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CONTROL MEANS FOR DENTAL ENGINES AND THE LIKE

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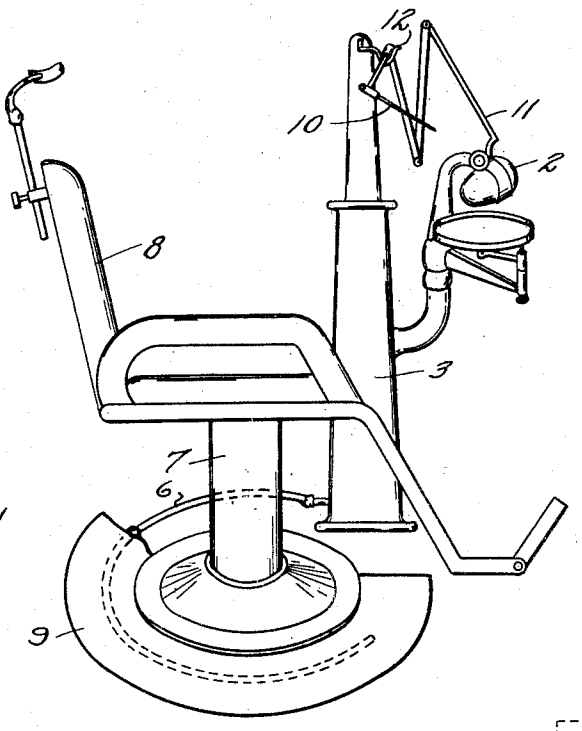

Fig. 1

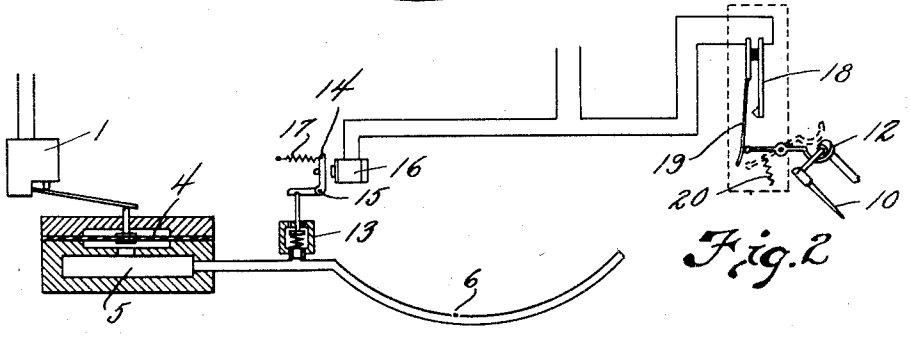

Fig. 2

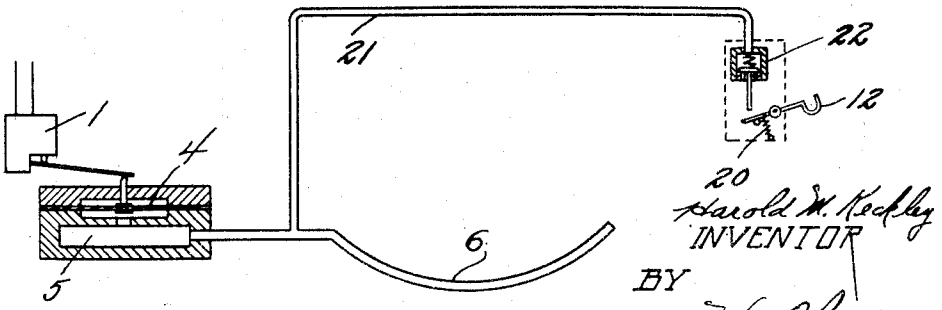

Fig. 3

Harold M. Keckley
INVENTOR

BY

Wm. O. Ballard
ATTORNEY

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CONTROL MEANS FOR DENTAL ENGINES AND THE LIKE

Harold M. Keckley, Findlay, Ohio, assignor, by direct and mesne assignments, to Wm. O. Ballard, Toledo, Ohio

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5 Claims. (Cl. 318—551)

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This invention relates, as indicated, to control means for dental engines and the like, and more particularly to a foot-operated control device of a type adapted to permit considerable freedom of movement on the part of the operator.

In my co-pending application Serial No. 718,950, filed December 28, 1946, I disclose novel switch-operated means whereby the operator may control a dental drill or the like merely through the action of foot pressure upon a resilient elongated tubular member. As stated in such application, this tubular member may be filled with any of a variety of fluids, including air, for example. From the point of view of initial cost and maintenance, air is, of course, ideal but certain practical problems have been encountered in the use of pneumatic means, primarily due to temperature fluctuation. At times when such pneumatic system has been subjected to relatively high temperatures there has been a tendency for sufficient pressure to build up therein to shift the diaphragm to operate the master switch even though such resilient tubular member has not been subjected to foot pressure. On the other hand, at times of relatively low temperature the pneumatic system may become relatively insensitive and difficult to operate due to the contraction in volume of the contained air. Both such conditions will, of course, depend upon the temperature at the time the system was sealed. It is very desirable to have a sensitively adjusted pneumatic system so that the operation of the dental engine or the like may be controlled simply by the pressure imposed by one foot of the operator as he stands by the dental chair.

It is therefore a primary object of my invention to provide control means for dental engines and the like including a foot operated pneumatic system which will be automatically compensated for ambient temperature variations.

Another object of my invention is to provide such control means which will be rendered inoperative to start the engine when the dental tool or the like is suspended from its usual support.

Other objects and advantages will become apparent as the following description proceeds.

To the accomplishment of the foregoing and related ends, said invention, then, comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

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In said annexed drawing:

Fig. 1 is a general perspective view of a dental chair and dental engine associated therewith showing a preferred arrangement of my new control device;

Fig. 2 is a diagrammatic layout of one embodiment of my invention employing an electric circuit as an element of the control means; and

Fig. 3 is another such diagrammatic layout of a system which is pneumatic throughout.

Referring now more particularly to such drawing, and especially Fig. 1 thereof, the master switch 1 of the motor controlling circuit for electric motor 2 is installed in the base of dental column 3 in the manner explained in my aforesaid co-pending application, master switch 1 corresponding to switch 16 of such application. Master switch 1 is a normally open micro-switch adapted to be operated by movement of diaphragm 4 in response to pneumatic pressure in chamber 5. Chamber 5 is connected to a resilient elongated tubular member 6 ordinarily of rubber and sealed at its other end to form a closed system. Such tubular member will preferably be arcuately disposed around the base 7 of the dental chair 8 and may lie beneath the rubber mat 9 ordinarily placed around such base.

The tool, such as dental drill 10 mounted on the end of jointed boom 11 is supported when not in use by hook 12 carried by an upper extension of column 3. As explained in my co-pending application, such hook may be pivotally mounted to operate a switch in an electric circuit controlling the operation of the motor. The present invention, however, is concerned with means for controlling the pneumatic system itself.

Referring now more particularly to the Fig. 2 embodiment of my invention, a valve 13 is provided in tubular member 6 communicating with the outer atmosphere. An armature 14 is pivoted at 15 to be rocked upon energization of solenoid 16, to close valve 13. When such solenoid is not thus energized, spring 17 acts on the armature to force valve 13 open. Valve 13 may, for example, be an ordinary automobile tire valve. The energization of the solenoid is controlled by switch 18 in the upper end of the dental column. Contact member 19 of such

switch is forced open by the end of pivoted hook member 12 when the dental tool is hung upon such hook, as shown in solid lines in Fig. 2. Consequently, in this position solenoid 16 will not be energized and valve 13 will be held open so that tubular member 6 is in communication with the outer atmosphere. Foot pressure upon such tubular member, therefore, will be ineffective to operate master switch 1 when the dental tool is supported upon hook 12. When, however, the operator lifts the tool from such hook, spring 20 is effective to move the hook into dotted line position, as shown in Fig. 2, and spring contact member 19 moves to close switch 18 and activate solenoid 16, thereby closing valve 13. Now that such valve is closed, operation of the dental engine may be initiated and controlled by means of foot pressure on member 6, as taught in my aforesaid co-pending application. Obviously the air entrapped in the pneumatic system will normally be under the same pressure as the outer atmosphere so that micro-switch 1 may be set for sensitive response to actuation of diaphragm 4.

Referring now more particularly to Fig. 3 of the drawing, the embodiment of my invention there illustrated is pneumatic throughout without the employment of electrical control means. A small tube 21, which may be of metal or thick-walled rubber pressure hose is in communication with resilient tubular member 6 and terminates in the upper end of column 3 in a valve 22 which may be of the same type as valve 13, for example. When the dental tool is not hung from hook 12, spring 20 will, of course, be effective to rock such hook out of engagement with valve 22. When, however, the dental tool is placed upon the hook, rotation of the latter will be effective to open valve 22 and place tubular member 6 in communication with the outer atmosphere. It will be seen therefore that foot pressure on member 6 will be ineffective to operate master switch 1 when the tool is hung from hook 12 and the pneumatic system will be automatically compensated for variations in atmospheric pressure. When, however, the tool is lifted from the hook the pneumatic system is at once closed and responsive to foot pressure on member 6 to move diaphragm 4 to close switch 1.

It will be seen from the foregoing that I have provided control means for dental engines and the like employing a pneumatic system in which ambient temperature and pressure changes are automatically compensated for, and which is rendered inoperative when the tool connected to such engine has been hung upon its supporting means.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:

1. A dental engine including an electric motor, a power operated tool adapted to be driven by said engine, a movable support for said tool when not in use, pneumatic pressure means operative to control operation of said engine, a normally open valve adapted to vent said pneumatic pressure means to render the same inoperative, an electric circuit including a solenoid operative upon energization to close said valve, and a switch in said circuit held open by said movable support only when said tool is resting thereon.

2. A dental engine including an electric motor, a power operated tool adapted to be driven by said engine, a movable support for said tool adapted to be held in one position when said tool is thereon and to move to another position when said tool is removed therefrom, pneumatic pressure means operative to control operation of said engine, said pneumatic pressure means including a normally open valve as a vent therefor, mechanism adapted to operate said valve, and means operative by said support to control said mechanism.

3. A dental engine including an electric motor, a power operated tool adapted to be driven by said engine, a movable support for said tool when not in use, pneumatic pressure means operative to control operation of said engine, said pneumatic pressure means including a normally open valve as a vent therefor, mechanism adapted to close said valve including a solenoid, an electric circuit for said solenoid, and a switch in said circuit operative by said movable support.

4. A dental engine, including an electric motor, a power operated tool adapted to be driven by said engine, a movable support for said tool, pneumatic pressure means operative to control operation of said engine, said pressure pneumatic means including a valve, means in said valve normally holding said valve open to thereby vent said pneumatic pressure means, mechanism operable to overcome the action of said latter means to close said valve, and means operable by said support to actuate said mechanism.

5. The structure set forth in claim 4 wherein said mechanism embodies a solenoid, an electric circuit therefor, and the support operated means is a switch in said circuit.

HAROLD M. KECKLEY.

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