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TEMPERATURE INDICATING DEVICE

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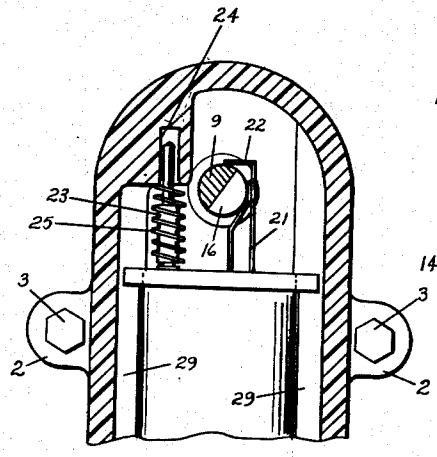

Fig. 2

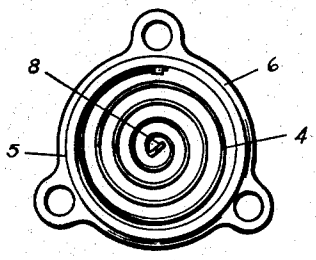

Fig. 3

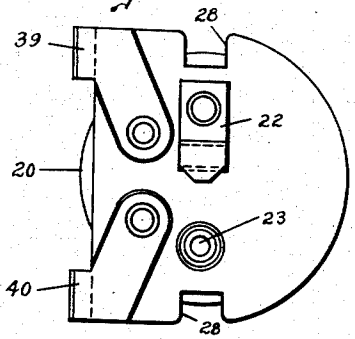

Fig. 4

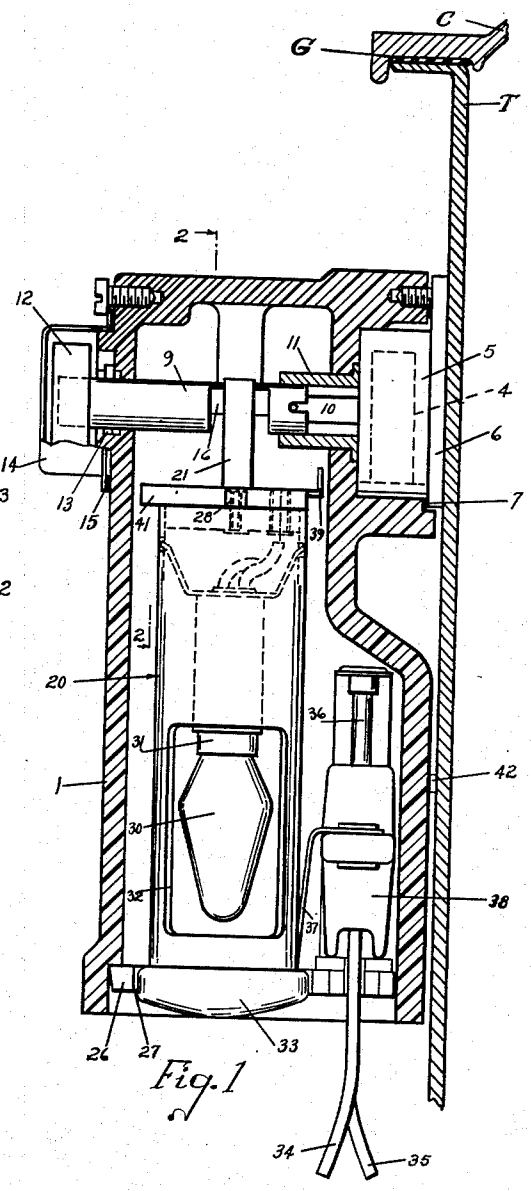

Fig. 1

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TEMPERATURE INDICATING DEVICE

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6 Claims. (Cl. 340—227)

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This invention relates generally to a temperature indicating device, and more particularly to an indicating device adapted for mounting upon the external surface of a tank-wall of a container to indicate attainment of certain predetermined temperatures.

An object of the present invention is to provide a temperature indicating device adapted for mounting externally of a container tank-wall, which device includes a temperature responsive actuator element as a means for releasing an indicating means provided with a warning signal which is readily perceptible from a distance on the attainment of a predetermined tank-wall temperature.

Another object of this invention is to provide a temperature indicating device adapted for mounting externally of a container tank-wall, which device includes a temperature responsive actuator element that is compensated for ambient temperature variations and which releasably retains an indicator member in a first position prior to movement to a second position and which indicator member may be further provided with either an audible or visible warning signal perceptible from a distance on the attainment of a predetermined tank-wall temperature.

Referring now to the drawing:

Fig. 1 is a side elevational view of the indicating device, illustrated partly in section, and mounted on a container tank-wall.

Fig. 2 is a fragmentary front elevational view of the device, illustrated partly in section.

Fig. 3 is an elevational view of the indicator actuator element for the device.

Fig. 4 is an enlarged top view of the movable indicator element.

Throughout the several views, like parts are referred to by the same reference characters.

The thermally controlled temperature indicating device, is preferably mounted directly on a tank-wall T having a removable cover C and a gasket G, being shown in fragment and in section.

The novel indicating device comprises a housing 1 closed at the top and opened at the bottom, and including integral mounting tabs or lugs 2 provided with openings for receiving bolts 3 for direct mounting to a tank-wall. Mounting means utilizing conventional mounting straps or brackets may also be used (not shown).

The housing is preferably of insulating material which may be conveniently molded in the desired shape. Thus, heat transmitted from the tank-wall will be prevented from being conducted

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to the various parts to effect their operation. The upper portion of the housing 1 contains the thermally responsive trip mechanism, which comprises a bimetallic actuator 4. The actuator, as shown in Fig. 3, is preferably spirally formed of a bimetallic material as a convenient means of supplying a rotative motion at its center. The outer end of the spiral actuator 4 is secured to a metallic heat conducting ring 5, which contacts or may be integrally formed with a cover plate 6. The device is mounted in a manner which provides intimate contact between the conducting cover plate 6 and the tank-wall T. Thus, the heat transmitted by the tank-wall will be conducted directly to the actuator 4.

A weather-tight mounting gasket 7 is provided between the housing and the plate 5. The gasket also acts to provide a means for directing heat away from the housing and towards the actuator 4. The innermost end 8 of the actuator 4 is arranged to be fastened to a drive shaft 9, at least a portion 10 of which is of insulating material. The drive shaft is rotatively supported by a bushing member 11 and terminates at its opposite end in an ambient temperature compensator 12.

It will be obvious that the compensator 12 should preferably be in insulating relationship to the actuator to provide a true indication of ambient temperatures effecting the device. The drive shaft 9 may thus be fabricated entirely of insulating material having sufficient strength transversely of its axis, or may include the portion 10 of heat insulating material. The shaft is rotatively supported at the compensator end by means of a bushing 13. The ambient temperature compensator is also preferably of a spiral shape and fastened to and protected by a cup-like cover plate 14 fastened to the housing 1, and including a weather-tight gasket 15. The cylindrical drive shaft 9 is notched intermediate its ends to provide a latch release surface 16 for purposes hereinafter described.

A visible indicating means is provided by the indicator 20, which is preferably tubular in construction, but which may be of a solid cross section and remain within the scope of the present invention. The indicator is slidably received within the bore of the housing 1 and is provided with an L-shaped latch spring 21. The latch spring is provided with a detent portion 22 arranged to normally engage the drive shaft 9 at its periphery, and is preferably positioned in the proximity of the notched surface 16. A pin 23 is mounted on the upper surface of the indicator 20 and is slidably received by a well-like

opening 24 of the housing 1. A compression spring 25 is positioned on the pin and acts to bias the indicator in a downward direction, as viewed in Figs. 1 and 2. The lower end of the housing 1 is preferably enclosed by means of a floor plate 26, which includes an opening 27 for slidably receiving the indicator 20. The indicator is preferably provided with opposed notches 28 adapted to be received by guide ribs 29 extending substantially coextensive lengthwise of the housing.

The preferred embodiment of the novel device includes a visible warning signal incorporated in the indicator in the form of an electric lamp 30, which is threadingly or otherwise releasably engageable with a conventional conducting socket member 31. The indicator 20 may be cut away to provide an opening 32 on either side thereof for the transmission of light from the signal lamp 30, or the indicator itself may be made of a light transmitting material, such as a transparent plastic or glass. A threaded cap 33 is provided as a removable closure for the indicator to permit access for replacement of burnt out lamps, and other routine maintenance operations.

The present embodiment is arranged for electrical connection with a supply source (not shown). This connection is made through the leads 34 and 35 and through the terminals of an exepndible protective fuse 36 and resilient contact members 37. These contact members are stationarily mounted on an insulating support 38 in spaced relationship. The contacts 37 are adapted to electrically engage the indicator contacts 39 and 40 when said indicator is released to indicating position as will hereinafter be described.

It will be apparent that a relatively inexpensive device, from a manufacturing standpoint, may be provided by substituting a reflective outer coating on the indicator 20 for the warning lamp 30. Thus, the indicator may take the form of a solid plug-like member having a reflective coating in the form of a brightly colored surface and/or any of the commercially available luminous or luminescent surface coatings. Coating materials of this nature may also be applied as additional signaling means to indicators having electrically actuated warning devices such as the lamp 30. It will also be apparent that audible signaling means may be used with or substituted for the lamp 30 and remain within the scope of the present invention.

It has been found to be desirable to provide an insulating projection 42 on the housing 1 for spacing the housing from the tank-wall T to permit the transmitted heat to be conducted directly to the actuator 4 from the plate 5 which is preferably in intimate contact with the tank-wall.

Any of the above-mentioned embodiments will operate substantially in the same manner and respond to predetermined temperatures affecting the tank-wall T as transmitted to the heat conducting plate 6. On the occurrence of a tank-wall temperature of a value exceeding or equal to a predetermined value, the spiral bimetallic actuator 4 will cause the drive shaft 9 to rotate in a counterclockwise direction, as viewed in Fig. 2. On reaching the predetermined temperature the shaft will have rotated to a position which will permit the latch spring detent 22 to clear the shaft 9 in the notched area 16. This will permit the indicator 20 to drop downwardly due to the forces of gravity exerted thereon and the pressure of the spring 25 reflected in the pin 23. The indicator will continue to drop until the overhanging portion 41 rests on the floor plate 26, thereby exposing the indicator to visible perception. In the preferred embodiment the indicator contacts 39 and 40 will engage the contacts 37 and cause the lamp 30 to be energized to provide an additional warning signal. After the tank-wall T has cooled to a temperature below the predetermined value, the shaft 9 will have been rotated by the bimetallic actuator 4 to the position shown in Fig. 2. Hand pressure on the closure 33 of the indicator will force the indicator upwardly until the latch spring 21 passes the notched portion and the detent 22 engages the shaft 9. The pin 23 will engage the opening 24 to cause a slight downward pressure on the indicator for providing a stable engagement in the housing 1. The device is now ready for another cycle of operations should the tank-wall temperature again reach the predetermined value.

We claim:

1. In a temperature indicating device including an indicator member biased for movement from a first position to a second position and including a set of normally disengaged electrical contacts and an electrically operated warning device, a second set of electrical contacts arranged for connection with an electrical supply source and arranged for electrical engagement with said first mentioned electrical contacts on movement of said indicator member to said second position, and a thermally responsive indicator member retaining means comprising in combination a thermally responsive actuator, an ambient temperature compensator for said actuator, a latch means operatively associated with said actuator and normally releasably engaging said indicator member in said first position, said latch means being movable towards release position on the occurrence of a predetermined temperature value effecting said actuator to affect the movement of said indicator member to said second position.

2. In a temperature indicating device including an indicator member biased for movement from a first position to a second position and including a set of normally disengaged electrical contacts electrically connected to a warning signal device, a second set of electrical contacts arranged for connection with an electrical supply source and for electrical engagement with said first mentioned electrical contacts on movement of said indicator member to said second position, and a thermally responsive indicator member retaining means comprising in combination a thermally responsive actuator, an ambient temperature compensator for said actuator, a latch means operatively associated with said actuator and normally releasably engaging said indicator member in said first position, said latch means being movable towards release position on the occurrence of a predetermined compensated temperature value effecting said actuator to affect the movement of said indicator member to said second position.

3. In a temperature indicating device including an indicator member having a latching detent and being biased for movement from a first position to a second position, a thermally responsive indicator member retaining means comprising in combination a thermally responsive bimetallic actuator, an ambient temperature compensator for said actuator, a drive shaft having a transverse notched portion intermediate its ends, said shaft being rotatively operated by said actuator, said detent on said indicator member

normally releasably engaged with said drive shaft and freely slidable in said notched portion for latching disengagement with said shaft, said drive shaft being rotatively movable towards disengagement with said detent on the occurrence of a predetermined compensated temperature value effecting said bimetallic actuator to affect the movement of said indicator member to said second position.

4. In a temperature indicating device including an indicator member having a latching detent and being biased for movement from a first position to a second position and further including a set of normally disengaged electrical contacts electrically connected to a warning signal device, a second set of electrical contacts arranged for connection with an electrical supply source and for electrical engagement with said first mentioned electrical contacts on movement of said indicator member to said second position, a thermally responsive indicator member retaining means comprising in combination a thermally responsive bimetallic actuator, a drive shaft having a transverse notched portion intermediate its ends, said shaft being rotatively operated by said actuator, said detent on said indicator member normally releasably engaged with said drive shaft and freely slidable in said notched portion for latching disengagement with said shaft, said drive shaft being rotatively movable towards disengagement with said detent on the occurrence of a predetermined temperature value effecting said bimetallic actuator to affect the movement of said indicator member to said second position.

5. In a temperature indicating device including an indicator member having a latching detent and being biased for movement from a first position to a second position and further including a set of normally disengaged electrical contacts electrically connected to a warning signal device, a second set of electrical contacts arranged for connection with an electrical supply source and for electrical engagement with said first mentioned electrical contacts on movement of said indicator member to said second position, a thermally responsive indicator member retaining means comprising in combination a thermally responsive bimetallic actuator, an ambient temperature compensator for said actuator, a drive shaft having a transverse notched portion intermediate its ends, said shaft being rotatively operated by said actuator, said detent on said indicator member normally releasably engaged with said drive shaft and freely slidable in said notched portion for latching disengagement with said shaft, said drive shaft being rotatively movable towards disengagement with said detent on the occurrence of a predetermined compensated temperature value effecting said bimetallic actuator to affect the movement of said indicator member to said second position.

6. In a temperature indicating device including an indicator member having a latching detent and being biased for movement from a first position to a second position and further including a set of normally disengaged electrical contacts electrically connected to a signal lamp, a second set of electrical contacts arranged for connection with an electrical supply source and for electrical engagement with said first mentioned electrical contacts for energizing said lamp on movement of said indicator member to said second position, a thermally responsive indicator member retaining means comprising in combination a thermally responsive bimetallic actuator, an ambient temperature compensator for said actuator, a drive shaft having a transverse notched portion intermediate its ends, said shaft being rotatively operated by said actuator, said detent on said indicator member normally releasably engaged with said drive shaft and freely slidable in said notched portion for latching disengagement with said shaft, said drive shaft being rotatively movable towards disengagement with said detent on the occurrence of a predetermined compensated temperature value effecting said bimetallic actuator to affect the movement of said indicator member to said second position.

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