Dec. 12, 1933. E. M. POST, JR., ET AL 1,938,858

THERMAL RELAY FOR REFRIGERATING MECHANISMS

Filed Aug. 13, 1932

Fig. 1

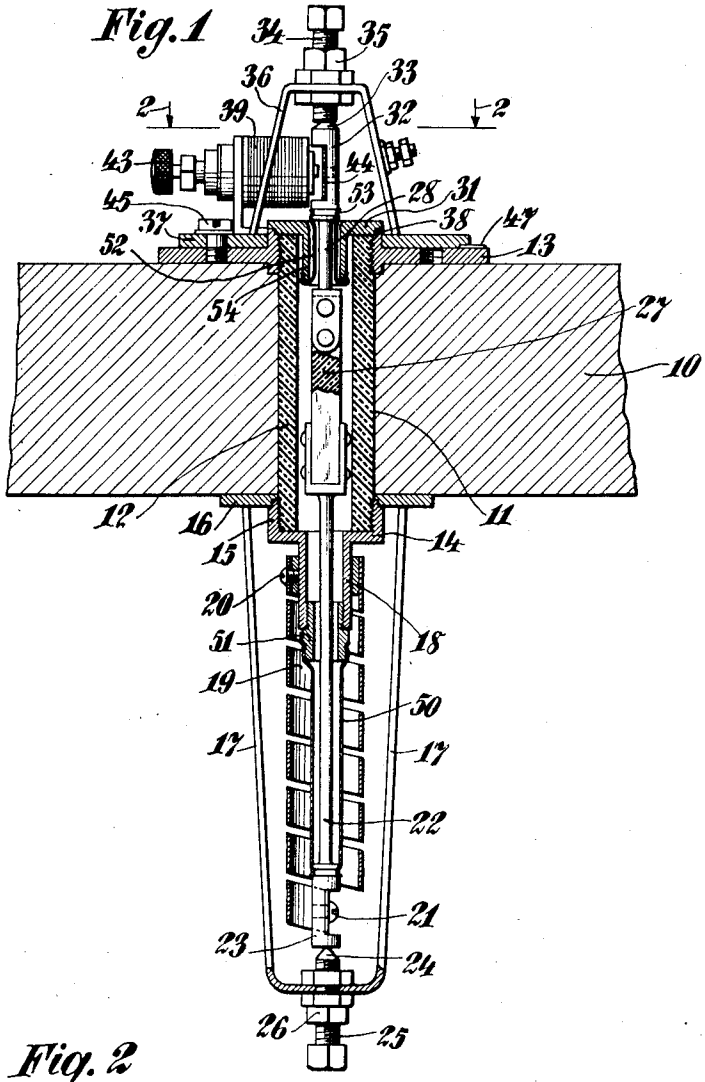
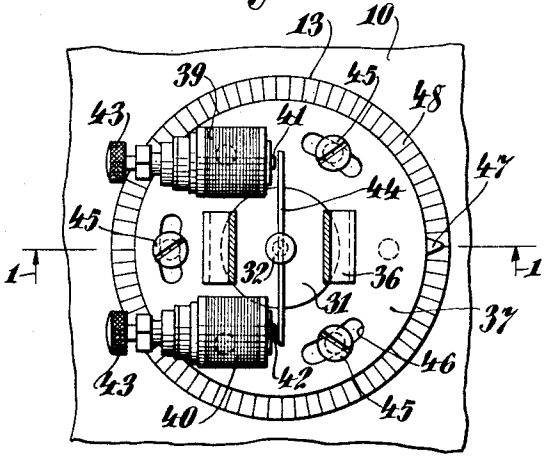


Fig. 2



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THERMAL RELAY FOR REFRIGERATING MECHANISMS

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3 Claims. (Cl. 200—138)

The present invention relates to electrical contacting devices and embodies, more specifically, an improved contact mechanism which is heat responsive and adapted for use in operating refrigerating mechanisms. More particularly, the invention embodies an improved thermal relay for use in refrigerating mechanisms, such relay being provided with a means for conveniently varying the sensitivity thereof.

It has been found in commercial refrigeration, that considerable difficulty is experienced in providing an effective thermal relay for controlling the electrical system of refrigerating mechanisms. An object of the present invention is to provide an electrical contact mechanism wherein a contact is actuated by a heat responsive element, a convenient and effective means being provided to afford adjustment of the sensitivity of such element.

A further object of the invention is to provide a thermal element contacting mechanism wherein the thermal element is so mounted that the same may function effectively with but a very limited extent of motion thereof.

A further object of the invention is to provide a thermal element and contacting device actuated thereby, the mechanism being of such character that the contacts are not inadvertently actuated, due to jarring or vibration of the mechanism.

A further object of the invention is to provide a device of the above character wherein means is provided to prevent excessive arcing at the contacts.

Further objects, not specifically enumerated above, will be apparent as the invention is described in greater detail in connection with the accompanying drawing, wherein:

Figure 1 is a view in transverse section taken on line 1—1 of Figure 2, and looking in the direction of the arrows, showing a thermal contacting mechanism constructed in accordance with the present invention.

Figure 2 is a plan view in section, taken on line 2—2 of Figure 1, and looking in the direction of the arrows.

The present relay or contacting device is adapted for use in connection with the refrigerating apparatus and electrical system shown in applicant's copending applications Ser. No. 627,310 filed August 3, 1932 and Ser. No. 627,311 filed August 3, 1932. Inasmuch as the present invention comprises the relay or contacting mechanism only, a detailed description of the mechanical features of the refrigerating mechanism, as well as the electrical connections and apparatus, is unnecessary herein.

The wall of a refrigerating compartment is indicated at 10 and provided with an aperture 11 extending therethrough into which a tube 12 is fitted. Tube 12 is threaded at each end and is adapted to be secured to a plate 13 at one end and a fitting 14 at the other. Fitting 14 is formed with a cylindrical internally threaded portion 15 which is secured to the tube 12 and bears against a plate 16 upon which arms 17 of a bearing bracket are formed.

Fitting 14 is further formed with a tube 18 upon which one end of a thermal element 19 is adapted to be secured as at 20. The thermal element 19 is shown as being formed as a helix, the free end of which is secured at 21 to a spindle 22. Spindle 22 is provided with an enlarged head 23 which is journaled upon a cone-shaped bearing member 24, formed upon a set screw 25. Set screw 25 is suitably secured to the brackets 17 and locked in position by means of a lock nut 26. The other end of spindle 22 is secured to an insulating shaft 27 which is received within tube 12 and connected to a shaft section 28. A cap 31 is mounted over the end of the tube and is formed with an inwardly extending portion 54. Shaft section 28 is formed with an enlarged extremity 32 having a conical bearing member 33 which is received within a set screw 34, a lock nut 35 being provided to afford suitable adjustment of the set screw. Set screw 34 is mounted upon a bracket 36 which is formed upon a plate 37, rotatably mounted upon plate 13 and about a cylindrical upwardly extending portion 38 on the plate 13.

Also mounted upon the plate 37 are electromagnets 39 and 40, being provided with contacts 41 and 42, the positions of which may be varied by set screws 43. An armature or contacting member 44 is mounted upon the enlarged portion 32 of shaft section 28 and is adapted to engage the contacts 41 and 42 upon movement of spindle 22 by reason of the expansion or contraction of thermal element 19. In order that a suitable adjustment of the thermal element may be afforded, lock screws 45 are provided in the plate 13, slots 46 being formed in the plate 37 to enable the plates 13 and 37 to be relatively rotated and secured in any desired fashion. A pointer 47 upon plate 37 and scale 48 upon plate 13 may be provided to facilitate the proper adjustment of the thermal element.

Upon the engagement of either of contacts 41 and 42 by the element 44, the respective electro-

magnets 39 and 40 are connected in the circuit of the respective contacts and thus element 44 is held in contacting position until such circuit is broken. This prevents the gradual movement of contacting element 44 away from the contacts and prevents destructive sparking between the contacting elements.

In order that the device may not become impaired by frost or frozen moisture of condensation collecting upon the device, a boot 50 is secured between the extension 18 and head 23. An adapter 51 is threaded into the extension 18 and is formed with a suitable head to receive an end of the boot which may be of a flexible material and impervious to moisture such as rubber. The top of the spindle is likewise provided with a boot 52 which is secured at one end 53 to the enlarged extremity 32 and at the other end to an inturned sleeve 54 formed on disc 31. These boots stagnate the air about the spindle 22 and associated elements 27 and 28 and thus protect the device without impairing the free action thereof.

It will thus be seen that an effective thermal contacting device has been provided, the device being formed of elements which are so mounted as to be unaffected by vibrations thereof inasmuch as the movable elements are symmetrically mounted upon the bearings 33 and 24. Inasmuch as the contacts are out of the chamber in which the temperature responsive element is located, frost and other deteriorating agents do not impair the functioning thereof. The adjustment of the temperature control may be done without opening the chamber, by means of the plates 37 and 13 which are outside the chamber.

While the invention has been described with specific reference to the accompanying drawing, it is not to be limited, save as defined in the appended claims.

We claim as our invention:

1. In a device of the class described, a heat responsive element, a spindle about which said heat responsive element is coiled and with which it is operatively engaged at one end, electrical contacting means mounted on the spindle at the other end, heat insulating means embodied in said spindle intermediate its ends, and a boot enclosing the first named end of the spindle to prevent the flow of air to the second named end of the spindle.

2. In a device of the class described, adapted to be mounted on a dividing wall, a tube extending through the wall, a spindle extending through the tube, a plate at one end of the tube engaged with one surface of the wall, a second plate supported on the first plate and movable angularly thereon about the axis of the spindle, electrical contact means carried fixedly on the second named plate, cooperating electrical contact means carried on the proximate end of the spindle, and heat responsive means disposed at the other side of the wall and engaged operatively with the other end of the spindle.

3. In a device of the class described, adapted to be mounted on a dividing wall, a tube extending through the wall, a spindle extending through the tube, a plate at one end of the tube engaged with one surface of the wall, a second plate supported on the first plate and movable angularly thereon about the axis of the spindle, electrical contact means carried fixedly on the second named plate, cooperating electrical contact means carried on the proximate end of the spindle, heat responsive means disposed at the other side of the wall and engaged operatively with the other end of the spindle, a bearing for the first named end of the spindle carried on the second named plate and disposed axially of the spindle, and a bearing carried by the tube at the second named side of the wall and engaging the spindle axially at its end.

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