Dec. 4, 1934. A. A. DURANT 1,982,984

THERMALLY CONTROLLED CIRCUIT BREAKER

Filed Nov. 12, 1932

Fig. 1.

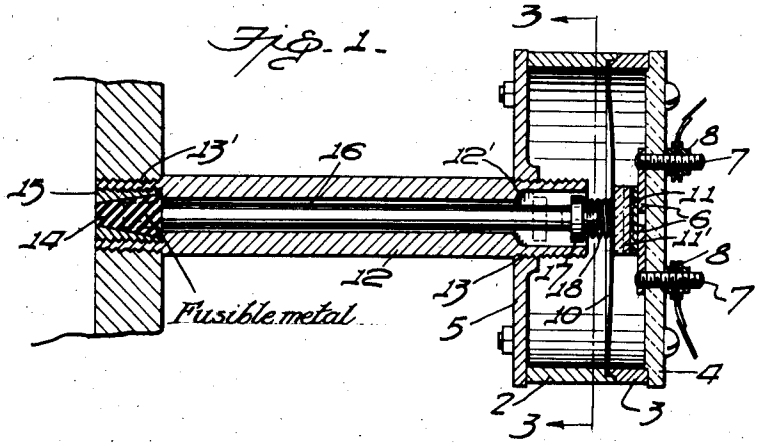


Fig. 3.

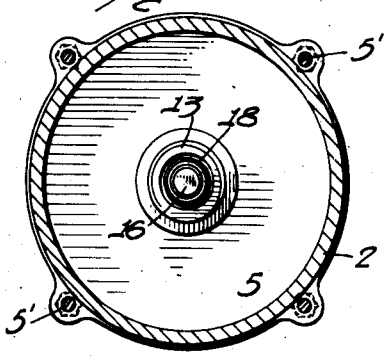


Fig. 2.

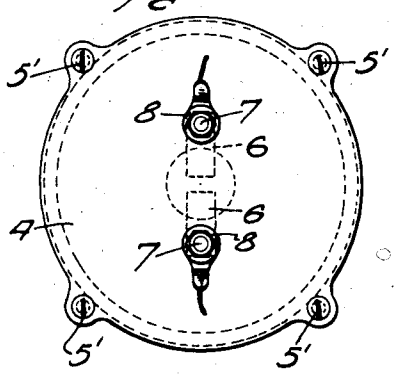
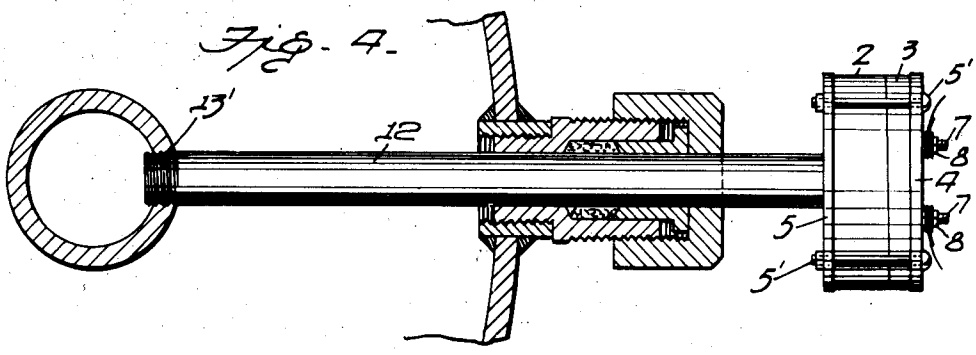


Fig. 4.



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Patented Dec. 4, 1934

1,982,984

UNITED STATES PATENT OFFICE

1,982,984

THERMALLY CONTROLLED CIRCUIT BREAKER

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Application November 12, 1932, Serial No. 642,465

6 Claims. (Cl. 200—142)

The invention relates to certain improvements in thermally controlled circuit breakers adapted to interrupt the circuit of the motor controlling the fuel supply to a boiler, heater or the like, when the water level in the heating unit falls below a certain predetermined point, which will result in the melting of a fusible plug, which, in turn, will effect a separation of the contacts in the circuit of the motor and thereby stop the supply of fuel to the boiler or heating device.

The invention is illustrated in the simplest and preferred form in the accompanying drawing, in which:—

Fig. 1 is a sectional elevation showing the device as applied to a boiler wall.

Fig. 2 is an end elevation.

Fig. 3 is a section on line 3—3 of Fig. 1.

Fig. 4 is a side elevation showing the device attached to a horizontal water-tube boiler.

Referring to the drawing, 1 indicates a casing or housing, preferably in the form of an annular box-like structure, divided into sections 2 and 3 in a plane transverse to its longitudinal axis, and fitted with end closures 4 and 5, which are connected by bolts 5′ engaging perforated lugs on the closures, said bolts serving to lock the parts of the casing together. The end closure 4 is preferably made of insulating material and has mounted on its inner face spaced fixed contacts 6, 6 which are secured in position by binding posts 7, 7 which constitute the terminal connectors for one of the leads to the electric motor which controls the fuel supply to the boiler or furnace.

Secured between the sections 2 and 3 of the casing is a diaphragm 10 having fixed to its center an insulating block 11′, carrying a bridging contact member 11 adapted to engage with and disengage from the fixed contacts 6, 6 to make and break the circuit to the electric motor aforesaid. The diaphragm 10 has a normal bias to maintain the bridging contact 11 out of engagement with the fixed contact 6.

The end closure 5 has a threaded central opening, which is engaged by the threaded end 13 of a tube 12, the opposite end 13′ of which is also screw threaded to adapt this end of the tube to be engaged with a threaded opening in the boiler wall or the like, as indicated in Fig. 1. Fixed in this end of the tube is a fusible plug, which may be of any preferred form and which, as illustrated, comprises a frusto-conical body of fusible metal 14 carried by a threaded thimble 15, which is adapted to be screwed into the interiorly threaded end 13′ of the tube.

Mounted in the tube 12 is a rod 16, one end of which engages the fusible plug and the other end projects into the casing 1 and serves to flex or distort the diaphragm 10 sufficiently to cause the bridging contact 11 to engage the fixed contacts 6. Preferably, a helical spring 18 is interposed between the end of the rod 16 and the diaphragm to insure the movement of the rod 16 in the tube 12, when the fusible plug is melted. In order to prevent the rod being completely displaced or separated from the tube, the latter is provided with an interior shoulder 12′ adapted to be engaged by a flange or collar 17 near the outer end of the rod and which limits the movement of the rod in one direction by engagement with said shoulder 12′.

Fig. 4 illustrates the device as applied to a horizontal water tube boiler in which the end 13′ of the tube is tapped into a threaded opening in the side of one of the boiler tubes, the tube 12 being passed through an opening in the boiler wall, which is provided with a suitable stuffing box. However, the construction of the device is the same as that illustrated in the preceding views, except that the tube 12 and the rod therein are necessarily longer than their corresponding elements as illustrated in Fig. 1.

In application, the device is connected to the boiler or furnace element as described, so that the plug of fusible metal 14 will be located at the low water safety limit, so that, when the water falls below the level of the fusible plug, the latter will be melted by the heat from the steam and rod 16 will be free to move longitudinally of the tube, thereby permitting the tension of the diaphragm 10 to move the latter to its normal position and separate the bridging contact 11 from the fixed contacts 6 and breaking the motor circuit and stopping the supply of fuel to the boiler or furnace. Any tendency of the rod 16 to stick in the tube 12 will be overcome by the spring 18.

It will be noted that the device is characterized by simplicity of construction and arrangement of its parts, may be manufactured at small cost and may be adjusted, repaired and applied without special tools. For example, after the apparatus has operated to effect the breaking of the motor circuit, due to the falling of the water level to the danger zone, and the fusible plug has been melted, it is only necessary to remove the device from its connection with the boiler and supply a new fusible plug to proper position to cause the rod 16 to flex the diaphragm 10 outwardly and engage the bridging contact 11 with

the fixed contacts 6, thereby closing this break in the motor circuit.

What I claim is:

1. A thermally controlled circuit breaker, comprising a casing, fixed terminal contacts carried thereby, a diaphragm in the casing having a contact member adapted to bridge the fixed contacts, said diaphragm normally tending to disengage the bridging contact from the fixed contacts, a tube supporting the casing at one end and connected with a boiler element at the other end, a fusible plug in the latter end, a rod in the tube engaging the plug, said rod being cooperable with the diaphragm to distend the latter for effecting engagement of the bridging contact with the fixed contacts, and means for moving the rod relatively to the diaphragm upon melting of the fusible plug to permit the diaphragm to return to normal position and thereby effect disengagement of the bridging contact with the fixed contacts.

2. A device as described in claim 1, in which the means for moving the rod comprises a spring interposed between the diaphragm and the adjacent end of the rod.

3. A thermally controlled circuit breaker, comprising a casing divided transversely into two sections and having end closures, a diaphragm secured between the sections, fixed contacts on one end closure, a contact on the diaphragm adapted to bridge the fixed contacts, said diaphragm when unrestrained separating the bridging contact from the fixed contacts, a tube having threaded ends to engage the other end closure and a boiler element respectively, a fusible plug in the end of the tube remote from the casing, and a rod in the tube interposed between the fusible plug and the diaphragm to distort the latter and hold the bridging contact in engagement with the fixed contact.

4. A device as described in claim 3, in which a spring is interposed between the end of the rod and the diaphragm.

5. A device as described in claim 3, in which the tube is provided with an interior shoulder and the rod with a flange to engage the shoulder to prevent separation of the rod from the tube when the plug melts.

6. A thermally controlled circuit breaker involving a casing, fixed terminal contacts carried by the casing, resilient means in the casing having a contact member adapted to bridge the fixed contacts, said means normally tending to disengage the bridging contact from the fixed contacts, a tube connected at one end to the casing and connected at its other end to a boiler element, a fusible plug in the latter end of the tube, a rod disposed in the tube in engagement with the plug, said rod being cooperable with the resilient means to distend the latter for effecting engagement of the bridging contact with the fixed contacts, and spring means interposed between the rod and the resilient means for moving said rod relatively to the resilient means upon melting of the fusible plug for permitting said resilient means to assume normal position and thereby effect disengagement of the bridging contact from the fixed contacts.

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