

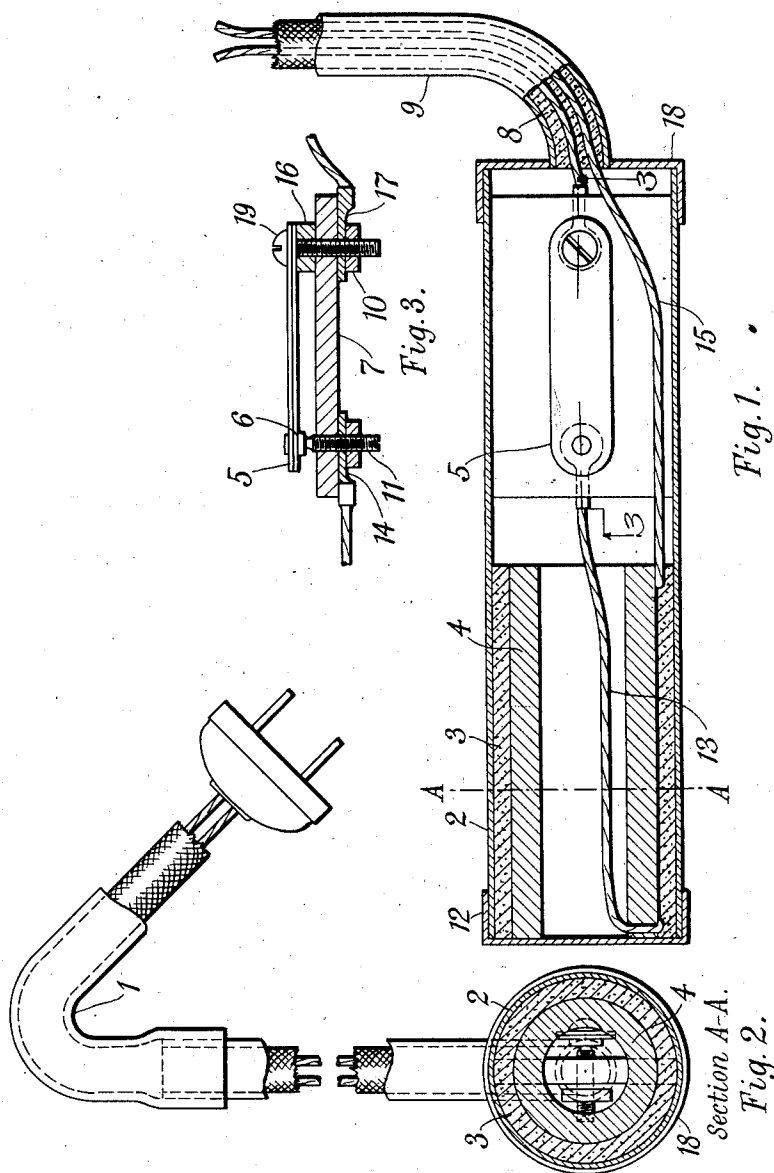
Oct. 30, 1928.

1,689,198

F. F. GAGELMAN

IMMERSION HEATER

Filed Nov. 22, 1926



Francis F. Gagelman, Inventor

UNITED STATES PATENT OFFICE.

FRANCIS F. GAGELMAN, OF NEW YORK, N. Y.

IMMERSION HEATER.

Application filed November 22, 1926. Serial No. 149,999.

The invention relates to new and useful improvements in immersion heaters and the objects of the improvements are:

First, to provide an electric heater and a thermostat complete in the same compartment with the necessary outgoing conductors for electric connection.

Second, to provide protection against burn-out of the heating element should the surrounding substance be incapable of conducting the heat away at a high enough rate.

Third, to provide an immersion heater of such nature as to increase, and automatically maintain, the temperature of a body of liquid to a desired value.

Fourth, to provide an immersion heater of as simple design and construction as possible to obtain the desired result.

Fifth, to provide an immersion heater of such construction as to be especially adaptable for heating aquariums and watering troughs for live stock, but not limited to these uses.

The above and other features will be better understood by referring to the accompanying drawings. Fig. 1 is a longitudinal section while Fig. 2 is a section AA of Fig. 1. Fig. 3 is a cross section of the thermostat in projection to the plan view.

The housing 2 in Fig. 1 consists of thin gauge cylindrical tubing with end caps 12 and 18 made fast to the ends, thus rendering the whole compartment water-tight. The thin wall of the housing allows the heat to be transferred from the heating element to the liquid very rapidly so that the rest of the compartment has the same temperature as that of the surrounding liquid.

To end cap 18 is connected a metal tube 9 bent into the form of an L and extended to a convenient length.

Located in one end of the housing is the heating element 4 consisting of any suitable form of electric resistance device for transmitting electrical energy into heat. Such heating means is shown by resistance wire wound on a porcelain spool and covered by enamel or the like. A notch is provided at one end of the porcelain spool for allowing lead 13 to be extended through the inside, and connected to terminal 14. Surrounding the heating element is a layer of material 3 with suitable electrical insulating properties.

Adjacent to the heating element with necessary intervening space is located the thermostat. The thermostatic element consists

of a bi-metallic strip 5 firmly fastened to the insulating base 7 by screw 19 and nut 10 and with spacer 16, thus holding it in suspension. The contact 6 of suitable contact substance is riveted to the opposite end of the strip 5 and contact is made to a headless screw 11 consisting of proper metal for making and breaking electric currents or with proper tip for making and breaking electric currents intermittently. The screw is used for temperature adjustments and may be locked in any position by means of nut 20, which also holds terminal 14 in place. The insulating base 7 is of sufficient width to fit snugly in the casing without further supports and is located in a vertical position in order that the arc which is broken at contact 6 may be extinguished more quickly, thus allowing longer life for the tips.

The insulation strip 21 has suitable electrical insulating properties and is fastened to the inner portion of the casing to eliminate possibilities of electrical ground or short circuit in case of extreme heat at the thermostat.

The remaining space in the compartment not taken up by the parts described or shown in the drawings may be filled with air or any substance to provide the proper electric insulating and heat conducting properties.

To lead 15 of the heater element and terminal 17 of the thermostat are connected two wires from a cable 8 which extends through the metal tube 9 to a suitable convenience plug. Over the insulated cable 8 is slipped a tube 1 of suitable material, thickness and length, to protect cable 8 against injury of the metal tube 9 and to make the end of the metal tube water-tight. To the wires in cable 8, which is extended to convenient length, is connected a standard plug, thus making it possible to connect to any standard socket or convenience outlet.

The entire exterior metal housing and tube are coated with suitable coating to prevent a detrimental effect upon the substance in which the heater is immersed or to protect the heater against injurious substances.

I am aware that prior to my invention immersion heaters have been made and controlled automatically by thermostats.

I therefore do not claim such a combination broadly; but I claim and desire to secure by Letters Patent:

1. In a heater for liquid, a substantially cylindrical casing, a heating unit in one end

thereof, and an electric circuit therefor and a thermostatic device in said circuit and in the other end of the casing, said device including a supporting block of insulating material frictionally braced along a substantial diameter between the walls of the casing.

2. In a heater for liquid, a substantially cylindrical casing, a heating unit in one end thereof, and an electric circuit therefor and a thermostatic device in said circuit and in the other end of the casing, said device comprising a supporting block of insulating material frictionally braced along a substantial diameter between the walls of the casing, a pair of longitudinally spaced terminals on the midportion of said block and hence along the axis of said cylinder, and a bi-metallic circuit controller extending longitudinally from one of said terminals to the other; whereby the entire thermostatic device is self-supported within the casing with the controller and the terminals thereof safely spaced from the walls of the casing.

3. In a heater for liquid, a substantially cylindrical casing, a bi-metallic thermostatic circuit controller in the casing and comprising an unbent conducting element arranged substantially along the axis of the cylinder so as to be safely spaced from the walls thereof, and supporting means for said controller element, said supporting means comprising a block of insulating material so sized as to be frictionally self-braced between opposite wall portions of the casing.

4. In a heater for liquid, a substantially

cylindrical casing, a bi-metallic thermostatic circuit controller in the casing and comprising a straight conducting element arranged substantially along the axis of the cylinder so as to be safely spaced from the walls thereof, supporting means for said controller element and comprising a block of insulating material so sized as to be frictionally self-braced between opposite wall portions of the casing, and circuit terminals carried by said block, one thereof being firmly connected to one end of said controller element, and the other thereof being positioned beneath the opposite end of said element.

5. In a heater for liquid, a substantially cylindrical liquid-tight casing adapted to be immersed in the liquid to be heated with its axis substantially horizontal, a bi-metallic thermostatic circuit controller in the casing and comprising a straight conducting element arranged substantially along the axis of the cylinder so as to be safely spaced from the walls thereof, and supporting means for said controller element and comprising a block of insulating material so sized as to be frictionally self-braced along a vertical diameter between opposite wall portions of the casing, said block being provided with means for supporting one end of said conducting element to permit the latter to pivot in a substantially horizontal plane.

In testimony whereof I have hereunto set my hand.

FRANCIS F. GAGELMAN.