

O. H. AND A. F. PIEPER.
DENTAL ENGINE.

APPLICATION FILED MAY 27, 1912. RENEWED MAR. 25, 1918.

1,340,908.

Patented May 25, 1920.

3 SHEETS—SHEET 1.

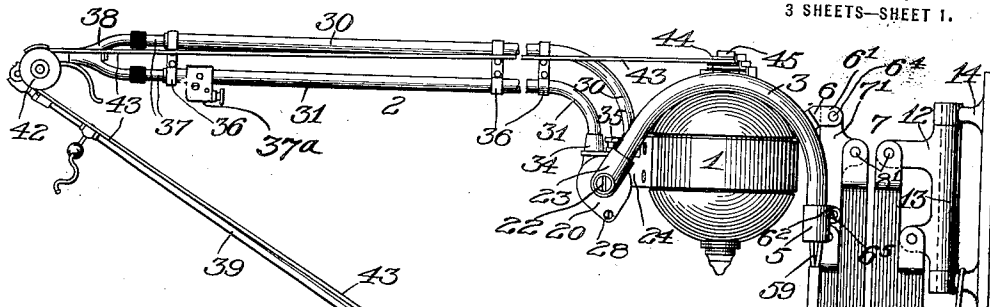


Fig. 1

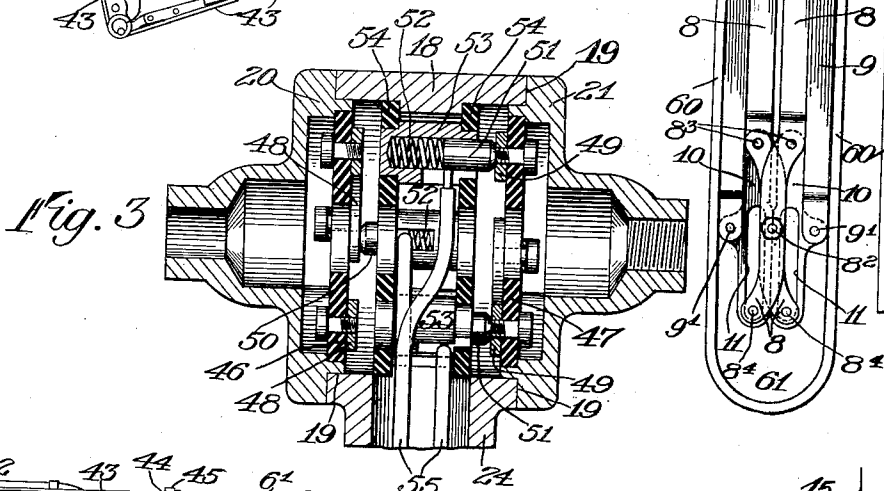


Fig. 3

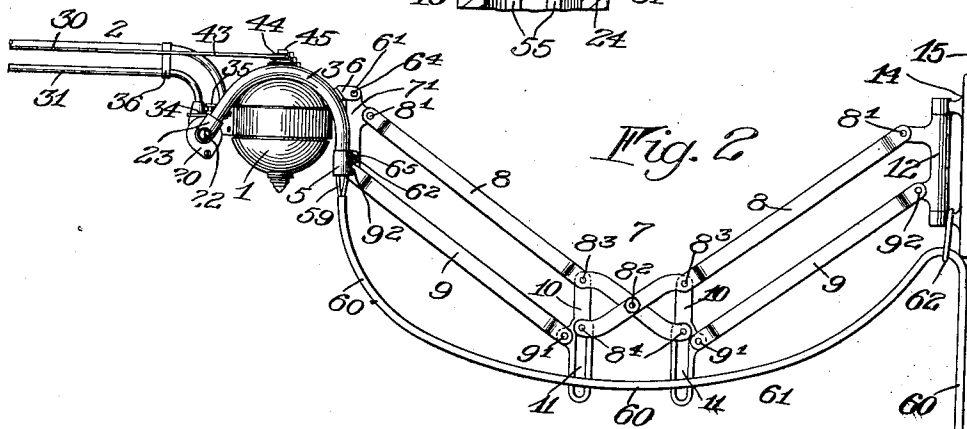


Fig. 2

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The image contains two technical drawings, Fig. 4 and Fig. 5, illustrating a mechanical device.

Fig. 4 is a perspective view of a long, slender mechanical arm or probe. It features a handle at the top with a pivot point (42) and a series of joints and linkages (38, 37, 36, 37a, 31, 30, 43, 40, 41). The arm terminates in a spherical component (1) which is connected to a complex assembly of parts (3, 6, 6a, 7, 7a, 8, 8a, 9, 9a, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100). The spherical component (1) is shown in a cross-sectional view, revealing internal components (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100).

Fig. 5 is a cross-sectional view of the device, showing the internal components and their arrangement. It includes a central shaft (1) and various internal parts (2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100).

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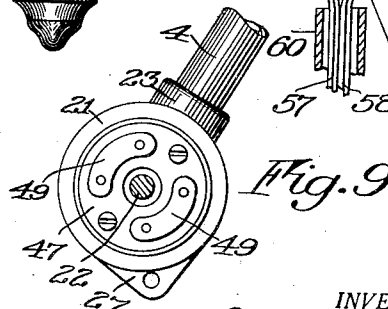
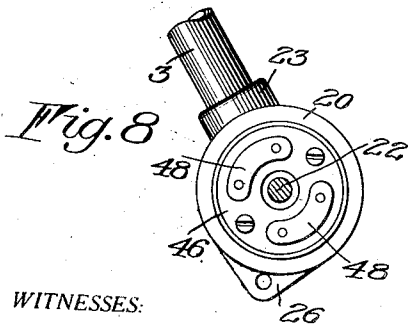
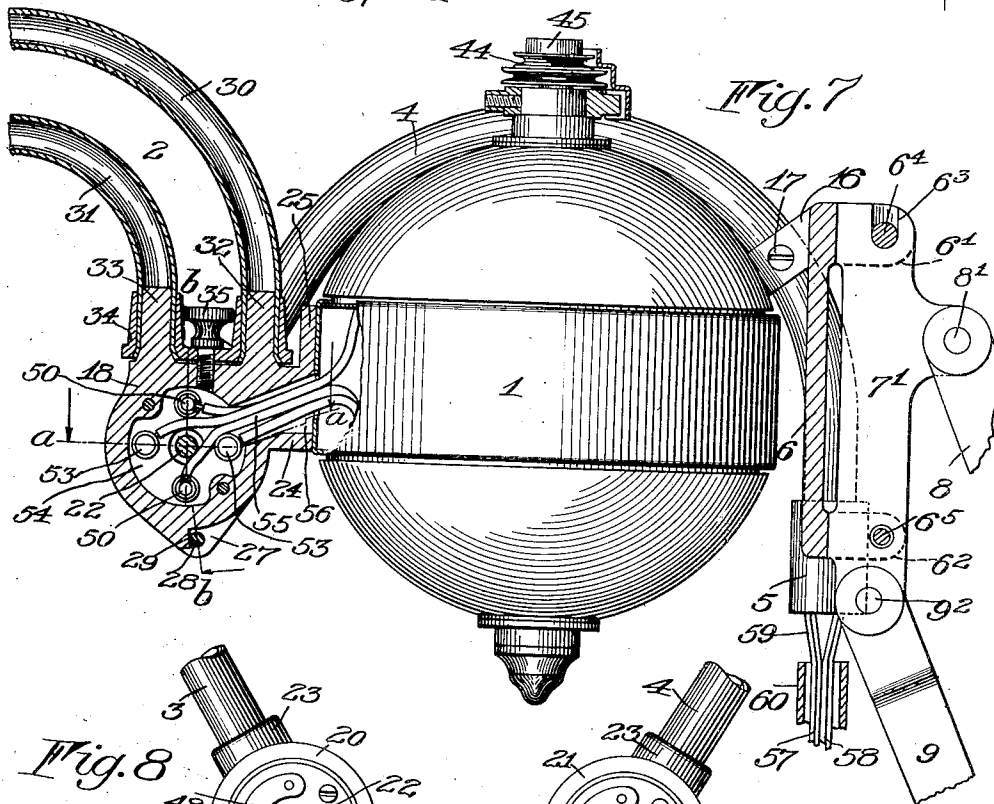
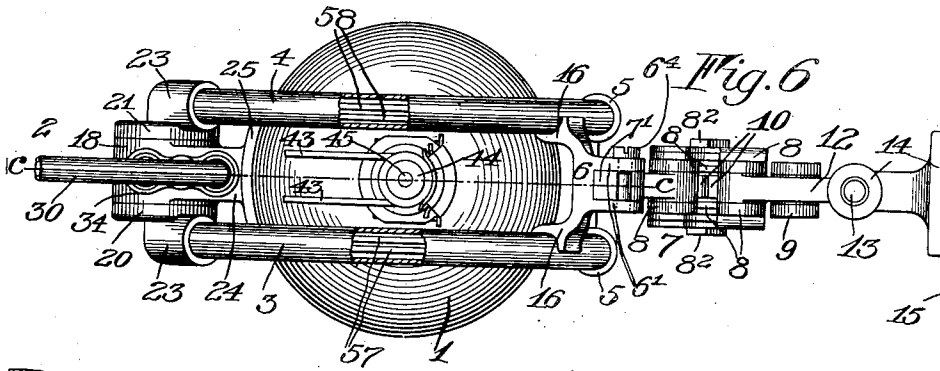
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UNITED STATES PATENT OFFICE.

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DENTAL ENGINE.

1,340,908.

Specification of Letters Patent.

Patented May 25, 1920.

Application filed May 27, 1912, Serial No. 699,938. Renewed March 25, 1918. Serial No. 224,650.

To all whom it may concern:

Be it known that we, OSCAR H. PIEPER and ALPHONSE F. PIEPER, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Dental Engines.

This invention relates to dental engines, more particularly of the electric type, and to the motor and tool arm supporting connections, and has for its general object to provide a simple, efficient, durable and easily handled mechanism which possesses a very wide range of adjustment and also a pleasing general design harmonizing with the usual aesthetic furnishings of dentists' offices.

More specific objects of the invention are to provide a special frame and supports for a counterbalanced electric dental motor and an attached tool carrying arm which permits the counterbalanced motor and arm to be not only swung laterally, when not of use, toward a wall to which they are held, but also allows the counterbalanced motor and tool arm to be together projected radially in any direction for a considerable distance from the wall to afford a very wide range of adjustment of the operating dental tool, while also preferably providing for covering and protecting the circuit wires leading from the motor within tubular or channeled portions of the supporting frame.

To these and other ends the invention consists in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the accompanying drawings, which illustrate a preferred embodiment of the invention, similar reference characters indicate corresponding parts in the several views.

Figure 1 is a side elevation of a preferred embodiment of the invention, showing the counterbalanced motor and tool arm swung into operative position, and with their extensible supporting bracket closely folded;

Fig. 2 is a smaller scale side view illustrating the bodily projection of the motor and tool arm by the manual extension of their supporting bracket;

Fig. 3 is an enlarged horizontal transverse section taken on the line *a-a* in Fig. 7;

Fig. 4 is a side elevation showing the mo-

tor and tool arm swung into inoperative position;

Fig. 5 is an enlarged detail vertical section taken on the line *b-b* in Fig. 7, and through the frame tube connections with the motor and tool arm fulcrum;

Fig. 6 is a detail partly broken out top plan view of the folded extensible bracket, the frame, the motor, and inner portions of the tool arm;

Fig. 7 is an enlarged side view with parts in vertical section on the line *c-c* in Fig. 6, and

Figs. 8 and 9 respectively represent inner face views of the two opposite contact carrying plates at the motor and tool arm fulcrum.

The frame which pivotally supports the rigidly connected electric motor 1, and tool arm 2, comprises two horizontally spaced members 3, 4, preferably in the form of up-standing arch tubes the inner ends of which are fastened in vertical hollow bearings 5 formed at the bottom of a detachable standard 6, supported by an extensible bracket 7 having two outer parallel arms 8, 9, which are pivoted at 8¹, 9² respectively, to the bracket head plate 7¹. The bracket 7 also has two inner parallel arms 8, 9, and two vertical guide links 10, slotted at 11. The lower or inner parts of the bracket arms 8, 8, cross each other where they are pivoted together at 8², and said arms also are pivoted at 8³ to the tops of the links 10, and at their extremities 8⁴ carry rollers or pins which move in the vertical slots 11 of the links 10, as the bracket is extended or collapsed. The lower or outer bracket arms 9 are pivoted at 9¹ to the links 10, and at 9² to the head plate 7¹, and the bearing 12. The plate 7¹ and the links 10 retain substantially vertical planes at all extending or collapsing adjustments of the bracket 7. The standard 6 also has upper and lower spaced pairs of lugs 6¹, 6² shown by dotted lines in Fig. 7, and between which the bracket head plate 7¹ is placed. Said plate is vertically slotted from the top at 6³ to receive a cross-pin 6⁴ fixed in the standard lugs 6¹, and a bolt 6⁵ secures the lower standard lugs 6² to the plate 7¹ when the plate slot 6³ engages the standard lug pin 6⁴, as shown in Fig. 7. The standard 6 also fixedly carries two upper concaved lugs 16 which closely fit around inner opposing faces of the motor

frame tubes 3 and 4, to which they are fastened by screws 17. With a motor frame and tool arm support thus constructed, it is obvious that after the bolt 6⁵ is removed, the standard 6, with its frame supports 5 and 16, may be detached from the bracket head plate 7¹, by simply raising the standard lug pin 6⁴ from the bracket head plate slot 6³, and the standard 6 may be as readily reapplied to the head plate and be again secured by replacing the pin 6⁴ in the slot 6³, and readjusting the bolt 6⁵ in the lugs 6² and the bracket plate 7¹.

The fulcrum connection of the counterbalanced motor 1 and tool arm 2 comprises a central collar 18, revoluble in annular rabbets or shoulders 19 formed in the inner faces of two opposite side or cheek plates 20, 21, and the parts 18, 20, 21 are preferably held together by a transverse bolt 22 passed through the plate 20 and threaded into the plate 21, as shown in Fig. 5. This connection permits the collar to turn or rock upon the cheek plates while the parts 18, 20, 21 together form a housing which incloses and protects the motor leads or circuit wires, and contacts hereinafter mentioned. The outer ends of the two horizontally spaced tubular frame members 3, 4, are tightly fitted within supporting bearings 23 on the respective cheek plates 20, 21, and the collar 18 has a lug 24 passing inward between the frame parts 3, 4 and carrying a horizontally curved bolt plate 25 to which the motor 1 is rigidly fastened. The two plates 20, 21 have pendent lugs 26, 27 holding a transverse bolt or pin 28, against which a shoulder 29 on the collar 18 engages to limit the swinging of the motor 1 when the connected tool arm extends about horizontally in its usual operative position, as shown in Figs. 1, 2 and 7.

The tool arm 2 comprises an inner main portion including two vertically spaced tubular members 30, 31, preferably having downwardly curved inner ends flared at their extremities to fit upon flared base portions of studs 32, 33, formed on or fixed to the fulcrum collar 18. A clamping plate 34 having thimbles fitting upon the tubes 30, 31, receives a screw 35 which enters the collar and thus holds the arm tubes securely binding them to the collar 18 to which the motor is also fixed. The motor 1 and the tool arm 2 thus rock or turn together as the collar 18 rotates upon the housing cheek plates 20, 21. The vertically spaced arm tubes 30, 31 are connected by suitable cross braces 36, and said tubes carry within them outwardly movable telescoping tubes 37 connected to the head 38 on which is pivoted a supplemental arm 39 coupled to a similar arm 40 carrying any suitable tool holding hand-piece 41. At 37^a is a means for sliding tubes 37 in tubes 30—31, which however

forms no part of the present invention and does not require description in more detail. Pulleys 42 on the arm sections 38, 39, 40, and on the tool holding spindle of the hand-piece 41, receive a driving belt 43 which leads from a pulley 44 on the motor shaft 45, whereby the dental tool may be operated from the motor 1 at any desired angular position. Whether the motor be running or be at rest, those portions of the driving belt 43 at and near the motor shaft and pulley, and also the inner portions of the two vertically spaced members 30, 31 of the tool arm, will pass upwardly and downwardly between the two opposite relatively fixed and horizontally spaced bowed portions 3 and 4 of the supporting frame as the motor and tool arm are rocked upon their bearings.

The motor lead and contact connections are shown particularly in Figs. 3, 5, 7, 8, 9 of the drawings. The hollow bearing member 18 affords a convenient concealing and protecting housing for the electrical connections of the motor, while the horizontally spaced and preferably upstanding and parallel arched frame members 3, 4, provide a like housing for those portions of the circuit wires passing from the contacts to intermediate looped portions of the wires leading from the motor frame. Disks 46, 47 of insulating material are fixed to inner faces of the respective housing cheek plates 20, 21, and contact plates 48, 49 are mounted on the disks in position to be engaged by yielding contact brushes 50, 51, pressed to the plates by springs 52, the parts 50, 51 and 52 being sustained by bushings 53, supported by insulating disks 54 fixed in the collar or bearing 18. Leads 55 pass from the brushes 50, 51, through a channel 56 in the collar 18 to the circuit terminals of the motor. Conductor wires 57, 58 pass from the contact plates 48, 49 and lead through the frame tubes or channels 3, 4, which conceal and protect said wires. Where the wires emerge from the hollow frame supporting bearings 5, they are brought together, as shown at 59, and thence preferably extend through a flexible covering and finishing tube 60. The grouped wires 57, 58, and their covering tube 60 extend in a pendent loop 61, long enough to pass under the fully folded or extended bracket 7, and the tube is preferably hung upon a hook 62 suspended on the fixed wall plate 14, whence the wires lead to a source of current supply.

The bowed frame members may consist of half-round or other channeled or tubular parts receiving the motor circuit wires 57, 58 and protecting them from injury by contact with outside objects, but it is preferred to use the tubes 3, 4, which give such protection and also exclude dust from the wires while entirely concealing them from view, thereby enhancing the pleasing general de-

sign of the entire apparatus when in operation, this being most desirable in view of the usual high class or aesthetic furnishings of dentists' offices and operating rooms. The bowed horizontally spaced tubular frame members may be placed in any position ranging from horizontal to vertical planes but the upstanding arch form as illustrated is preferred because of their strength and rigidity as well as their pleasing symmetry.

We claim as our invention:

1. In a dental engine, the combination with a frame comprising two horizontally spaced upstanding arch members, and means for sustaining the frame, of a counterbalanced motor and tool arm fulcrumed at the outer ends of the arch frame members, said tool arm lying in a plane between the arch frame members, pulleys on the motor shaft and the tool arm, and a driving belt on said pulleys; the parts being relatively disposed to permit both sides of the running belt to pass between the arch frame members when the motor and tool arm are rocked to operative and inoperative positions.

2. In a dental engine, the combination with a frame comprising separated bowed side parts provided at their outer ends with opposing cheek plates, of a motor having a laterally projecting hollow fulcrum bearing movable between the cheek plates, means coupling said bearing and cheek plates together, opposing contact plates carried on the cheek plates within the bearing, yielding contacts within the latter and engaging the contact plates, leads passing from said yielding contacts to the elements of the motor, and conductors passing from the contact plates adapted to be connected to a source of current.

3. In a dental engine, the combination of a frame comprising spaced bowed side parts provided with opposing cheek plates at their outer ends, a motor having a laterally projecting hollow bearing movable between said cheek plates, means coupling said bearing and cheek plates together, contact plates on the cheek plates within the bearing, yielding contacts within said bearing and engaging said contact plates, leads connecting said yielding contacts with the motor, leads passing from the contact plates and adapted to be connected with a source of current, and means associated with said cheek plates for limiting the movement of the motor in the frame.

4. In a dental engine, the combination of a frame comprising a supporting arm, a motor having a supporting arm, cooperating cheek bearing surfaces of substantial area on said frame and motor arms respectively for movably and efficiently supporting the motor on the frame, electrical contacts on said frame arm adjacent said bearing sur-

face connected with a source of power, contacts on the motor arm connected with the motor circuits and cooperating with said frame contacts during movement of the motor and a housing adjacent said bearing surfaces inclosing and protecting said contacts.

5. In a dental engine, the combination of a frame comprising a hollow supporting arm, a motor having a supporting arm, cooperating cheek bearing surfaces of substantial area on said frame and motor arms respectively, for movably and effectively supporting the motor on the frame, electrical contacts on said frame arms adjacent said bearing surfaces, conductors within said hollow arm connecting said contacts with a source of power, contacts on the motor arm connected with the motor circuits and cooperating with said frame contacts during movement of the motor, and a housing inclosing said contacts.

6. In a dental engine, the combination of a supporting frame, a motor, a tool arm extending from said motor, an annular bearing surface of substantial area on said frame, a cooperating annular bearing surface of substantial area on said arm in counterbalancing position between the motor and tool arm thereof, securing means holding said bearing surfaces in engagement for movably and securely supporting the motor on the frame, cooperating electrical contacts, located within said annular bearing surfaces on the arm and frame, respectively, with resilient means maintaining said contacts in engagement with each other during movement of the motor, connections between said contacts on the frame and a source of power and between said contacts on the tool arm and the motor circuits, and a housing adjacent said bearing surfaces inclosing and protecting said contacts.

7. In a dental engine, the combination of a supporting frame, a motor, a tool arm extending from said motor, an annular bearing surface of substantial area on said frame, a cooperating annular bearing surface of substantial area on said arm in counterbalancing position between the motor and tool arm thereof, concentric securing means holding said bearing surfaces in engagement for movably and effectively supporting the motor on the frame, electrical contacts within said annular bearing surfaces on the arm and frame comprising substantially annular conductors and resiliently supported contact points cooperating with said conductors during movement of the tool arm, connections between said contacts on the frame and a source of power and between the contacts on the tool arm and the motor circuits, and a housing formed on said frame and tool arm for inclosing said contacts.

8. In a dental engine, the combination of

a frame comprising spaced supporting arms, a motor having a tool arm extending therefrom, cheek bearing surfaces of substantial area on said frame arms, bearing surfaces of substantial area on said tool arm cooperating with said bearing surfaces on the frame for movably and effectively supporting the motor and tool arm, securing means holding said bearing surfaces in engagement with each other, electrical contacts on said frame arms adjacent said bearing surfaces and connected with a source of power, electrical contacts on said tool arm connected with the motor circuits and cooperating with said contacts on the frame arms during movement of the motor, and a housing adjacent said bearing surfaces inclosing said contacts.

9. In a dental engine, the combination of a frame comprising spaced supporting arms, a motor having a tool arm extending therefrom, cheek bearing surfaces of substantial area on said frame arms, bearing surfaces

of substantial area on said tool arm located between and cooperating with said bearing surfaces on the frame arms for movably and effectively supporting said motor and tool arm, a belt carried on said tool arm and motor adapted to pass freely between said spaced frame arms during movement of the motor and tool arm, electrical contacts on said frame arms adjacent said bearing surfaces, connections carried by said frame arms between said contacts and a source of power, contacts on said tool arm connected with the motor circuits and cooperating with said contacts on the frame arms during movement of the motor, and a housing formed on said frame and tool arm for inclosing said contacts.

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