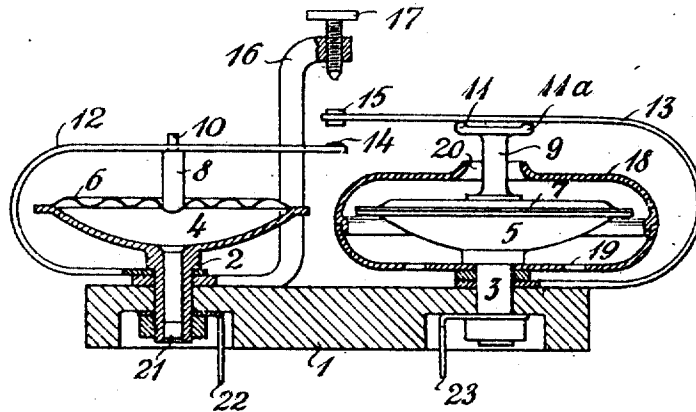


N. BENDIXEN.
THERMOSTATIC CIRCUIT BREAKER.

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1,233,746.

Patented July 17, 1917.



Witnesses

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UNITED STATES PATENT OFFICE.

NIELS BENDIXEN, OF COPENHAGEN, DENMARK.

THERMOSTATIC CIRCUIT-BREAKER.

1,233,746.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, NIELS BENDIXEN, a subject of the Kingdom of Denmark, residing at Copenhagen, Nr. 31, Gamle Kongevej, Denmark, have invented certain new and useful Improvements in Thermostatic Circuit-Breakers, and especially in devices of that nature actuated by expansion of fluid against yielding diaphragms having electric contacts arranged to move therewith.

The chief object of said invention is to provide satisfactory means for closing or opening circuit and thereby sounding an alarm when there is a sudden rise in temperature, also when there is a slow and gradual rise. To this end I employ an uninclosed liquid-containing receptacle, also an inclosed one, the former being the more exposed and therefore more immediately responsive to sudden change. The electric current follows different paths through the apparatus in the two cases, although one of the contacts and its supporting spring-arm is utilized for both.

The accompanying drawing represents a vertical central section through the apparatus, some of the parts being shown in side elevation.

To the insulating base 1 are fastened two tubular studs 2 and 3, supporting above said base two receptacles 4 and 5, having preferably the dish-form shown in said drawings and supplied with expansible fluid through the bores of said studs. This fluid may be normally liquid, expanding into a vaporous condition when sufficiently heated. For example it may be sulfuric ether or acetaldehyde. Each of said receptacles is provided with a yielding diaphragm 6 or 7, preferably stretched over the top of the same and subject on one side to the expansive action of said fluid and on the other side to the pressure of the atmosphere.

In the center of the diaphragm 6 is arranged a pin 8 which in the end opposite to the said diaphragm is provided with a reduced extension 10, which is inserted in a hole in a U-shaped spring 12. The diaphragm 7 carries at its center a firmly connected pin 9, the upper end of which is provided with two bifurcations 11 and 11^a, which in the position shown in the drawing both touch a U-shaped spring 13. One end of the spring 12 is attached to stud 2, the other end of said stud being provided with

a contact 14. Similarly one end of spring 13 is attached to stud 3, the other end of this spring being provided with a contact 15, arranged above contact 14, but normally at an interval therefrom as shown. A rod 16, which carries a contact screw 17 arranged above contact 15 at an interval adjustable by said screw, but usually greater than that between contacts 14 and 15, is electrically connected with the stud 2.

Around the receptacle 5 is placed a case 18 with openings 19 and 20 respectively in the top and bottom thereof.

The tubular studs 2 and 3, after the receptacles 4 and 5 have been filled through the same are closed by means of plugs and soldered. The said studs are connected with the two poles 22 and 23 of an electrical circuit, which includes a generator and an alarm.

This circuit closer is operated by a slight sudden rise of temperature; also by a slow and greater rise of temperature.

By a swift rise of the temperature the fluid in the receptacle 4 is vaporized, whereby the pressure of the vapor acts upon the diaphragm 6, the pin 8 and one end of the spring 12, so that the latter moves upward. The contact 14 thereby will come in touch with contact 15 and close an electrical circuit through the wire 22, the stud 2, the spring 12, the contacts 14 and 15, the spring 13, the stud 3 and the wire 23, thereby operating the alarm-bell or the like, which is inserted in the circuit.

The fluid in the receptacle 5 is only slightly influenced by the rise of the temperature, because this receptacle is protected by the case 18, so that the spring 13 and the contact 15 remain in almost unaltered position.

By a slow rise of the temperature the receptacle 5 will be heated almost as swiftly as the receptacle 4, the air circulating through the openings 19 and 20. The contacts 14 and 15 will therefore both move upward, but without touching each other. When the rise of the temperature has reached a certain height, the contact 15 will touch the screw 17, and a circuit is then closed through the wire 22, the stud 2, the rod 16, the screw 17, the contact 15, the spring 13, the stud 3 and the wire 23.

Of considerable importance to the invention is the particular shape of the pin 9

with its two bifurcations 11 and 11^a and the manner in which the latter act upon the spring 13.

When the spring 13 is in its central position—as shown in the drawing—it is touched by both bifurcations 11 and 11^a. If the temperature rises, so that the spring 13 is moved upward, it is only touched by the bifurcation 11^a, and the speed of the contact 15 is thereby increased. If the temperature is lowered, so that the spring 13 moves downward, the arm of the lever is altered, so that the speed of the contact 15 decreases. This arrangement is very advantageous for preventing errors which may arise on account of the diaphragms not being manufactured quite similarly and therefore not moving with the same speed.

Having now particularly described and ascertained the nature of my said invention, I declare that what I claim is:

1. A pair of expansible receptacles for fluid, in combination with a casing surrounding one of them, contacts carried by said receptacles respectively and arranged to control the circuit by the greater responsiveness of the uninclosed receptacle to sudden increase of temperature, an additional relatively fixed contact arranged to cooperate with the contact carried by the inclosed receptacle for controlling the circuit when a gradual increase of heat is operative on this receptacle, without closing the circuit through the contacts carried by the two receptacles as first above stated.

2. A pair of fluid-containing expanding receptacles, one of which is inclosed in a pro-

TECTIVE casing, the other being left open to the sudden action of increased temperature, contacts carried by said receptacles and arranged to close a circuit by the expansion of the latter receptacle while the former receptacle remains substantially without expansion, and an additional contact arranged to close circuit through the contact carried by the inclosed receptacle when the two receptacles expand to a certain degree under gradual rise of temperature without their contacts coming into touch with each other.

3. A pair of receptacles for fluid provided with expansible diaphragms, in combination with tubular, electrically conducting studs for supporting and supplying such receptacles, pins carried by said diaphragms, a casing surrounding one of said receptacles and partially protecting it against heat, contacts carried by said pins, and arranged one above the other, electric connections from said contacts to said studs, circuit wires connected to the latter, an additional contact arranged to cooperate with the contact carried by said inclosed receptacle and electric connections between this latter contact and the stud supporting the other receptacle, in order that a gradual increase of heat to a certain point may close the circuit through the latter contact, though a sudden increase of heat will close circuit through the two contacts carried by the receptacles.

In witness whereof I have hereunto set my hand in the presence of a witness.

NIELS BENDIXEN.

Witness:

YAGNUS JENSEN.