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C. H. WALSH

2,362,423

TANK-WALL TEMPERATURE INDICATOR

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Fig. 1

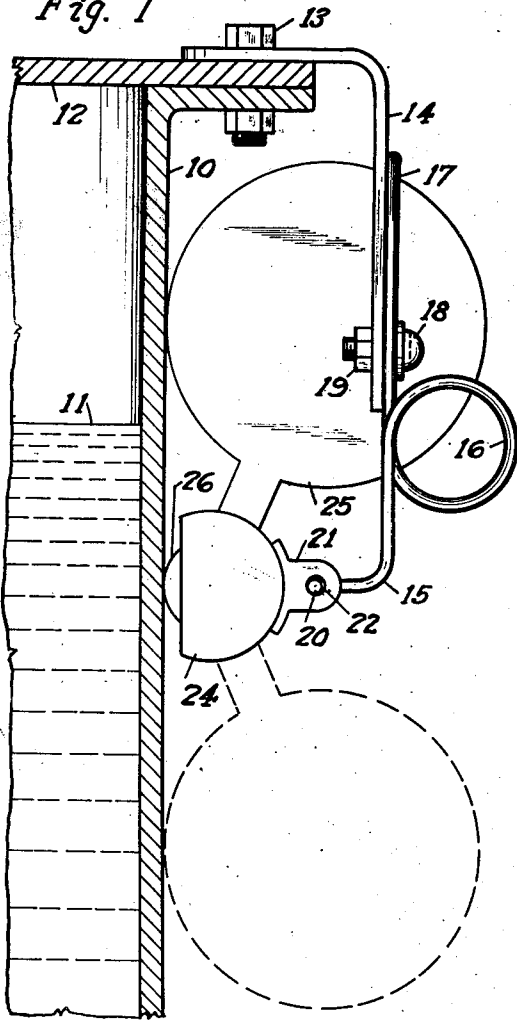


Fig. 2

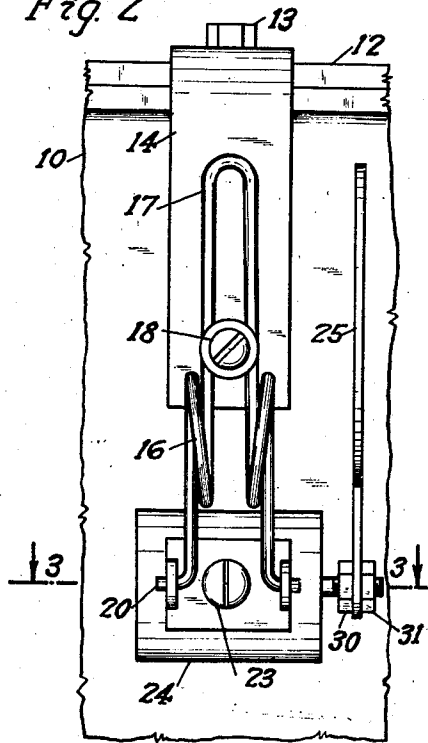


Fig. 3

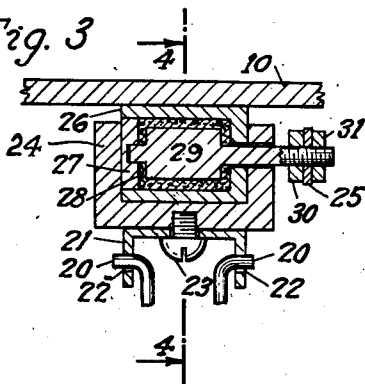
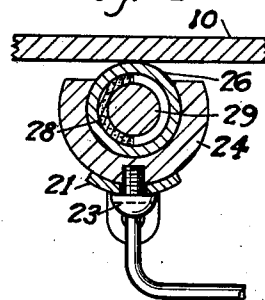


Fig. 4



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TANK-WALL TEMPERATURE INDICATOR

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12 Claims. (Cl. 116—114.5)

This invention relates generally to devices the operation of which is dependent upon the attainment of a predetermined temperature, and particularly to devices adapted for response to associated tank-wall temperatures.

Among the objects of the present invention may be noted the provision of a tank-wall temperature indicator having indicating means and means for maintaining the indicating means in a normal position through frictional engagement of a portion of the indicator with an associated tank-wall and for releasing the indicating means in response to fusing of normally frozen fusible material embodied in the device; means for re-setting the indicating means in the normal indicating position when the fusible material is unfused; and structural means for adjusting the vertical position of the contained fusible material and for resiliently holding the contained fusible material in abutment with the associated tank-wall to provide the desired frictional engagement. Other objects will be in part obvious, and in part pointed out hereinafter.

The invention comprises certain of the elements, and combinations thereof, features of construction and arrangement of parts to be exemplified in the description to follow, and the scope of the invention will be indicated in the accompanying claims.

In the drawing: Fig. 1 is a side elevational view of the device in the service position; Fig. 2 is a front elevational view; Fig. 3 is a section along the line 3—3 of Fig. 2; and Fig. 4 is a section along the line 4—4 of Fig. 3.

Referring to Figs. 1 and 2, a fragmentary portion of a tank is shown, including the tank-wall 10, the cover 12 attached thereto by the cover fastening bolt 13, and a liquid level in the tank indicated by the numeral 11. A rigid supporting member 14 is rigidly secured at its upper end between the head of the fastening bolt 13 and the tank cover 12, and extends first outwardly and then downwardly to a point near the elevation of the liquid level 11. At this point the bolt 18 extends laterally through the member 14 toward the tank-wall, and the adjusting nut 19 threadedly cooperates with the bolt 18 to rigidly fasten the generally downwardly and inwardly extending resilient supporting member 15 to the rigid member 14.

A housing 24, preferably of material of low heat conductivity, is positioned between the inwardly extending portion of the resilient supporting member 15 and the tank-wall 10, and is provided with the mounting connector 21, the

latter being secured thereto by means of the screw 23, between the housing 24 and the inwardly extending portions of the resilient supporting member 15. To provide a pivotal and resilient mounting for the housing 24, the connecting member 21 is arranged with a pair of spaced parallel outwardly extending portions having axially aligned openings 22 near the respective ends thereof, through which laterally and oppositely bent end portions 20 of the resilient supporting member 15 extend. From the pivotal attachment to the connecting member 21, the member 15 comprises first the spaced parallel members of resilient material which extend outwardly in substantially horizontal spaced parallel relationship for a distance about equal to that of the spacing between the tank-wall and the lower end of the rigid supporting member 14, thence bending upwardly and forming the convolutions 16, and thence again upwardly in a closed loop formed by the spaced parallel portions 17. The bolt 18 is arranged to extend through the space between the loop 17, and the head thereof to engage respective parallel portions of the loop, to enable adjustment of the elevation of the housing 24, and to establish its position, by tightening the nut 19, following adjustment.

It may be noted that each of the horizontal parallel portions of the resilient member 15 acts through the pivotal connections, which are positioned in a plane passing through the line of abutment of the container 26 with the tank-wall 10, to independently urge the respective ends of the housing 24 toward the tank-wall, and thereby assure effective contact of the interposed container 26 with the tank-wall 10.

The inner surface of the housing 24 is shaped to conform to the outer surface of the hollow cylindrical container 26, and is of such size that a small portion of the latter extends outside of the housing 24 and between the latter and the tank-wall 10, as shown in Fig. 4. The container 26 is closed at one end by the pressed closure 27, and contains the concentrically positioned rotatable releasable member 29, the latter being smaller in diameter than the hollow of the container 26, to provide an annular space therebetween in which is disposed the fusible material 28, which may be of any material having suitable mechanical characteristics and desired melting point. One such is naphthalene if a melting point of 80 degrees Centigrade is desired. A portion of the releasable member 29 extends coaxially outwardly through the other end of the container 26, and also through an end wall of the housing

24, and to the outwardly extending portion is secured, between the securing nut 30 and the lock nut 31, the indicating member or semaphore 25.

With the arrangement as described, assume that the semaphore 25 is in the normal or first indicating position as shown by Fig. 1, and that the fusible material is unfused. Under this condition, the semaphore is rigidly secured to the rotatable container 26 through the releasable member 29 and the frozen material 28. In the absence of friction of the container 26 with the tank-wall 10 or the housing 24, the container 26 would rotate under the influence of gravity until the semaphore assumed the position indicated by the dashed lines in Fig. 1, but such movement is prevented because of the action of the resilient supporting member 15 in continuously exerting pressure upon the container 26 between the tank-wall 10 and the inner curved surface of the housing 24. Movement of the semaphore 25 due to rotation of the container 26 is thus frictionally restrained.

Upon attainment of a predetermined temperature of the tank-wall, heat is conducted through the contact of the external portion of the container 26 with the tank-wall, and causes the frozen material 28 to melt. The releasable member 29 is thereby released for rotation from the container 26, and the semaphore 25 drops under the influence of gravity to the position indicated by the dashed lines of Fig. 1.

When the fusible material 28 is fused, the semaphore may be manually rotated to the normal position, but upon being released, again falls to the lower position. If the temperature of the material 28 drops to or below the freezing point, then the semaphore 25 is again fastened to the container 26, and the semaphore may then be restored to the normal position by pulling outwardly the resilient member 15 to remove the frictional engagement of the container 26 with the tank-wall, and rotating with respect to the housing 24 the container 26; the releasable member 29 and the semaphore 25 to the normal position of the latter, and releasing the resilient member 15 to reestablish the frictional engagement for maintaining the normal position.

The construction herein described, in which the support forms a working part of the indicator cooperating with the semaphore to establish its position; makes possible a simple and inexpensive device which may be reset without the use of ratchet devices or other more complicated arrangements.

Embodiments of the invention other than the specific one illustrated will be apparent, and it will be understood that the description herein is intended as illustrative rather than limiting.

I claim, as my invention:

1. A tank-wall temperature indicator comprising a hollow housing of insulating material spaced from said tank-wall, a hollow tubular container of conducting material bridging the space between said housing and said tank-wall and rotatably carried by said housing, a releasable member within said container and mounted for rotary movement with respect to both said housing and said container, said releasable member having an outside diameter less than the inside diameter of said hollow container to provide an annular space therebetween, fusible material within said annular space fastening said releasable member to said container when said material is unfused and releasing said releasable member from said container when said fusible

material fuses, means normally urging both said releasable member and said container for rotation in the same direction, resilient mounting means normally urging said housing toward said tank-wall for normally frictionally restraining movement of said tubular container, and visible indicating means responsive to movement of said releasable member.

2. A tank-wall temperature indicator comprising a hollow arcuate housing of insulating material spaced from said tank-wall, a hollow tubular container of conducting material bridging the space between said housing and said tank wall and rotatably carried by said housing, a releasable member within said container and mounted for rotary movement with respect to both said housing and said container, said releasable member having an outside diameter less than the inside diameter of said hollow container to provide an annular space therebetween, fusible material within said annular space fastening said releasable member to said container when said fusible material is unfused and releasing said releasable member from said container when said fusible material fuses, means normally urging both said releasable member and said container for rotation in the same direction, resilient mounting means normally urging said housing toward said tank-wall for normally frictionally restraining movement of said tubular container, and normally urging and container rotation means including said releasable member adapted for manually rotating said container with respect to said housing against the frictional restraint when said material is unfused.

3. A tank-wall temperature indicator comprising a hollow arcuate housing of insulating material, a hollow tubular container of conducting material rotatably carried by said housing, a releasable member within said container and mounted for rotary movement with respect to both said housing and said container, said releasable member having an outside diameter less than the inside diameter of said hollow container to provide an annular space therebetween, fusible material within said annular space fastening said releasable member to said container when said fusible material is unfused and releasing said releasable member from said container when said fusible material fuses, means normally urging both said releasable member and said tubular container toward rotation, means urging said container against said tank-wall for normally frictionally restraining rotary movement of said container, and means including said releasable member for rotating said container with respect to said housing against the frictional restraint when said fusible material is unfused.

4. A tank-wall temperature indicator comprising a hollow arcuate housing of insulating material spaced from said tank wall, a hollow tubular container of conducting material bridging the space between said housing and said tank-wall and rotatably carried by said housing, a releasable member mounted within said housing for rotary movement with respect to both said housing and said container, fusible material within said container in engagement with and fastening said releasable member to said container when said fusible material is unfused and releasing said releasable member for movement with respect to said container when said fusible material fuses, means normally urging both said releasable member and said container for rotation in the same direction, resilient mounting

means normally urging said housing toward said tank-wall for normally frictionally restraining movement of said tubular container, and visible indicating means secured to said releasable member externally of said housing for manually rotating said container with respect to said housing against the frictional restraint when said fusible material is unfused.

5. A tank-wall temperature indicator comprising a hollow arcuate housing of insulating material spaced from said tank-wall, a hollow tubular container of conducting material bridging the space between said housing and said tank-wall and rotatably carried by said housing, said container having an internal portion thereof disposed within said housing and an external portion thereof extending outside of said housing, a releasable member mounted within said container for rotary movement with respect to both said housing and said container, fusible material within said container in engagement with and fastening said releasable member to said container when said fusible material is unfused and releasing said releasable member for movement with respect to said container when said fusible material fuses, means normally urging both said releasable member and said container for rotation in the same direction, resilient mounting means normally urging the external portion of said container to abutment with said tank-wall for normally frictionally restraining movement of said tubular container, and visible indicating means secured to said releasable member externally of said housing for manually rotating said container with respect to said housing when said fusible material is unfused.

6. A tank-wall temperature indicator comprising a hollow arcuate housing, a hollow tubular container of conducting material rotatably carried by said housing, said container having an internal portion thereof disposed within said housing and a relatively smaller external portion thereof extending outside of said housing and interposed between the latter and said tank-wall, a releasable member mounted within said container for rotary movement with respect to both said housing and said container, fusible material within said container in engagement with and fastening said releasable member to said container when said fusible material is unfused and releasing said releasable member for movement with respect to said container when said fusible material fuses, means normally urging both said releasable member and said container for rotation in the same direction, resilient mounting means continuously urging the external portion of said container to abutment with said tank-wall for frictionally restraining movement of said tubular container, and visible indicating means secured to said releasable member externally of said housing for manually rotating said container with respect to said housing when said fusible material is unfused.

7. A tank-wall temperature indicator comprising a housing, a hollow tubular container of conducting material carried by said housing, said container having an internal portion thereof disposed within said housing and a relatively smaller external portion thereof extending outside of said housing and interposed between the latter and said tank-wall, a releasable member mounted within said container for rotary movement with respect to both said housing and said container, fusible material within said container in engagement with and fastening said releasable

member to said container when said fusible material is unfused and releasing said releasable member for movement with respect to said container when said fusible material fuses, means urging said releasable member for said movement, and vertically adjustable resilient mounting means rigidly secured at the top of said tank-wall and extending downwardly therefrom for continuously urging the external portion of said container to abutment with said tank-wall.

8. A tank-wall temperature indicator comprising a housing, a hollow tubular container of conducting material carried by said housing, said container having an internal portion thereof disposed within said housing and a relatively smaller external portion thereof extending outside of said housing and interposed between said housing and said tank-wall, a releasable member normally positioned within said container and rotatably movable with respect to both said housing and said container in response to predetermined temperature rise of the latter, means urging said releasable member for movement with respect to both said housing and said container, and supporting means for continuously urging the external portion of said container to abutment with said tank-wall, said supporting means including a rigid member secured at the top of said tank-wall and extending downwardly therealong, a relatively resilient member extending downwardly from said rigid member and pivotally joining said housing thereto, and means for adjusting the vertical position of said resilient member with respect to said rigid member.

9. A tank-wall temperature indicator comprising a housing, a hollow tubular container of conducting material carried by said housing, said container having an internal portion thereof disposed within said housing and a relatively smaller external portion thereof extending outside of said housing and interposed between the latter and said tank-wall, a releasable member normally positioned within said container and rotatably movable with respect to both said housing and said container in response to predetermined temperature rise of the latter, means urging said releasable member for movement with respect to both said container and said housing and supporting means for continuously urging the external portion of said container to abutment with said tank-wall, said supporting means including a resilient member arranged to provide two separately movable spaced portions pivotally connected to said housing at each of two spaced points in the plane passing through the line of abutment of said container with said tank-wall.

10. A tank-wall temperature indicator comprising a housing, a hollow tubular container of conducting material carried by said housing, said container having an internal portion thereof disposed within said housing and a relatively smaller external portion thereof extending outside of said housing and interposed between the latter and said tank-wall, a releasable member normally positioned within said container and rotatably movable with respect to both said housing and said container in response to predetermined temperature rise of the latter, means urging said releasable member for movement with respect to both said container and said housing and supporting means for continuously urging the external portion of said container to abutment with said tank-wall, said supporting means including a resilient member associated with said

housing, said resilient member being arranged to provide at the lower end thereof two spaced outwardly extending and separately movable portions pivotally connected to said housing at two spaced points positioned in the plane passing through the line of abutment of said container with said tank-wall, and means for rigidly securing the upper end of said resilient member to said tank-wall.

11. A tank-wall temperature indicator comprising a housing, a hollow tubular container of conducting material carried by said housing, a releasable member normally positioned within said container and rotatably movable with respect to both said housing and said container in response to predetermined temperature rise of the latter, means urging said releasable member for movement with respect to both said container and said housing and supporting means for continuously urging the container along a line of abutment with said tank-wall, said supporting means including a resilient member associated with said housing, said resilient member being arranged to provide two spaced outwardly extending and separately movable portions having the respective ends thereof pivotally connected to said housing at two spaced points positioned in

a horizontal plane through which both of said separately movable portions extend in substantially parallel relationship.

12. In combination, a tank, a cover fitted on the top of said tank, fastening means securing said cover to said tank, a rigid member secured to said tank by said fastening means and extending downwardly therefrom in spaced relationship therewith, a resilient member adjustably mounted on said rigid member, said resilient member including two independently movable arms extending first downwardly from said rigid member and thence inwardly toward said tank, the end portion of each of said arms being bent in a direction substantially normal to the respective associated arm, a housing for a temperature indicator, said housing embodying a pair of laterally spaced outwardly extending openings adapted for registration with said end portions and into which said end portions respectively extend for releasably mounting said housing on said resilient member, the arrangement being such that said housing is urged toward said tank at two laterally spaced points by said arms for maintaining said heat indicator in heat conducting relationship with said tank.

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