

June 27, 1939.

N. MORRIS

2,164,282

THERMOSTATIC SWITCH FOR SCIENTIFIC BATHS

Filed July 22, 1937

3 Sheets-Sheet 1

Fig.1

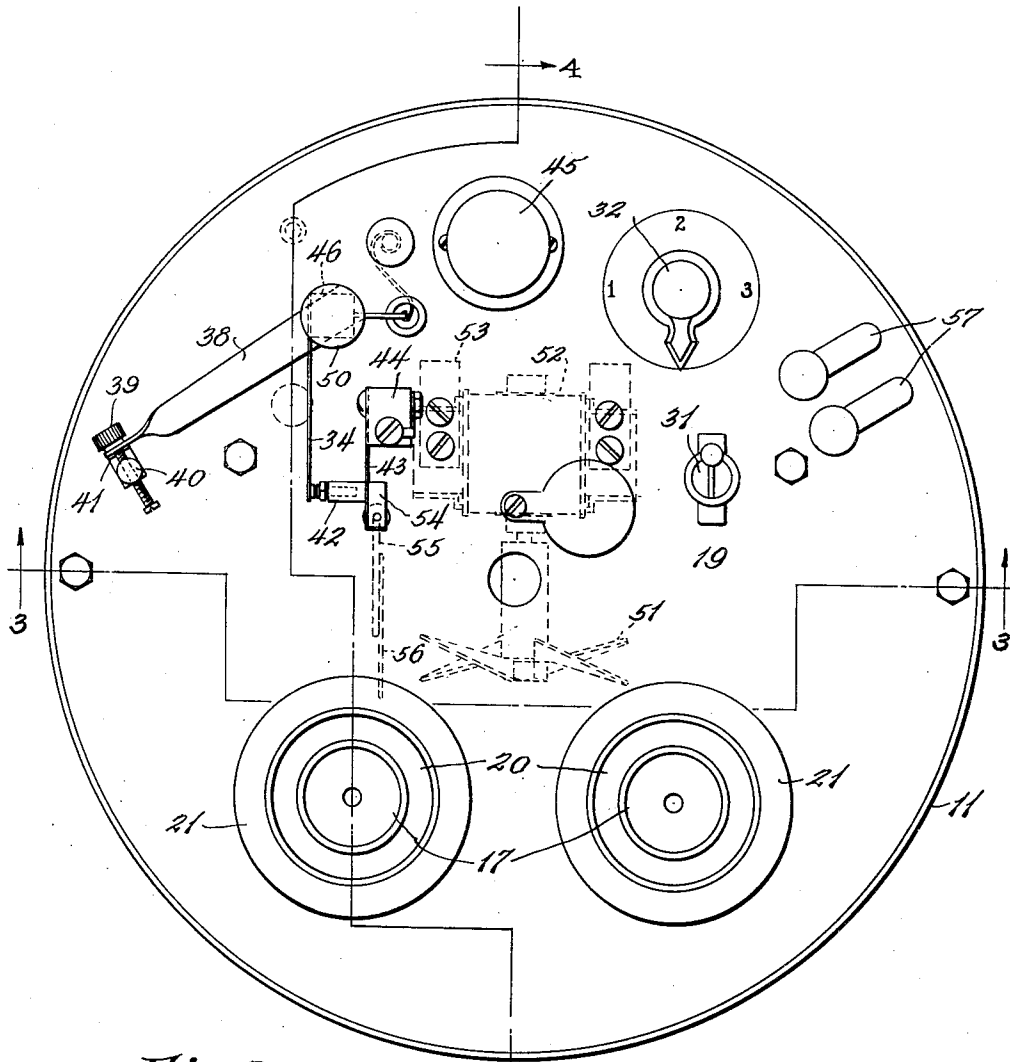
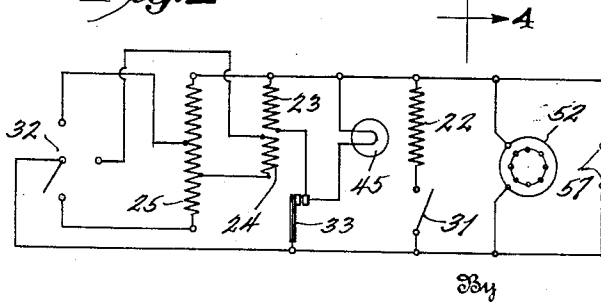


Fig. 2



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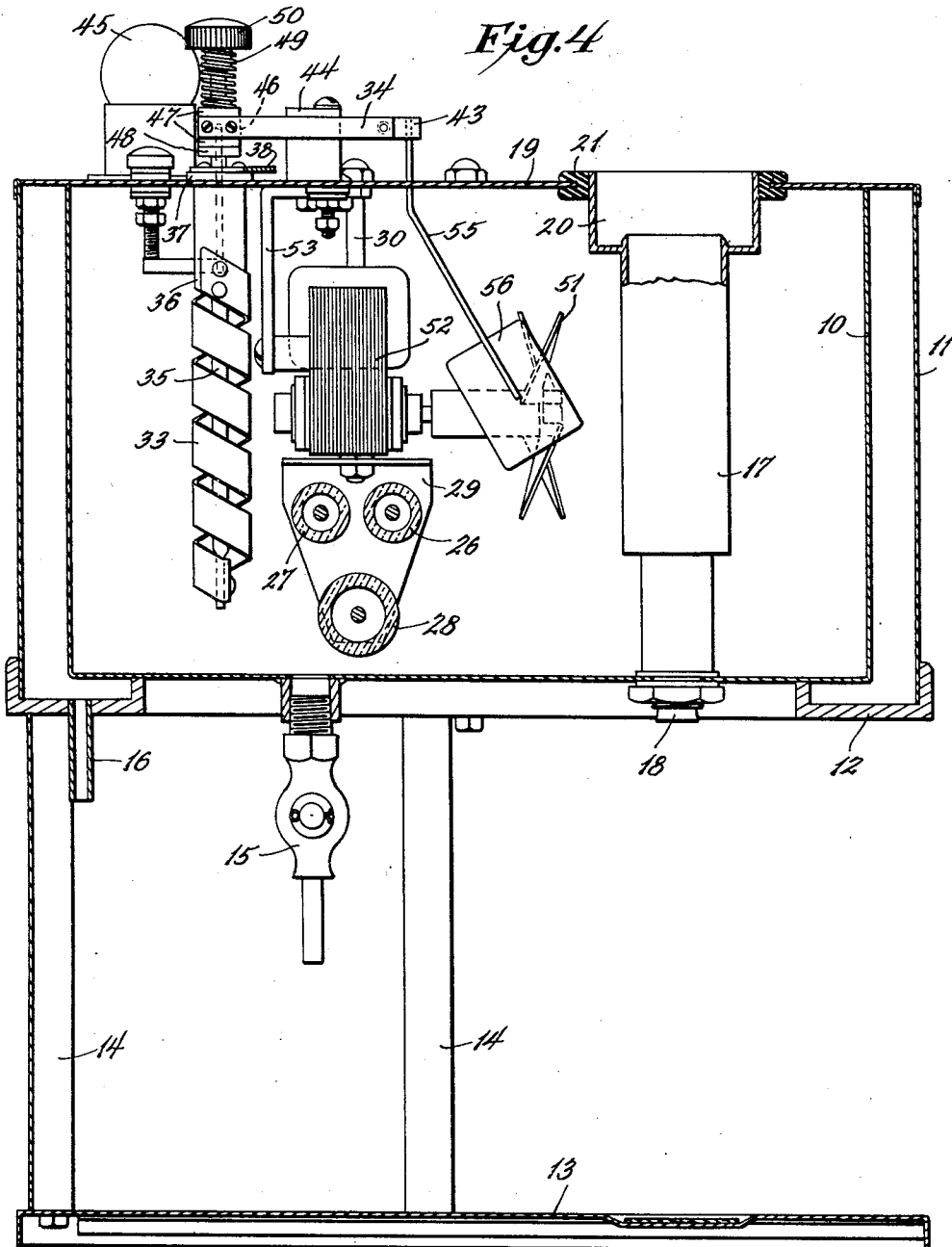
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3 Sheets-Sheet 3



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THERMOSTATIC SWITCH FOR
SCIENTIFIC BATHS

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6 Claims. (Cl. 219—20)

This invention relates to scientific baths wherein the temperature of an electrically heated liquid or heat-exchanging medium is adapted to be maintained substantially constant and the heating circuit is controlled by a thermostatically operated switch. The main idea is to provide a bath or viscosimeter having an agitator in the liquid and means responsive to the turbulence of the liquid to prevent the contacts of the thermostatically operated switch from fusing together or sticking.

Other aims and advantages of the invention will appear in the specification, when considered in connection with the accompanying drawings, wherein:

Fig. 1 is a top plan view of a viscosimeter embodying the invention;

Fig. 2 is a wiring diagram of an electrical heating circuit employed in the viscosimeter;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1; and

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3.

In electrically heated water and oil baths, such as viscosimeters, wherein the heating circuit is controlled by a thermostatically operated switch, considerable difficulty has been encountered on account of the contacts fusing and sticking when they close and open. To obviate sticking, it is necessary to provide means for vibrating or oscillating switch contacts relative to each other. In accordance with this invention, vibratory movement is imparted automatically to one of the contacts which controls the heating circuit of the bath in response to the turbulence of the heat exchanging liquid or oil in the bath, thereby eliminating any mechanical driving or operating connections for the contact.

In the present example, there is shown a bath including an ordinary container 10 for the oil or heat-exchanging liquid carried in an insulating cylindrical housing 11 which is supported in an annular channel 12 at the bottom. The channel is supported above a base 13 by an ordinary arcuate shield or apron secured to uprights or standards 14 (Fig. 4). The arrangement is such that a working space or opening is provided at the front between the bottom of the bath and the base. The oil or other heat-exchanging medium is adapted to be poured into the bath and emptied through a faucet 15. Any water of condensation is adapted to be drained from the insulating jacket through a nipple 16.

An ordinary standard oil testing tube 17 is shown as being removably secured in the bottom

of the container 10 so that its stopper 18 may be removed and the contents drained into a vessel on the base. The bath is shown as having a metal cover 19 which is secured in place by ordinary tie bolts projecting through the insulating air space or channel and the annular channel 12 at the bottom. The cover has an opening to accommodate or receive the overflow cup 20 of the testing tube 17. Herein, the overflow cup is closely fitted in the opening and insulated from the cover by means of a rubber grommet or gasket. This grommet also prevents any oil from splashing out of the bath or vapor from escaping through the opening around the overflow cup.

The electrical heating means and controlling attachments are all carried by the cover. Herein, the bath is adapted to be heated by a series of resistance coils 22, 23, 24 and 25 shown as being wound on three insulating tubes 26, 27 and 28 which are supported at their ends by brackets or plates 29 and suspended from the cover by rods 30. The first coil 22 has an ordinary hand switch 31 to control its circuit when initially heating the bath. After the bath is raised to approximately the desired temperature, this heating coil is cut off. The two coils 24 and 25 are shown as being tapped and controlled by a manually operated three point switch 32. The arrangement is such that the coils or the tapped parts thereof may be used to maintain the bath at nearly the desired or working temperature selected. The coil 23 is automatically controlled by a bi-metallic, helical thermostat 33 which operates a movable contact or switch arm 34 mounted on a shaft 35 which is connected to the lower end of the thermostat.

The upper end of the thermostatic element 33 is secured to a rotatable sleeve or tube 36 having a flange 37 above the cover and it is adapted to be adjusted to vary the tension of the thermostat and the temperature at which it will respond by means of an arm 38 and an adjusting screw 39 in a post 40. The end of the arm is held against the head of the adjusting screw by means of a small leaf spring 41 secured to the cover. The contact arm 34 cooperates with a relatively stationary contact 42 supported on a spring blade and conductor 43 which, in turn, is carried by an insulating block 44 on the cover. There is shown a signal lamp 45 connected in circuit with the thermal switch to show when the switch is closed.

Incidentally, the contact arm 34 is frictionally held on the thermostatically operated shaft 35 by means of a metal block 46 insulated from the shaft and carried between a pair of insulating

washers 47. The shaft has a flange 48 which supports the lower fibre or insulating washer and the washers are held in frictional engagement with the block for the contact arm by means of a compression spring 49 mounted on the projecting upper end of the shaft against a knob 50 secured to the shaft. This knob is knurled and may be used to adjust the contact arm for any selected temperature. The frictional connection permits the contact arm to slip on the shaft when the bath cools and thereby prevents breakage of the parts.

The oil bath is agitated by means of a propeller 51 to maintain the temperature throughout the bath substantially uniform. It is shown as being driven by a small submerged motor 52 suspended by bracket arms 53 from the cover. In this instance, the turbulent liquid near the propeller is utilized to vibrate the relatively stationary contact arm 42 and prevent the contact points from welding or fusing together. For that purpose, there is shown a small insulating block 54 secured to the spring blade 43 and carrying a stem 55 projecting downwardly through the cover into the bath and carrying a vane 56 near one side of the propeller. However, it is to be understood that the vane may be arranged anywhere in the bath and will vibrate in response to turbulence of the liquid created by a propeller. It imparts very rapid vibrations to the spring-supported contact and is very effective to prevent fusing and sticking.

The electrical heating circuit is adapted to be connected to an ordinary source of current or outlet by means of a lamp cord (not shown) connected to terminals 57 secured to and suitably insulated from the cover. It will be understood that all of the necessary parts of the circuit are properly insulated, the usual shading for insulation being omitted for the purpose of clarity, since the insulation forms no part of the present invention.

The operation of the viscosimeter shown will be obvious to those skilled in the art. The temperature of the bath, as it is initially heated, is measured by an ordinary thermometer (not shown) inserted through the usual thermometer opening (Fig. 1). When the desired temperature is reached, the switches are operated so that the temperature is controlled automatically by the thermostat. The thermostat then intermittently opens and closes the switch to maintain the temperature substantially constant as long as the bath is used.

Obviously, the present invention is not restricted to the particular embodiment thereof herein shown and described. Moreover, it is not indispensable that all the features of the invention be used conjointly, since they may be employed advantageously in various combinations and sub-combinations.

What is claimed is:

1. In a scientific bath wherein the temperature of a heat-exchanging liquid is controlled by a

thermostatically operated electrical switch, an agitator in the bath; and means in the bath responsive to the turbulence of the liquid connected to the switch to impart vibrations to a portion thereof and thereby prevent the contacts of the switch from fusing together as the switch opens and closes.

2. In a scientific bath wherein the temperature of a heat-exchanging liquid is controlled by a thermostatically operated electrical switch, an agitator in the bath; and a vane in the bath connected to impart vibratory movement to a portion of the switch due to the turbulence of the liquid to prevent the contacts of the switch from fusing together as the switch opens and closes.

3. In a scientific bath wherein the temperature of a heat-exchanging liquid is controlled by a thermostatically operated electrical switch, a motor-driven agitator in the bath; a vane in the bath near the agitator connected to impart vibratory movement to a portion of the switch due to the turbulence of the liquid to prevent the contacts of the switch from fusing together as the switch opens and closes.

4. In a scientific bath of the class described wherein the bath is heated electrically and the temperature is controlled by a thermostatically operated switch, means supporting one contact of the switch for vibratory movement relative to the other contact; a motor-driven agitator suspended in the bath; a vane in the bath in the vicinity of the agitator having an arm connected to said vibratory contact to impart vibratory movement thereto due to turbulence of the liquid to prevent the contacts of the switch from fusing together as the switch opens and closes.

5. In a scientific bath of the class described wherein the bath is heated electrically and the temperature is controlled by a thermostatically operated switch, a spring blade supporting a stationary contact of the switch for vibratory movement; means to agitate the liquid; and means operable by the turbulence of the liquid connected to impart vibratory movement to said stationary contact to prevent the contacts of the switch from fusing and sticking as the switch opens and closes.

6. In an electrically heated scientific bath having a removable cover from which electrical heating means is suspended; a thermostatically operated switch on the cover connected to control a portion of the heating means and having one contact arm controlled by the thermostat and a relatively stationary contact; a spring blade supporting the stationary contact for vibratory movement; a motor-operated agitator suspended from the cover in the bath; and a vane in the bath near the agitator having an arm projecting through the cover and connected to said stationary contact to impart vibratory movement to the contact to prevent the contacts from fusing together and sticking as the switch opens and closes.

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