Nov. 17, 1936. E. W. EVANS 2,061,513

THERMOSTATIC SWITCH

Filed Oct. 4, 1934

Fig. 1.

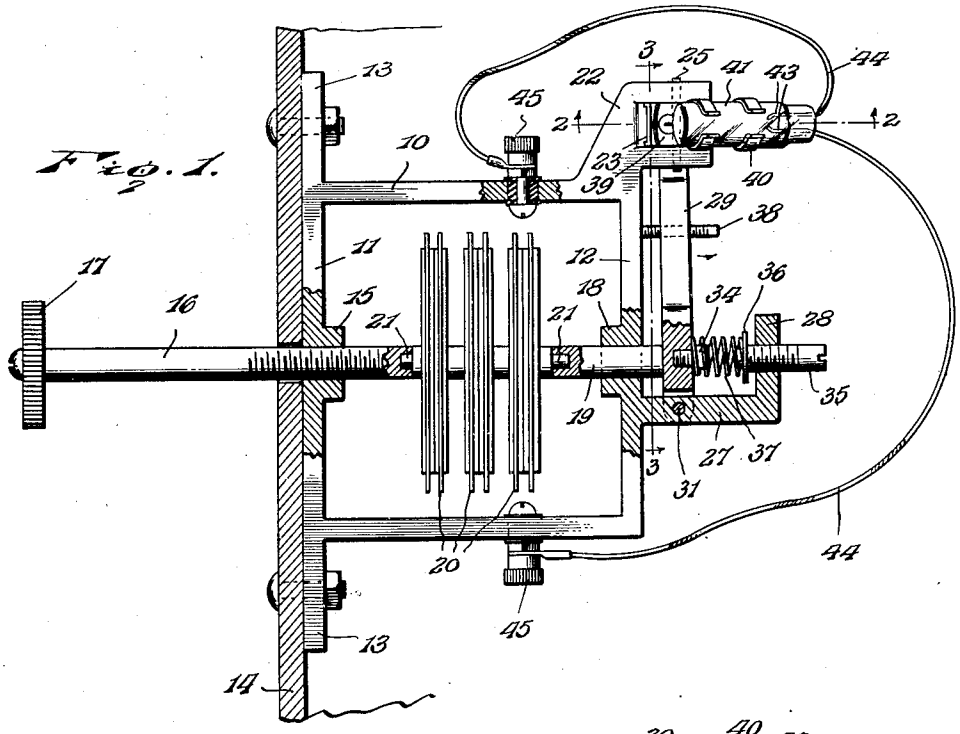


Fig. 2.

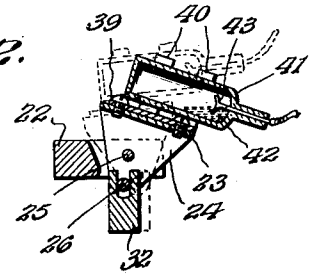
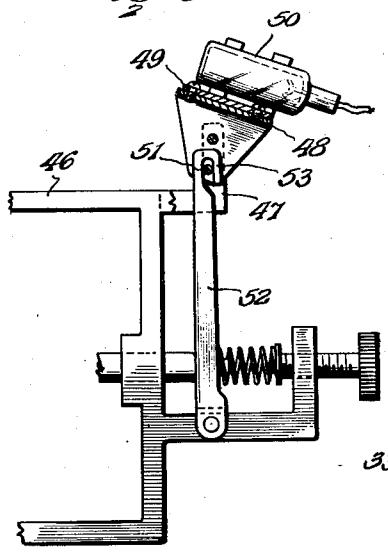


Fig. 5.



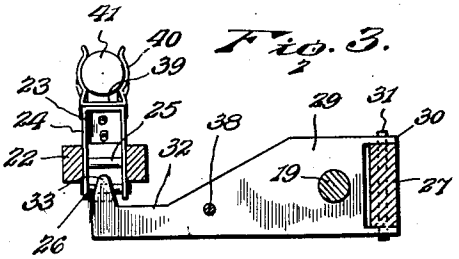
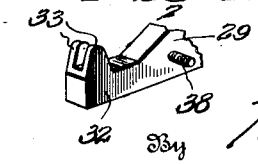


Fig. 3.

Fig. 4.



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THERMOSTATIC SWITCH

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Application October 4, 1934, Serial No. 746,907

3 Claims. (Cl. 200—140)

This invention relates to an improved thermostatic switch for incubators and while being particularly designed to be employed in connection with the structure shown in my co-pending application for Vaporizing mechanism for incubators filed January 29, 1934, Serial No. 708,896 is, nevertheless, well adapted for general use.

A salient object of the invention is to provide a thermostatic switch which will be more or less sensitive and thus adapted to maintain the temperature of an incubator relatively constant.

A further object of the invention is to provide a switch wherein but slight expansion of the thermostatic element employed will be sufficient to open the switch and similarly, wherein but slight contraction of said element will permit the switch to again be closed.

Another object of the invention in this connection is to provide a switch wherein the mercury tube employed will be mounted on a rocker movable to shift the tube from either side of the pivotal center of the rocker to the other to effect opening and closing of the switch and wherein the expansive movement of the thermostatic element will be transmitted through a lever in such a way that but a relatively slight expansion of said element will serve to swing the lever and actuate the rocker.

And the invention seeks, as a still further object, to provide a switch which is dependable so that no fear need be entertained of overheating the incubator, which may be set to function at any desired temperature and which will eliminate arcing.

Other and incidental objects of the invention will appear as the description proceeds and in the drawing forming part of this application.

Figure 1 is a top plan view of my improved switch, parts being broken away and shown in section.

Figure 2 is a detail sectional view on the line 2—2 of Figure 1.

Figure 3 is a detail sectional view on the line 3—3 of Figure 1.

Figure 4 is a fragmentary perspective view particularly showing the lugs employed on the free end of the rocker actuating lever, and

Figure 5 is a fragmentary side elevation showing a slightly modified form of the invention.

In carrying the invention into effect, I employ a rectangular frame embodying side bars 10 connected by end bars 11 and 12 respectively. The end bar 11 is continued to provide lateral lugs 13 at the rear corners of the frame and these lugs are apertured to accommodate bolts or the like for securing the device against the inner face of a wall of an incubator, such a wall being conventionally illustrated at 14.

Formed on the end bar 11 of the frame is a bearing 15 and screwed through said bearing is an adjusting screw 16. As will be observed, the screw 16 extends freely through the wall 14 of the incubator and removably fixed to the outer end of said screw is an appropriate handle 17. Formed on the end bar 12 of the frame is a bearing 18 and slidable freely through said bearing is a plunger 19 aligning with the screw 16.

Removably mounted between the inner ends of the screw 16 and plunger 19 is a thermostatic element 20. This thermostatic element may be of any appropriate character but preferably comprises spaced pairs of expansible wafers, as shown, connected axially to provide a unit and projecting from the front and rear wafers are studs 21 which are accommodated in suitable sockets in the inner ends of the plunger and screw for supporting the thermostatic element therebetween.

Formed on the frame at one of the forward corners thereof is a forwardly projecting yoke 22 extending in a plane with the frame and pivoted between the sides of said yoke is a channel shaped rocker 23, preferably of sheet metal. As best shown in Figure 2, this rocker is provided with triangular shaped side flanges 24 which, as brought out in Figure 3 are more or less snugly received between the sides of the yoke 22 and extending through the sides of the yoke and through said flanges is a pivot pin 25 freely supporting the rocker for pivotal movement. Extending transversely through the lower ends of the flanges 24 below the pin 25 and in parallel relation thereto is a pin 26 suitably fixed to the flanges.

Formed on the end bar 12 of the frame adjacent the bearing 18 is a forwardly projecting L-shaped arm 27 lying in a plane with the frame and provided at its outer end with a laterally projecting terminal 28 extending in parallel relation to said end bar. Pivoted upon the arm 27 is a lever 29 for actuating the rocker 23. As best shown in Figure 3, the lever is provided at its inner end with lugs 30 which straddle the arm and extending through the arm and through said lugs is a pin 31 pivotally supporting the lever. The lever thus extends in front of the plunger 19 so that the plunger will coact therewith and is reduced in width toward its free end to provide a terminal 32 extending beneath the yoke 22 at a right angle thereto. Formed on the terminal 32 of the lever, as particularly seen in Figure 4, is a pair

of upstanding lugs 33 which, as brought out in Figure 2, straddle the pin 26 of the rocker 23. Thus, as will be seen, when the lever 29 is swung, the rocker will be actuated.

Screwed into the forward side of the lever 29 near its lower end is a stud 34 aligning with the plunger 19 and extending through the terminal 28 of the arm 27 is an adjusting screw 35 aligning with said stud and provided with a collar 36. Fitting at one end over the stud 34 is a spring 37 resting at its opposite end against said collar so that, as will be seen, the screw 35 may be adjusted for tensioning said spring. The spring 37 will, of course, tend to swing the lever toward the frame and extending through the free end portion of the lever is an adjustable stop screw 38 to coact with the end bar 12 of the frame for limiting the lever in its movement under the influence of said spring.

Attached by screws or otherwise removably fixed to the rocker 23 is a mercury tube holder 39 having spaced pairs of upstanding spring fingers 40 and removably clamped between said fingers is a mercury tube 41 containing a drop more or less of mercury 42. Extending into the tube at the forward end thereof are spaced terminals 43 and connected to said terminals are circuit wires 44. Mounted upon the side bars 10 of the frame, but insulated therefrom, as seen in Figure 1, are binding posts 45 to which the wires 44 are attached so that the switch may thus, as will be appreciated, be easily connected in the circuit of an electric heater for the incubator.

When the switch is closed, the rocker 23 stands in the full line position shown in Figure 2 so that the mercury tube 41 is thus tilted downwardly at its forward end. Accordingly, the drop of mercury 42 will contact the terminals 43 to close the circuit therebetween. When the thermostatic element 20 expands, however, the plunger 19 will be shifted forwardly to rock the lever 29 against the tension of the spring 37. The lever 29 will thus be caused to swing the rocker 23 from the full line position of Figure 2 to the dotted line position shown. Accordingly, the mercury tube 41 will be tilted downwardly at its rear end so that the drop of mercury 42 will collect in the rear end of the tube, thereby breaking the circuit between the terminals 43.

As the thermostatic element 20 subsequently contracts, the spring 37 will, of course, act on the lever 29 for returning the lever to its initial position so that the lever will be caused to swing the rocker 23 and return the mercury tube 41 to a position tilted downwardly at its forward end, when the drop of mercury 42 will again close the circuit through the terminals 43. The switch will thus function automatically and, of course, the tension of the spring 39 may be regulated by adjusting the screw 35. As the screw 16 forms an abutment for the thermostatic element 20, this screw provides a means, as will be readily appreciated, for varying the temperature at which the lever 29 is swung for actuating the rocker 23 and opening the switch and, of course, the screw may be readily adjusted at the exterior of the incubator.

Attention is now directed to the fact that only a slight movement of the lever 29 is required to swing the free end of the lever across the pivotal center of the rocker 23. Furthermore, as the plunger 19 coacts with the lever near the pivoted end thereof, a correspondingly slight forward movement of said plunger is required to swing the lever. As a result, only a slight expansion of the thermostatic element is required to open the switch, thus making the switch sensitive and highly responsive to changes in temperature within the incubator. Furthermore, as the pin 26 is located close to the pivot pin 25 of the rocker, movement of the lever 29 will cause the free end thereof to quickly swing the rocker from either side of the pivotal center thereof to the other with a correspondingly quick making and breaking of the circuit.

In Figure 5 of the drawing, I have shown a slight modification of the invention. In this modification, the frame 46 is mounted in a vertical plane. This frame is identical with the frame previously described with the exception that the frame 46 is provided at its upper forward corner with an upstanding yoke 47. Pivoted between the sides of said yoke is a rocker 48 like the rocker 23 and which carries a tube holder 49 like the tube holder 39. Carried by the tube holder 49 is a mercury tube 50 like the tube 41.

The rocker 48 is equipped with a pin 51 like the pin 26 and coacting with said pin is a lever 52 like the lever 29 with the exception that the lever 52 is provided at its free end with a hook 53 which engages over the pin 51. In thus employing a hook at the free end of the lever 52, the use of a stop screw on said lever like the screw 38 is rendered unnecessary, the hook being adapted to coact with the pin 51 for limiting the lever in its movement toward the frame. Otherwise, this modification of the invention is identical with the construction previously described and as it functions in like manner, further description is believed unnecessary.

Having thus described the invention, I claim:

1. A thermostatic switch including a frame, a rocker pivoted thereon, means mounted on the rocker and movable thereby for making and breaking a circuit, a pivoted lever coacting at its free end with the rocker for actuating the rocker, a plunger supported by the frame and coacting with the lever near the pivot point thereof, a screw carried by the frame, a thermostatic element mounted between and supported by said screw and plunger and expansible for swinging the lever in one direction, and yieldable means for swinging the lever in the opposite direction, said screw being adjustable for varying the temperature at which the rocker is actuated by said lever under the influence of said element.

2. A thermostatic switch including a frame having a yoke thereon, a channel shaped rocker pivoted between the sides of said yoke, a pin carried by the rocker adjacent the pivot point thereof, an arm projecting from the frame, a lever pivoted upon said arm and at its free end engaging said pin for swinging the rocker from either side of its pivotal center to the other, means mounted on the rocker and movable thereby for making and breaking a circuit, a plunger slidable through the frame to coact with the lever near the pivot point thereof, a screw carried by the frame in alignment with said plunger, a thermostatic element mounted on the screw and plunger therebetween and expansible for swinging the lever in one direction, a screw adjustable on said arm, and a spring interposed between the latter screw and said lever and operable for swinging the lever in the opposite direction, said first mentioned screw being adjustable

for varying the temperature at which the lever is swung under the influence of said element.

3. A thermostatic switch including a frame, a rocker pivoted thereon, means mounted on the rocker and movable thereby for making and breaking a circuit, a pivoted lever for actuating the rocker, a plunger slidable in the frame to coact with the rocker, a screw carried by the frame in alignment with the plunger, a thermostatic element supported by said screw and plunger therebetween and expansible for rocking the lever in one direction, and a spring coacting with the lever in alignment with the plunger for swinging the lever in the opposite direction.

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