

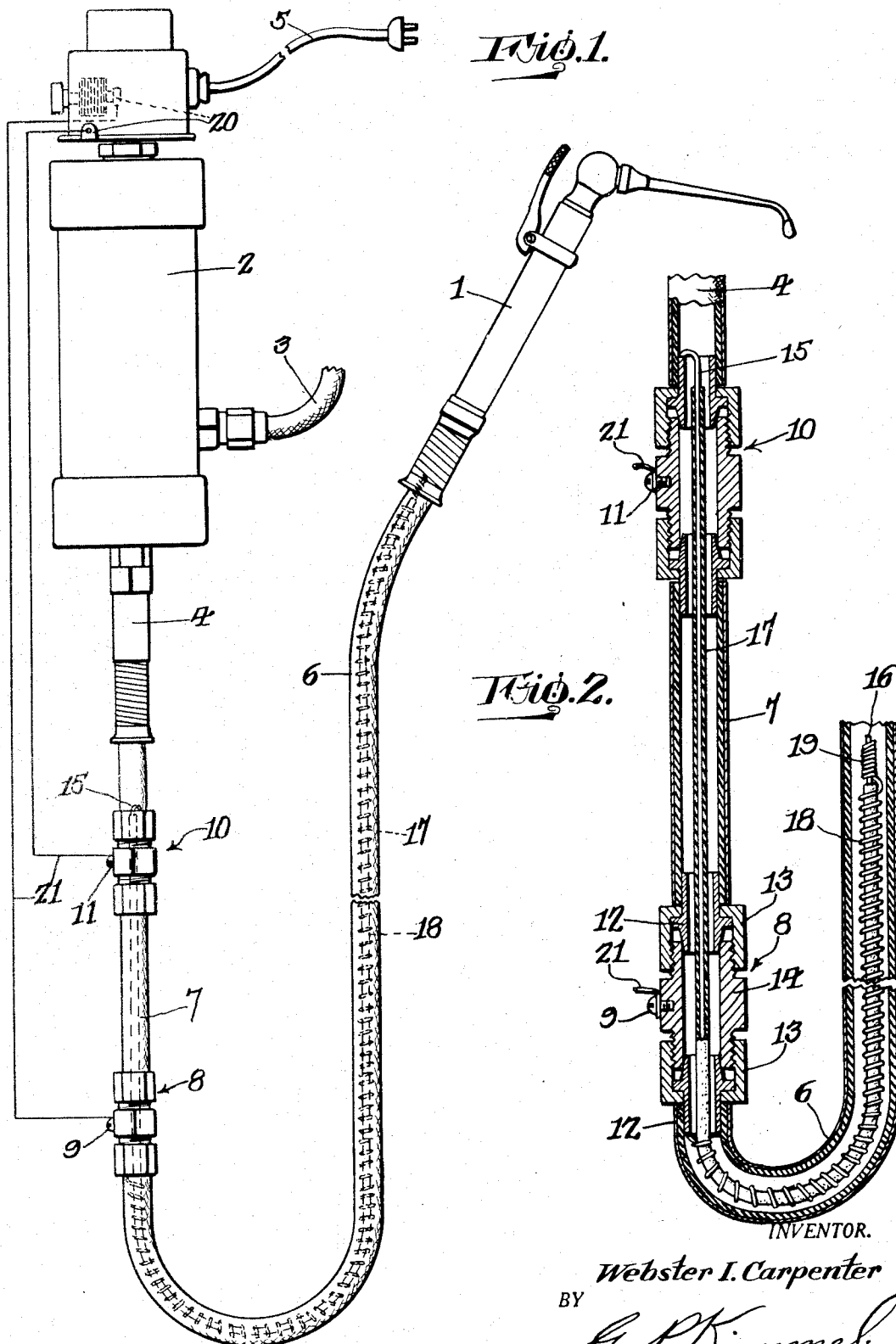
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FLUID TEMPERATURE MAINTAINER

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## UNITED STATES PATENT OFFICE

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## FLUID TEMPERATURE MAINTAINER

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This invention relates to a fluid temperature maintainer particularly adapted for disposition between a source of warm fluid supply and a dental syringe and has for its primary object to provide, in a manner as hereinafter set forth, a device of such character by means of which water or air may be maintained at a given temperature while being conveyed to the syringe in order that a cavity in a sensitive tooth may be irrigated or dried by discharging thereinto a fluid at body temperature.

A further object of the invention is to provide a device of the character aforesaid including a flexible fluid conduit having a heating element secured therein which includes a resistance coil floatingly mounted with respect to the wall of the conduit.

A further object of the invention is to provide a device of the character aforesaid including a flexible, insulated support for the resistance coil wherein the support and coil have connected therewith means for securing the same in position within a tubular fluid conveyor of any type which it is desired to employ.

A further object of the invention is to provide a fluid temperature maintainer including a resistance coil floatingly mounted with respect to the wall of the fluid conduit as aforesaid and further including a flexible conductor leading to the resistance coil, said conductor being insulated from the wall of the conduit and from the fluid within the conduit, the insulating means for the conductor providing a flexible support for the resistance coil.

A further object of the invention is to provide a fluid temperature maintainer which may be connected with a source of fluid supply without regard to the temperature of such fluid and by means of which the fluid may be raised to and maintained at the temperature desired within the maintainer.

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts as hereinafter more particularly described, and as illustrated in the accompanying drawing wherein is shown an embodi-

ment of the invention, but it is to be understood that the description and drawing are to be taken as illustrative and that the invention is intended to be limited only by the scope of the claims hereunto appended.

In the accompanying drawing wherein like numerals are employed to designate like parts throughout the several views:—

Figure 1 is an elevation of a fluid temperature maintainer in accordance with this invention showing the same in association with a dental syringe and a source of fluid supply.

Figure 2 is a fragmentary longitudinal section through the maintainer.

Referring to the drawing in detail, the numeral 1 indicates a dental syringe which may be of any well known construction, and the numeral 2 indicates a source of warm fluid supply. In the embodiment shown, the source of warm fluid supply 2 is in the form of a fluid warmer having an inlet pipe 3 and an outlet pipe 4 and being adapted for connection as indicated at 5 with a source of electrical energy, not shown.

Having one end suitably connected with the syringe 1 is a length of flexible tubing 6, the opposite end being connected with a relatively short length of tubing 7 by means of a hollow coupling element 8 which includes an electric terminal 9. The length of tubing 7 is also connected with the outlet pipe 4 by means of a coupling element 10 similar to the coupling 8 and including an electric terminal 11.

In the embodiment shown, the coupling element 8 includes a pair of flanged plugs 12 respectively inserted into the sections of tubing 6 and 7. Swiveled on the plugs 12 are a pair of internally threaded sleeves 13 which are connected together by means of a hollow plug 14 which is provided with the electric terminal 9 heretofore mentioned. The coupling 10 is of the same construction as the coupling 8. It is to be understood that the couplings 8 and 10 might be modified as desired in order to connect the same with conduits of any type other than the tubing sections 6 and 7 herein disclosed.

Having one end secured to the coupling element 10 is a flexible conductor 15 which

extends through the section of tubing 7, coupling element 8, and section of tubing 6, the conductor terminating in a floating end 16 extending into the handle of the syringe

1. Encircling the conductor 15 is a flexible insulating member 17, the ends of which terminate in spaced relation to the ends of the conductor. The insulating member 17 preferably is in the form of a soft rubber tube. Coiled around the insulating member 17 is a flexible resistance coil 18, one end of which is secured as shown at 19 to the floating end 16 of the conductor, and the opposite end of which is connected with the coupling element 8. The resistance coil 18 forms the outer peripheral surface of the heating element and is spaced from the wall of the tubing 6. The coupling elements 8 and 10 are formed of conducting material in order that an electric current may be passed between the terminals 9 and 11 and the coil 18 and conductor 15 respectively. In the embodiment shown, the terminals 9 and 11 are connected in series with the terminals 20 of the source of fluid supply 2 by means of a pair of conductors 21, although the conductors 21 may be connected with any suitable source of electrical energy in any manner desired. Obviously when the terminals of the maintainer are connected in series with the terminals of the fluid supply as shown, the supply of electrical energy to the resistance coil 18 will be controlled by the same means which controls the supply of electrical energy to the source of supply 2. In the event that the conductors 21 are connected with a source of electrical energy independently of the source of supply 2, a suitable thermostat, not shown, may be provided for controlling the supply of electrical energy to the coil 18.

When using the maintainer in connection with a supply of air, the insulating member 17 preferably will be formed of asbestos.

In the operation of the maintainer, the fluid being conveyed through the tubing sections 7 and 6 to the syringe 1 is maintained at the proper required temperature by the contact of the fluid with the resistance coil 18, in order that the fluid may be discharged from the syringe 1 at the same temperature at which it is discharged from the source of supply 2, irrespective of the length of time which may elapse between the time of discharge from the source 2 and syringe 1.

It is to be noticed that no special type of tube section 6 is required in order to secure the heating element therein, and it is to be further noticed that the heating element is entirely free of connection with the wall of the tube section 6. In the event that the tube section 6 becomes damaged through long continued use, the same may be readily replaced simply by disconnecting it from the syringe 1 and coupling element 8. The

conductor 15 will be of appropriate size to prevent any material heating of the insulating member 17 interiorally of the latter in order to protect the same from deterioration. Owing to the contact of the outer face of the insulating member 17 with the fluid within the tube section 6, the member 17 is only subjected to heat from the coil 18 substantially equal to the temperature of the fluid within the tube 6. Owing to the short tube section 7 employed, a positive insulation is provided between the coupling elements 8 and 10, thereby preventing any possibility of a short circuit between the terminals 9 and 11.

It is thought that the many advantages of a fluid temperature maintainer in accordance with this invention will be readily apparent, and although the preferred embodiment of the invention is as illustrated and described, it is to be understood that changes in the size, shape and arrangement of parts may be resorted to, so long as such changes fall within the scope of the invention as defined in the appended claims.

What I claim is:—

1. A fluid temperature maintainer comprising, a flexible conduit adapted to be positioned between a dental syringe and a source of warm fluid supply, a pair of spaced electric terminals carried by the conduit, a flexible conductor connected with one of said terminals, said conductor extending longitudinally of the conduit and having its opposite end free of connection therewith, a flexible insulating member for the conductor, and a flexible resistance coil supported on the insulating member and having its respective ends connected with the other of said terminals and the free end of said conductor.

2. A fluid temperature maintainer comprising, a flexible tube section adapted for connection with a dental syringe, a relatively short flexible tube section having a coupling element at one end adapted for connection with a source of fluid supply and further having a coupling element at its other end connecting the same with the first mentioned tube section, an electric terminal carried by each coupling element, a flexible conductor secured to one coupling element and extending through said tube sections, a flexible insulating member for said conductor, and a flexible resistance coil supported on said insulating member, said resistance coil having its respective ends connected with one end of the conductor and with the other of said coupling elements.

3. A fluid temperature maintainer comprising, a flexible conduit adapted to be positioned between a dental syringe and a source of fluid supply, and a flexible heating device of elongated construction having one end floatingly disposed within the conduit

and including a resistance coil which forms the outer peripheral surface of the heating device and which is spaced from the wall of said conduit.

- 5 4. A fluid temperature maintainer comprising, a flexible conduit adapted to be positioned between the handle of a dental syringe and a source of fluid supply, and a flexible heating device of elongated construction  
10 within said conduit, said heating device having one end extending in and floatingly disposed within said handle and said device including a resistance coil which forms the outer peripheral surface thereof and which coil  
15 is spaced from the wall of the conduit.

In testimony where, I affix my signature hereto.

WEBSTER I. CARPENTER.

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