

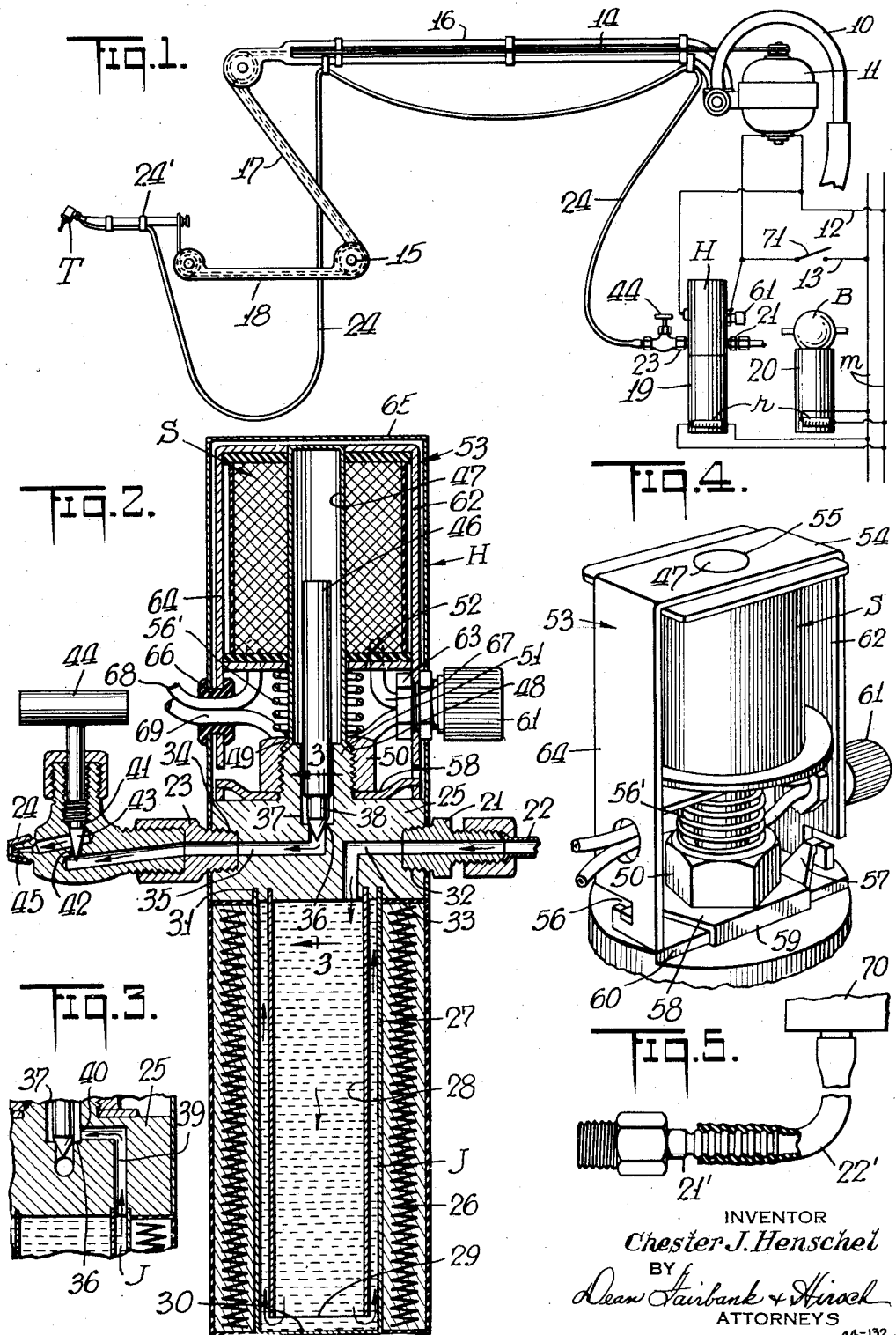
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DENTAL ENGINE ACCESSORY EQUIPMENT

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DENTAL ENGINE ACCESSORY EQUIPMENT

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6 Claims (Cl. 32—28)

The present invention is concerned with dental engines and relates more especially to accessories therefor for automatically controlling the temperature at the region of drilling, grinding or other heat evolving dental operation. In dental surgery, especially in the process of drilling, grinding, or buffing of teeth, the friction engendered heat in many cases gives rise to excruciating pain and accounts largely for the common fear of the dentist. Moreover, such heat tends to spoil the temper of the drills, burs and other working bits. It is therefore beneficial to play a stream of tempered water upon the area being treated, desirably at about blood temperature, but ordinarily a temperature of between 95° F. and 120° F. is satisfactory, which precludes heating or cooling of the region being worked and in most cases renders the operation relatively painless, even in the absence of anaesthesia.

It is accordingly among the objects of the invention to provide a simple self-contained unit, universally applicable to various models of dental engine installations without need for modification therein, which may at will be rendered inoperative, but which in normal setting is adapted during drilling, grinding or the like, automatically to apply to the area being worked on, a stream of tempering fluid, such as water in desired volume, and maintained between predetermined limits of temperature.

Another object is to provide a tempering accessory for the above purpose which is universally applicable to various models of dental engine installations without need for modification therein, which utilizes the electric heating facilities universally available in all such installations as the means for heating the tempering fluid, which dispenses with the need for any bracket or holder for the accessory, other than what is inherently afforded by various such conventional installations, which requires a minimum of hydraulic and electrical connections and serves automatically to play upon the area being drilled, ground or buffed, with the elimination for the purpose, of the need for a chair assistant operating a warm water syringe and which will not ooze or drip when the drilling or grinding is interrupted.

In the accompanying drawing in which are shown one or more of various possible embodiments of the several features of the invention:

Fig. 1 is a diagrammatic view of a dental engine installation incorporating the present invention,

Fig. 2 is a transverse cross section on a greatly

enlarged scale showing the heater and flow control unit,

Fig. 3 is a longitudinal sectional detail view taken on line 3—3 of Fig. 2,

Fig. 4 is a fragmentary perspective view of the upper part of the heater and flow control unit, with the cover removed, and

Fig. 5 is a fragmentary diagrammatic view of another type of fluid connection.

Referring now to the drawing, the conventional dental engine installation is diagrammatically shown, which includes the usual goose neck 10, supporting the electrical motor 11 connected as by conductors 12 and 13 across the electrical power mains *m* and controlled by treadle operated switch 14. The conventional device includes the flexible driving cord 14 extending over a system of pulleys 15 supporting articulated arms 16, 17 and 18. The device also includes usually two spray bottle heater wells 19 and 20 which are adapted to mount the conventional heated water spray bottles, one of which is shown at B in well 20. Each of the wells has an electric heating coil 26 in the wall thereof with an adjustment *r* for varying the heat, as required.

According to the present invention there is removably mounted in one of the heater wells 19 a unit H which has an inlet nipple 21 supplied, as from pipe 22, fed from the city water mains, and an outlet nipple 23 connected to a flexible small-bore rubber or plastic tube 24, the outlet end of which is affixed as by spring clips 24' to the drill or other dental tool T, for delivering water or other fluid heated in the well 19, to the dental area being operated upon.

The details of a preferred embodiment of the unit per se, as shown in Figs. 2 to 4 will now be described.

Referring to Fig. 2, the flow control unit is shown as a head desirably a thick generally cylindrical block 25 of brass adapted to rest at its rim upon the rim of the spray bottle heater well 19 which has the conventional electrical coil 26 embedded in the wall thereof.

Rigid with the block 25 is a receptacle 27 depending therefrom and co-axial therewith. The receptacle 27 is of length and diameter to fit with small clearance into the well and to replace the spray bottle for which the well is designed in the standard dental engine installation. Thus the receptacle serves incidentally to center the block with respect to the well. The receptacle is desirably formed with a jacket J determined by an inner depending cylindrical wall 28 spaced at its lower end 29 from the bottom 30 of the recep-

tacle. The receptacle and the inner wall forming the jacket may be lodged in corresponding grooves 31 in the bottom of the block 25 and brazed in place therein to form a structure unitary therewith.

The inlet nipple 21 is mounted in a corresponding socket 32 in the lateral wall of the block 25 and communicates through a port 33 in said block with the interior of the receptacle 27. The block also has a lateral outlet socket 34 which mounts the outlet nipple 23 and which communicates by way of bore 35 with valve seat 36 at the lower end of an axial bore 37 in said block, that constitutes a cage for the plunger valve 38. Another bore 39 through the block 25 communicates from the upper end of jacket J to the side of the valve cage 37 as at 40 above the valve seat 36.

For controlling the rate of tempering water discharge, the outlet nipple may contain a needle valve of any conventional construction, desirably including an elongated bore 41 with a conical seat 42 and a co-acting elongated or needle valve 43 adjusted by external knob 44 thereon. The needle valve has also a small outlet nipple 45 for the rubber or plastic tube 24 that leads therefrom to the dental tool as above described.

The valve is desirably of solenoid operated type and to this end, plunger 38 desirably of bronze is embedded in and welded to a heavy soft iron armature core 46 and thus normally tends to be seated by gravity upon seat 36. Desirably the iron core is enclosed in a hollow copper sheath 47 having an outturned rim 48 embraced by the inturned shoulder 49 of nut 50, which is threaded upon axial upstanding nipple 51 unitary with block 25.

The solenoid S which actuates the armature 46 rests upon a plate 52 between the legs of a yoke 53 through an aperture 55 in the cross arm 54 of which the copper sheath 47 extends. The yoke 53 is removably mounted as by bayonet slots 56 at its lower end over the protruding end arms 57 of a metal washer 58 and about nipple 51 and is held in locked position by coil spring 56' about sheath 47 and interposed between nut 50 and plate 52. Washer 58 is clamped against the block 25 by nut 50 and retained against rotation by downturned lug 59 resting against a flat 60 in the lateral wall of the block 25.

Desirably the solenoid supporting platform 52 is well above the nut 50 to afford room for an electric snap switch 61 mounted on one leg 62 of the yoke 53 by nut 63 and operated from the knob on the exterior thereof; and also for a bushing 66 on the other leg 64 of the yoke through which the electrical leads extend for making circuit to the solenoid S and the switch 61.

Preferably an external cover 65 encasing the solenoid and yoke, is telescoped at its rim over the block 25 and affords an aperture for the knob of switch 61 and for the bushing 66, which latter is preferably rolled thereover as shown. The solenoid S is connected in series with the switch 61 by conductor 67, and leads 68 and 69 from solenoid and switch respectively, pass through the bushing 66. The series connection set forth is in parallel with the conductors 12 and 13 from the mains directly to the motor 11.

While for most uses inlet bushing 21 is connected by metal pipe 22 to the city water main system as described, it is understood that where distilled water or other special fluid is required, or where water mains are not available, the nipple 21 might be replaced by an ordinary corrugated nipple 21' for accommodating the end of an inlet rubber hose 22' supplied as for instance from an elevated tank 70.

The operation will be apparent from the above description, but will be briefly set forth. The unit shown in Fig. 2 is simply inserted at its receptacle end into a spray bottle heater well 19, the water main is connected by pipe 22 to inlet nipple 21 and flexible hose 24 which leads to the dental tool T is applied over the small nipple 45 on the needle outlet valve 23. The two electrical connections 68 and 69 through the bushing 66 are connected with the motor circuit in manner readily understood.

With the switch 61 turned on, the device will function whenever the circuit of motor 11 is closed for operation. As long as the motor is in circuit the solenoid S is actuated to lift the iron core 46 and cause the bronze plunger valve 38 to be elevated from its seat 36. Thus in a drilling, grinding or buffing operation, water will flow under the pressure of the water mains through inlet nipple 21 downward through port 33 into the receptacle 27 and upward through the jacket J thereof, where it is promptly heated by the electric heater coil 26 in the well, and thence through bore 39 into the valve cage 37 through valve seat 36 past needle valve 43 in the outlet nipple 23 and thence by way of tube 24 to the operating end of the dental tool T. The knob 44 of the needle valve can, of course, be adjusted to the desired rate of water feed.

As long as the motor is in operation the water is thus being fed, but as soon as the motor circuit, controlled by switch 71 is interrupted the iron core 46 drops, to cause the bronze plunger valve 38 to seat and immediately interrupt the flow of water. The action is prompt, and by reason of the capillary character of the small tube 24 beyond said valve 38, no oozing or dripping of water will occur, once the motor circuit has been interrupted. Yet the instant that the motor is again set into operation the solenoid promptly picks up the iron core 46 with its valve 38 and the required feed of tempered water resumes instantly.

It will be understood that if it is desired to operate the dental tool dry, it is merely necessary to open circuit at the electric cutoff switch 61 so that the valve will remain closed, without interfering with the operation of the motor 11.

Were the heating receptacle 27 in the path of flow from the valve 38 to the dental tool, pressure might build up in such receptacle, especially if air or gas bubbles have collected at the top thereof, and this would lead to dripping or oozing.

The head block 25 being of brass or other highly conductive metal and being adjacent to the heating receptacle and unitary or integral therewith, the water remains warm in its flow therethrough, without the excessive cooling which might result were the solenoid controlled valve at a distance from the heating unit.

It will be understood that while the device finds its preferred use for the heating and feeding of water or other liquid, it may be applied to the heating of air or other gas or vapor.

According to the invention, pain from drilling or the like is minimized, without any distraction on the part of the dentist, who conducts the operation without paying the slightest attention to the tempering spray that operates as soon as drilling or grinding is started and continues throughout such operation. Thus the necessity of a chair assistant in constant attendance, operating a warm water syringe is obviated. The constant stream of water prevents pain, trauma to pulp tissue and also preserves the temper of

steel burs and otherwise prolongs their usefulness.

As many changes could be made in the above device and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a dental engine installation of the type which includes an electric motor, a dental tool driven therefrom and a spray bottle electric heater well; the combination of a feed unit for feeding fluid under pressure, said unit being removably located in heat absorbing relationship with the heater of the well, said unit having an inlet, an outlet, a connection from the latter to the dental tool, a valve constituting an element of the feed unit and at the upper part thereof for interrupting the flow from said inlet to said outlet and electric control equipment adjacent to said valve and also constituting part of the feed unit and adapted to open said valve when the motor is in circuit.

2. A dental engine installation of the type including an electric motor, a dental tool driven therefrom, and an electric heater well; the combination therewith of a water heater and flow control unit mounted in said well, said unit comprising a water receptacle within said well and a head unitary therewith protruding above said well, said head having an inlet and a port therethrough feeding water from said inlet to said receptacle, a water outlet from said head, a port leading thereto from said receptacle and a conduit conveying water from said outlet to the dental tool, said head having a plunger normally closed to shut off water flow between said ports, and having an associated solenoid in circuit with said motor adapted to open said valve when the motor is in circuit.

3. The combination recited in claim 2 in which the receptacle has a jacket communicating at the lower end thereof with the receptacle contents for prompt heating of the outflow from the receptacle.

4. A unit for heating and controlling the flow of fluid under suitable pressure to the tool of a motor driven dental engine installation; the combination of a selfcontained unit adapted to be introduced at its lower end into a conventional spray bottle heater well, said lower end comprising a receptacle having a jacket communicating at its lower end with the main body of the receptacle, said unit having a head block adapted to rest upon the rim of such well, said head block having an inlet nipple and an outlet nipple, and having ports therethrough communicating from the respective nipples to said receptacle and to

the jacket thereof respectively, a valve seat in said head, a port through said head block communicating from said valve seat to said outlet nipple, a plunger valve co-acting with said seat normally to shut off the outlet and a solenoid carried in the upper end of said unit and co-acting with said plunger for opening said valve when the motor is in circuit and permitting outflow of heated fluid from the receptacle under pressure.

5. In a dental equipment of the character described, the combination of a unit for heating water and controlling the flow thereof to a dental tool, said unit comprising a water receptacle having a jacket communicating with the lower end of the receptacle and adapted to fit into the conventional spray bottle heater well, said unit having a head block adapted to rest on the rim of such heater well, said head block having an upstanding axial nipple and having laterally extending inlet and outlet nipples, the former communicating with the upper end of the receptacle, said head block having an axial valve cage, a valve seat at the lower end thereof, a plunger valve in said cage, a bore through said head block communicating from said jacket to the side of said valve cage, a port through said head block communicating from said seat to said outlet nipple, an iron core unitary with said valve, a copper sheath encasing said core, a nut accommodating the lower rim of said sheath and threaded upon said upstanding nipple, a yoke carried by said head, and a solenoid mounted in said yoke and encompassing said copper sheath, said solenoid when in circuit serving to open said valve.

6. In a dental equipment of the character described, the combination of a unit for heating water and controlling the flow thereof to a dental tool, said unit comprising a receptacle having a jacket communicating with the lower end of the receptacle and adapted to fit into the conventional spray bottle heater well, said unit having a head block adapted to rest on the rim of such heater well, said head block having a laterally extending inlet nipple communicating with the receptacle contents, said head block having an axial upstanding nipple, a valve seat coaxial with said nipple, a valve cage thereabove, a laterally extending outlet nipple in said head block in communication with the opening through said valve seat, a port communicating from said valve cage to the upper end of said jacket, a valve plunger extending through said cage and resting in said seat, an iron core unitary with said plunger, a copper sheath encasing said core, a nut accommodating the lower rim of said sheath and threaded upon said upstanding nipple, a yoke carried by said head block, a solenoid mounted in said yoke and encompassing said copper sheath, said solenoid when in circuit serving to open said valve, and an electric cutoff switch mounted on said yoke and laterally accessible near said head block for taking the solenoid out of circuit.

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