

Feb. 25, 1930.

F. B. COREY

1,748,330

HEAT RESPONSIVE DEVICE

Filed May 31, 1928

2 Sheets-Sheet 1

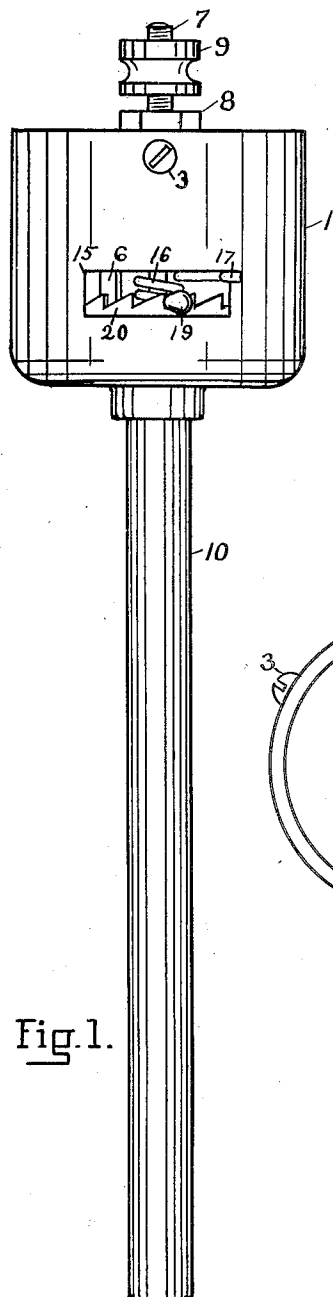


Fig. 1.

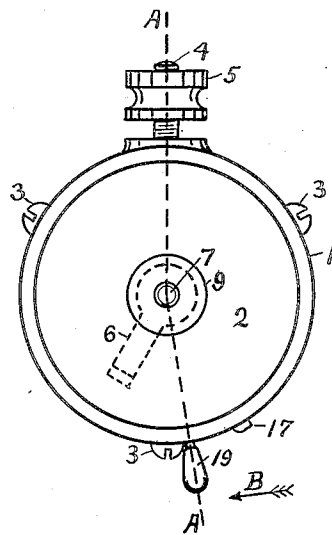


Fig. 2.

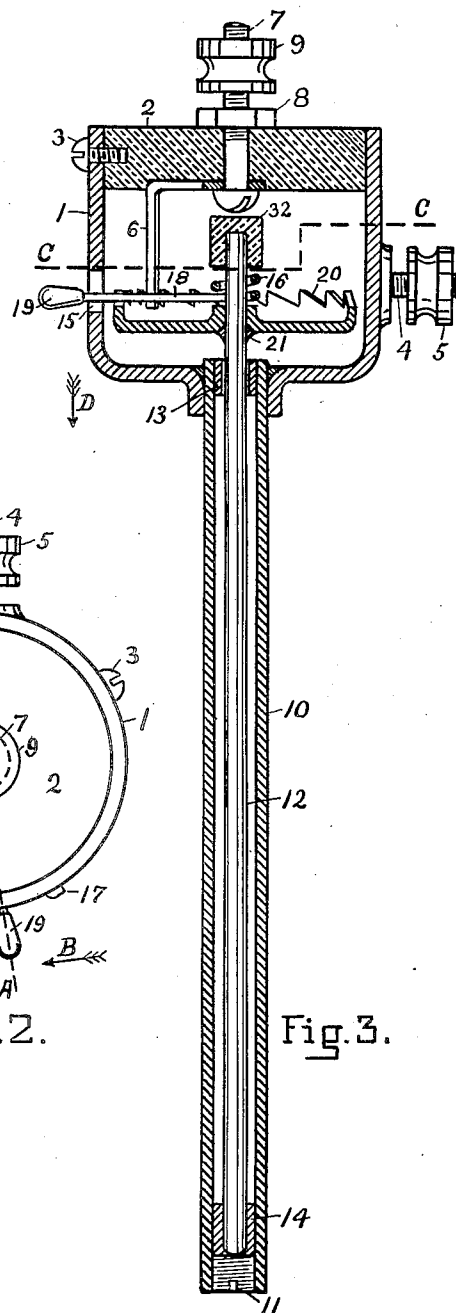


Fig. 3.

Inventor,
Fred B. Corey.

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2 Sheets-Sheet 2

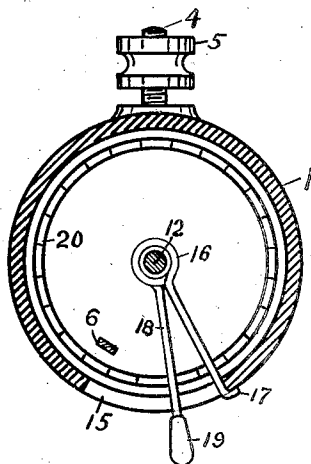


Fig. 4.

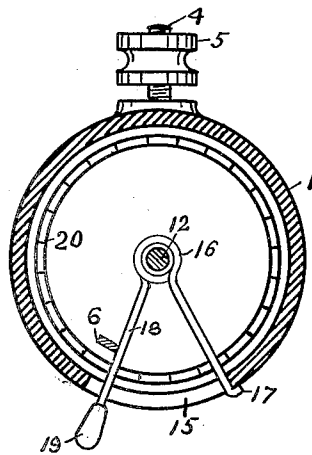


Fig. 5.

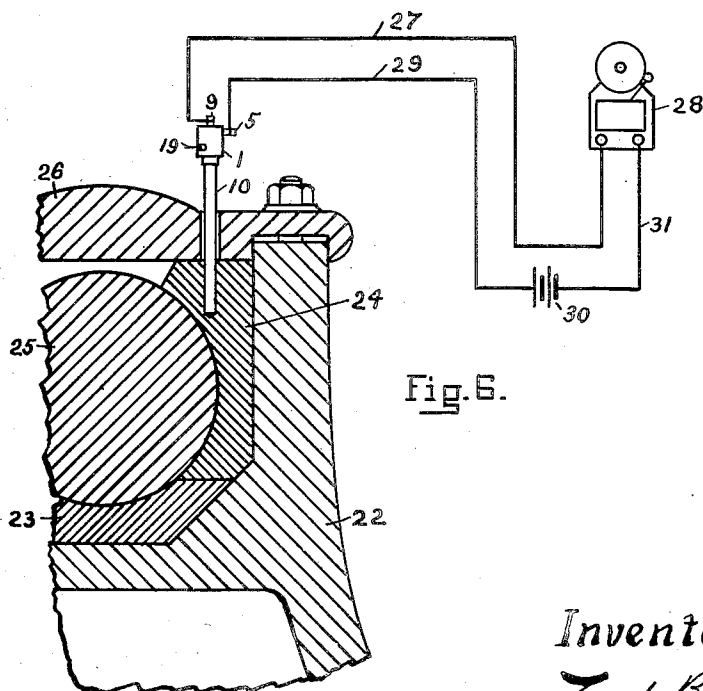


Fig. 6.

Inventor,
Fred B. Corey.

UNITED STATES PATENT OFFICE

FRED B. COREY, OF BARBERTON, OHIO

HEAT-RESPONSIVE DEVICE

Application filed May 31, 1928. Serial No. 281,992.

This invention relates to devices responsive to fixed temperatures that may be used as heat indicators or alarms and especially to such devices as are applicable to the bearings and other parts of moving machinery.

The objects of my invention are to provide a device that shall be positive in its action in giving an indication or sounding an alarm at the temperature for which the device is constructed, to provide a device that may be applied directly to a bearing shell or to other stationary or moving part of a machine or tool and to provide a device of this nature that will repeatedly operate without deterioration of its parts and without change in temperature adjustment.

My invention consists of an electric contact device having normal and alarm positions, a spring for moving the contact device from normal to alarm positions, a shaft and casing united at one end by fusible material, means whereby the spring is held in normal position by the shaft, the said shaft being turned by the said spring and the said contact device moved to alarm position when the fusible material is softened by heat, and means for resetting the spring to its normal tensioned position after solidification of the fusible material.

In the drawings which illustrate my invention, Fig. 1 is a side view of my improved heat responsive device. Fig. 2 is a top view of the same device. Fig. 3 is a partial section taken through the line A—A in Fig. 2, looking in the direction indicated by the arrow B. Fig. 4 is a sectional view taken through the line C—C in Figure 3, looking in the direction indicated by the arrow D, with the parts in normal position. Fig. 5 is a view similar to Fig. 4 except the parts are shown in alarm position. Fig. 6 is a sectional view of a machine bearing equipped with my invention, together with a diagram of the electrical connections used in my preferred method of operation.

Similar numerals refer to similar parts throughout the several views.

In the drawings, 1 is the casing of an electric switch or contact device. 2 is the top or cover, preferably made of molded in-

sulating material, which is held in place in the upper part of the casing 1 by the screws 3. Soldered or otherwise secured to the casing 1 is a screw 4 which carries the binding nut 5 forming one terminal of the contact device. Supported by the cover 2 is the stationary contact piece 6 which is held in position by means of the screw 7 and the nut 8. This screw 7 carries the binding nut 9 and forms the other terminal of the contact device. Joined to the bottom of the casing 1 is the metallic tube 10, the lower end of which is closed by the screw plug 11. Encased in the tube 10 is the shaft 12.

In Fig. 3 I have shown, in the upper end of the tube 10, a bushing 13 forming a loose journal for the shaft 12. This bushing may be omitted if the tube 10 is small enough to prevent excessive lateral movement of the shaft 12. Any rotary movement of the shaft 12 with respect to the tube 10 is normally prevented by the fusible metal 14 which serves to solder the lower end of the said shaft 12 to the closed end of the tube 10.

Loosely mounted on the shaft 12 is the spring 16. Both ends of the spring 16 project through the slot 15 in the casing 1, one end of the spring forming a hook 17 that engages one end of the slot, while the other end 18 of the spring 16 is provided with the handle 19 and is adapted to make electrical connection with the contact piece 6 when the said spring is in its released position as shown in Fig. 5. The end 18 of the spring 16 is normally held in its retracted position as shown in Fig. 4 by means of the teeth of the ratchet wheel 20. The ratchet wheel 20 is securely fastened to the shaft 12 by hard solder 21 or other suitable means. The shaft 12 is surmounted by the insulating cap 32 which serves both to limit the upward movement of the spring 16 and to prevent accidental contact between the shaft 12 or spring 16 with the terminal screw 7.

For soldering the shaft 12 to the lower closed end of the tube 10 I make use of a fusible solder which has a melting point corresponding to the temperature at which I desire to operate my alarm device. Such solders of any desired melting point from

about 150 degrees F. to 460 degrees F. may be made by alloying various proportions of cadmium, tin, lead and bismuth.

When the electric contact device is in its normal or open circuit position, as indicated by Fig. 4, heat may be applied to the lower end of the tube 10 and the temperature raised to such a degree as to melt the solder 14 and so release the shaft 12. When this occurs the spring 16 will turn the ratchet wheel 20 and shaft 12 until the end 18 of the spring meets the stationary contact piece 6, as shown in Fig. 5, thus closing the circuit between the terminal screws 4 and 7.

When the lower end of the tube 10 has cooled, the solder 14 again solidifies and the shaft 12 is again rigidly attached to the tube 10. By means of the handle 19 the spring 16 may then be returned to its normal tensioned position as shown in Fig. 4 by engaging another tooth of the ratchet wheel 20.

A useful application of my invention is shown in Fig. 6, in which 22 is a machine part supporting the boxes or journal sections 23 and 24 which form part of the bearing of the shaft 25. The bearing is covered by the cap 26 in the usual manner. Holes are drilled in the cap and bearing so that the end of the tube 10 may be placed in contact with the journal box at a point near to the bearing surface, as shown in Fig. 6. The wire 27 connects the binding nut 9 to the electric bell 28, the wire 29 connects the binding nut 5 to the battery 30 and the wire 31 connects the battery 30 to the bell 28. In case the bearing becomes abnormally heated the solder at the bottom of tube 10 will be melted and the bell circuit will be closed by the action above described. The ringing of the bell calls attention to the overheating of the bearing before the temperature has risen enough to cause damage to the machine.

In order to determine if the battery, bell and circuits are in proper condition, it is necessary only to raise the handle 19 and then move it to the left until the circuit is closed as shown in Fig. 5. The alarm will then be sounded if all is in working order and the device may then be set in its normal position as shown in Fig. 4. It is obvious that any desired form of electrical indicating device may be substituted for the bell 28.

While I have described my invention as embodied in concrete form and as operating in a specific manner in accordance with the provisions of the patent statutes, it should be understood that I do not limit my invention thereto, since various modifications thereof will suggest themselves to those skilled in the art without departing from the spirit of my invention, the scope of which is set forth in the annexed claims.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. In a heat responsive circuit closing de-

vice, a metallic casing, a cover of insulating material closing the upper end of said casing, a contact piece supported by said cover, a shaft within said casing, a fusible connection between said shaft and casing, a notched wheel mounted on said shaft and a spring acting on said wheel to turn said shaft and form an electrical connection between said shaft and said contact piece when said fusible connection is melted.

2. In a heat responsive circuit closing device, a metallic casing, a circuit terminal in electrical connection with said casing, a second circuit terminal insulated from said casing and joined to a contact piece in the interior of said casing, a shaft within said casing, a fusible connection between said shaft and casing, a notched wheel secured to said shaft and a spring surrounding said shaft and engaging said casing and a notch of said wheel and adapted to turn said wheel and engage said contact piece when said fusible connection is melted.

3. In a heat responsive circuit closing device, a metallic casing, a contact piece within said casing and insulated therefrom, a shaft within said casing and a notched wheel carried thereby, a fusible connection between said shaft and said casing, a spring engaging said casing and one notch of said wheel and adapted to turn said wheel and engage said contact piece when said fusible connection is melted, and a handle attached to said spring and projecting from said casing, said handle being adapted to move said spring out of engagement with said contact piece and into engagement with another notch of said wheel when said fusible connection is solidified.

4. In a heat responsive circuit closing device, a metallic casing, a cover of insulating material closing the upper end of said casing, a circuit terminal attached to said casing, a second circuit terminal attached to said cover, a contact piece within said casing and connected to said second circuit terminal, a shaft within said casing, a fusible connection between said shaft and casing, a notched wheel mounted on said shaft and a spring acting on said wheel to turn said shaft and form an electrical connection between said shaft and said contact piece when said fusible connection is melted.

5. In a heat responsive circuit closing device, a metallic casing, a cover of insulating material closing the upper end of said casing, a contact piece supported by said cover, a shaft within said casing, a fusible connection between said shaft and casing, a notched wheel mounted on said shaft, a spring acting on said wheel to turn said shaft and form an electrical connection between said shaft and said contact piece when said fusible connection is melted, and a handle attached to said spring and projecting from said casing, said

handle being adapted to move said spring and break the electrical connection between said shaft and said contact piece when said fusible connection is solidified.

5 6. In a heat responsive circuit closing device, a metallic casing, a circuit terminal in electrical connection with said casing, a second circuit terminal insulated from said casing and joined to a contact piece in the interior of said casing, a shaft within said casing, a fusible connection between said shaft and casing, a notched wheel secured to said shaft, a spring surrounding said shaft and engaging said casing and one notch of said wheel and adapted to turn said wheel and engage said contact piece when said fusible connection is melted, and a handle attached to said spring and projecting from said casing, said handle being adapted to move said spring out of engagement with said contact piece and into engagement with another notch of said wheel when said fusible connection is solidified.

10 7. In a heat responsive circuit closing device, a metallic casing, a cover of insulating material closing the upper end of said casing, a circuit terminal attached to said casing, a second circuit terminal attached to said cover, a contact piece within said casing and connected to said second circuit terminal, a shaft within said casing, a fusible connection between said shaft and casing, a notched wheel mounted on said shaft, a spring acting on said wheel to turn said shaft and form an electrical connection between said shaft and said contact piece when said fusible connection is melted, and a handle attached to said spring and projecting from said casing, said handle being adapted to move said spring and break the electrical connection between said shaft and said contact piece when said fusible connection is solidified.

15 In witness whereof, I have hereunto set my hand this 29th day of May, 1928.

20 FRED B. COREY.