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THERMALLY OPERATED ELECTRIC SWITCH

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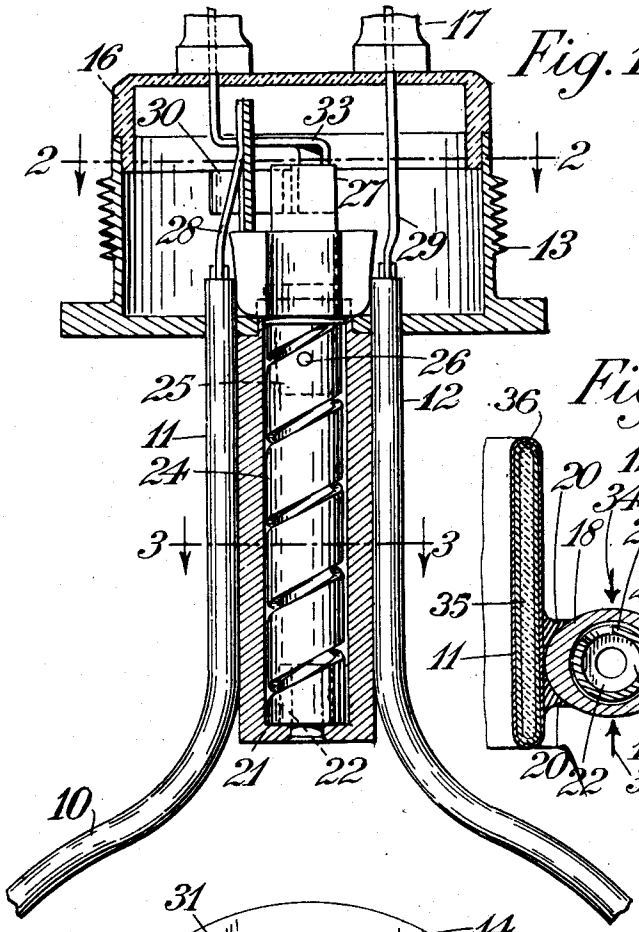


Fig. 1.

Fig. 3.

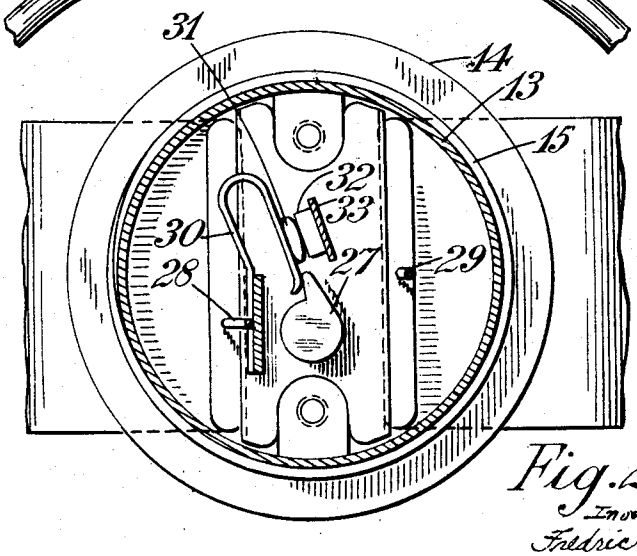


Fig. 2.

Inventor:
Fredric L. Best

Watson, Cole, Grindle & Watson
Attys.

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THERMALLY OPERATED ELECTRIC SWITCH

Fredric Lafargue Best, Felixstowe, England, assignor to Best Products Limited, Felixstowe, England, a British company

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1 Claim. (Cl. 219—38)

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This invention relates to thermally operated electrical switches and has for its object to provide an improved construction and arrangement which is suitable for various purposes. It may for example be used as a safety-switch in association with an immersion heating element.

In the accompanying drawings, a switch in accordance with this invention is illustrated as arranged to constitute a safety switch for an immersion heater. In the drawings:

Figure 1 is a sectional view showing the improved safety-switch mounted on an immersion heating element,

Figure 2 is a section on the line 2—2 of Figure 1, and

Figure 3 is a section on the line 3—3 of Figure 1.

The heating element of an electric kettle or like vessel is constructed in the form of a loop 10 of circular or any other desired shape, and comprises an electrical resistance 35 embedded in a refractory insulator 36 in a metal tube, the two ends of the loop 11, 12 being secured in a suitable watertight manner in the heater-head 13 which is itself secured to the wall of the kettle. This head 13 is provided with a flange 14 which is located on the inner surface of the wall of the kettle, and the cylindrical part of the head extends through a hole in the wall and is clamped thereto by a nut screwed on to the threaded part 15 on the outside of the wall of the kettle. This head carries at its outer end a terminal plate 16 carrying contact pins 17 or other suitable means whereto connection is made from the supply-mains.

The ends 11, 12 of the heating element adjacent the head 13 are made straight and parallel with one another, and a tubular casing 18 is mounted between them so as to lie in contact or close to each of them. As shown in Figure 3 this casing is of oval external shape with a central cylindrical bore 19, but any other desired shape may be used. It is soldered or brazed as shown at 20 to the ends 11, 12 of the element throughout its length, so that it is in good thermal contact therewith. This casing 18 also makes a watertight joint with the heater-head 13, and opens into an aperture therein. The other end of the casing at 21 is closed, and has placed in it a ferrule 22 of copper, copper alloy or brass, which is a good conductor of heat, and resilient.

A helix 24 formed from a bi-metallic strip is mounted in the casing 18 and its inner end is anchored thereto by clinching it on the ferrule 22, this clinching being effected by pressure on the outside of the casing in the direction indicated by the arrows 34 in Figure 3. The other, free end of the helix lies near the open end of its casing 18 and a shank 25 is secured therein by a transverse pin 26, this shank extending outwards into the heater-head 13, where it carries an arm or cam-like member 27, see Figure 2.

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The connecting-leads for the resistance in the element 10 are indicated at 28, 29 respectively and one of them as shown at 29 is connected directly to the terminal pin 17; the lead 28 is connected to a flexible strip 30 which carries one contact member 31 of a switch whereof the other contact member 32 is carried on a bracket 33 which in turn is connected to the second contact pin 17; the arm 27 carried by the helix, and the flexible strip 30, are so disposed and arranged that when the helix is distorted by a rise in temperature, the arm 27 engages the spring 30 in its rotation and separates the contacts 31, 32 thereby opening the circuit to the heating element 10. The parts are so proportioned that this opening of the circuit takes place at a temperature slightly above that of boiling water, such as would be obtained if the element were switched on when the kettle is dry or which would be obtained after the water had boiled away sufficiently to expose the element to a risk of damage by overheating.

It will be appreciated that the precise arrangement of the casing for the safety-switch on the heating element may be varied according to size and shape of the heating element, and according to the length of the casing which is required to accommodate the helix, but the essential feature is that the casing should be in good thermal contact with the heating element so that it follows substantially the temperature changes thereof and will become operative before a dangerous temperature is reached.

I claim:

In portable water-heating apparatus the combination of a liquid-containing vessel, a heater-head secured on and extending through the wall of the vessel, a pair of contact-pins carried on the outer end of said heater-head, an electric immersion heating element in the form of a loop having straight parallel end-portions which extend into the inner end of said heater-head and thereby support the element, an electric resistor in said heating element, having one end connected to one of said contact-pins, a tubular casing secured in intimate thermal contact with said parallel end-portions of said element, a ferrule within said casing, a helical bimetallic strip within said casing having one end compressed between said casing and said ferrule, a switch-con-

tact connected to the other of said contact pins, a cooperating spring-mounted switch-contact connected to one end of said resistor, a shank located in the free end of said helical strip, a pin securing said shank to said helical strip, and an arm mounted on the end of said shank away from said helical strip to engage said spring-mounted switch-contact and to open and close said switch-contact relative to said cooperating switch contact on changes of temperature of said helical strip.

FREDRIC LAFARGUE BEST.

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