereby the desired friction-wheel is put in contact with said driving-disk, substantially as described.

4. A dental engine comprising a motor having a driving-wheel, a driven wheel adapted to receive its rotation therefrom, a support for said driven wheel, a yielding arm or connection secured thereto, an operating rod or shaft connected thereto, said yielding arm or connection permitting the movement of said operating rod or shaft, within certain limits, without disturbing the contact between the driving and the driven parts, or their position relatively to each other; substantially as described.

5. A dental engine comprising a motor having a driving-wheel, a driven wheel, a swivel-support therefor, a yielding arm or connection secured to said support, an operating rod or shaft connected thereto, said yielding arm or connection permitting said operating rod or shaft to be moved, within certain limits, without destroying the operative connection between the driving and driven parts; substantially as described.

6. A driving-gear, comprising a motor, a driving and driven wheel, a support therefor, an operating rod or shaft, a yielding arm or connection whereby contact between the driving and driven wheels is effected, speed-controlling mechanism operated by said operating rod or shaft, said yielding connection permitting the speed-controlling mechanism within certain limits to be operated to change the speed of the motor without disturbing the contact between the driving and driven wheels, or the point of contact between them; substantially as described.

7. In a dental engine, a motor having a driving-shaft, a disk thereon, a driven shaft, having friction-wheels mounted thereon, a swivel-support for said driven shaft, a flexible arm secured to said support, a rocking lever engaging said arm, and adapted to move said driven wheel into and out of engagement with the driving-disk, substantially as described.

8. In a dental engine, a motor, having a driving-shaft, a disk mounted thereon, a driven shaft, having friction-wheels mounted thereon, a swivel-support for said driven shaft, an arm upon said support, a rocking lever, engaging said arm, a rock-shaft having a loose connection with said rocking lever whereby the frictional contact is made or broken, a speed-regulator also operated by said shaft, said mechanism permitting the motor to be started before contact between the driving and driven wheels is made, and also permitting the speed of the motor to be increased or decreased after the maximum pressure of the friction-wheel has been attained without altering the point of contact; substantially as described.

9. In a dental engine, a motor, having a driving-shaft, a disk thereon, a driven shaft, having friction-wheels mounted thereon, swivel-support for said driven shaft, a flexible arm upon said support, a rocking lever, engaging said arm, a rock-shaft having a loose connection with said rocking lever whereby the frictional contact is made or broken, a speed-regulator also operated by said shaft, said mechanism permitting the motor to be started before contact between the driving and driven wheels is made, and also permitting the speed of the motor to be increased or decreased after the maximum pressure of the friction-wheels has been attained without altering the point of contact between the driving and driven parts; substantially as described.

10. In a dental engine, a motor, having a driving-shaft, a disk thereon, a driven shaft, having friction-wheels mounted thereon, swivel-support for said driven shaft, an arm upon said support, a rocking lever engaging said arm, a rock-shaft provided with cams adapted to operate said rocking lever, and thereby said swiveled support, and the friction-wheels carried thereby, so that one or the other of said wheels is put in contact with said driving-disk, said cams permitting the motor to be started before the contact between the driving and driven wheels is made, and also permitting the speed of the motor to be increased or diminished after the maximum pressure of the friction-wheel has been attained, without altering the point of contact between the driving and driven wheels; substantially as described.

11. In a dental engine, a motor having a driving-shaft, a disk mounted thereon, a support, a driven shaft carried thereby, friction-wheels thereon, a slip connection within certain limits between the operating shaft or rod and said support carrying the friction-wheel, whereby the motor may be started before frictional contact between the driving and

driven wheels is established and permitting a variation of speed after said contact is made, substantially as described.

12. In a dental engine, comprising a motor having a driving-shaft, a driving-disk, a driven shaft having friction-wheels mounted thereon, a swivel-support for said driven shaft, means whereby the driven shaft may be held at rest and the motor started before frictional contact is established between the driving and driven parts, and other means whereby the parts may be retained in the desired position with respect to direction of rotation and speed, substantially as described.

In testimony whereof I have hereunto set my hand.

HARRY W. HEINZ.

Witnesses:
L. S. LEVIN,
V. R. COVELL.