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HEAT-PRESSURE OPERATED WARNING SWITCH

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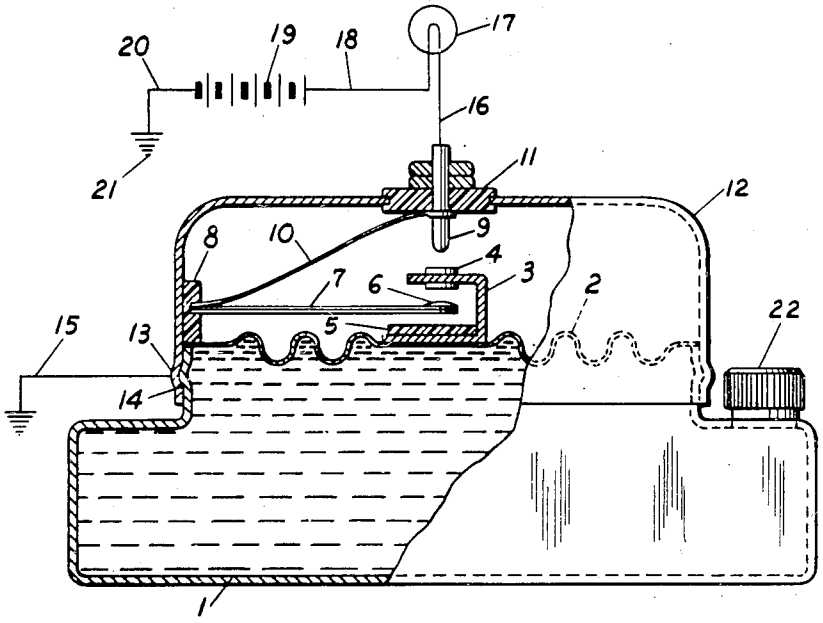


Fig. 1

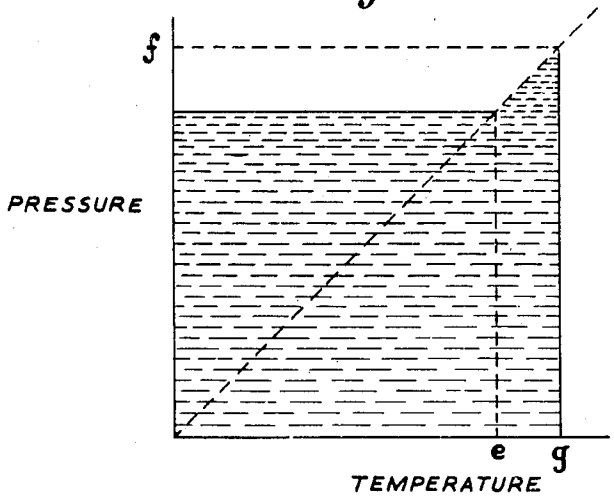


Fig. 2

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HEAT-PRESSURE OPERATED WARNING SWITCH

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4 Claims. (Cl. 200—81.5)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates generally to signalling means, and more particularly to signalling means for indicating excessive changes in temperature and/or pressure in a closed fluid system.

All devices of this character, made in accordance with the teachings of the prior art, and with which I am familiar, have been operated in direct proportion to the pressure of the fluid in the system or they operated on a change of temperature of the fluid in the closed system. Such systems have a relief valve so that steam escapes when a certain pressure is reached. Many of the sealed radiator systems on automobiles have a thermostatic switch which operates a warning light on the instrument panel. These warning lights usually operate only on changes in temperature and protection is not given if a break should occur in the fluid line. Thus no warning is given in the present systems when there is a leak.

It is, accordingly, an object of my invention to overcome the above and other defects in warning systems for closed fluid systems; such as, the radiator system of an automobile, and it is more particularly an object of my invention to provide a warning system responsive to temperature and/or pressure changes in a closed system, which is simple in construction, economical in cost, efficient in operation, economical in manufacture, and easy to install.

Another object of my invention is to provide means in a fluid system which gives a warning upon an excessive increase in pressure and/or temperature.

Other objects of my invention will become evident from the following detailed description, taken in conjunction with the accompanying drawings, in which:

Figure 1 is a vertical cross sectional view of my novel warning system, and

Figure 2 is a graphic representation illustrating the limits of operation of my device.

Referring now to the drawings, Figure 1 shows a housing 1 separated by a diaphragm 2, a portion of the housing below the diaphragm being in a closed fluid system such as a sealed cooling system for an internal combustion engine of an automobile. A generally U-shaped member 3 is disposed on the diaphragm 2 and has contact member 4 in one side thereof and an insulating member 5 on the inside of the bottom portion

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thereof. A contact member 6 on a bimetallic element 7 of any suitable metal engages the contact member 4 upon an excessive increase of temperature of the fluid in the system. The bimetallic member 7 is supported by insulating support member 8 and is connected to the depending contact member 9 by an electric conductor member 10. The depending contact member 9 is disposed in an insulating member 11 in the top of the cap member 12. The cap 12 is grounded by ground wire 15. The contact member 9 is in an electrical circuit which comprises wire 16, indicating light 17, wire 18, battery 19 and wire 20 to ground 21. A safety cap member 22 is disposed in the housing 1 to permit escape of fluid upon an excessive increase of pressure to prevent an explosion. The diaphragm 2 is at ground potential while contact members 6 on the bimetallic member 7 and contact member 9 are at the potential of the battery 19. This is true when contact member 6 does not touch contact member 4.

In operation, when the pressure in the system increases, such as when a head gasket in an internal combustion engine leaks, allowing combustion gases to enter the fluid system, the diaphragm 2 is raised thereby causing the contact member 4 to engage the contact member 9, thereby energizing a circuit from ground 21 to wire 20, battery 19, wire 18, indicating light 17, wire 16, contact member 9, contact member 4, U-shaped member 3, diaphragm 2, cap member 12, wire 15 to ground, thereby energizing the light 17 to give a warning of the increased pressure. When the temperature in the fluid system becomes excessive, bimetallic member 7 will move upwardly and the contact member 6 will engage the contact member 4. The indicating light 17 will again be energized by energization of the circuit from the ground 21, wire 20, battery 19, wire 18, indicating light 17, wire 16, contact member 9, conductor member 10, bimetallic member 7, U-shaped member 3, diaphragm 2, cap 12, wire 15 to ground.

It will thus be seen that a warning will be given that is best illustrated by the diagram shown in Figure 2. A warning will be given:

1. When the fluid in the system is confined and a temperature corresponding to point *g* is reached.

2. When the fluid is not confined due to a leak in the system and the temperature reaches point *e*.

3. When a cylinder head gasket leaks, allow-

ing combustion gases to enter the fluid system and thus forcing the pressure above point *f*.

It will be evident that my novel warning system will be operative under a change in either pressure or temperature or both, and a leak in the system will not negative the operation of my novel indicating means.

Various changes may be made in the specific embodiment of my invention without departing from the spirit thereof or from the scope of the appended claims.

What I claim is:

1. In a warning system employing a warning indicator actuated by the closing of an electrical circuit for indicating an excessive increase in pressure and/or temperature of fluid in a closed fluid system, a unitary switch automatically closing said electrical circuit upon a predetermined increase in pressure and/or temperature of said fluid, said switch comprising a housing, a diaphragm extending across the interior of said housing, said housing on one side of said diaphragm being in communication with said fluid system, a generally U-shaped supporting member on the opposite side of said diaphragm, a contact member on one of the legs of said generally U-shaped supporting member, a bimetallic member extending between the legs of said generally U-shaped supporting member, a second contact member in said housing spaced from said first mentioned contact member and from the same side of said diaphragm, and an electrical conductor between said bimetallic member and said second contact member, said bimetallic member being engageable with said first mentioned contact member to close said electrical circuit upon a predetermined increase in temperature of the fluid in said fluid system, and said first mentioned contact member being engageable with said second contact member to close said electrical circuit upon a predetermined increase in pressure of the fluid in said fluid system.

2. In a warning system employing a warning indicator actuated by the closing of an electrical circuit for indicating an excessive increase

in pressure and/or temperature of fluid in a closed fluid system, the switch as set forth in claim 1, wherein said bimetallic member and said second contact member are insulated from said housing, and said bimetallic member is further insulated from the other of the legs of said generally U-shaped supporting member.

3. A unitary switch responsive to a predetermined increase in pressure and/or temperature of fluid in a closed fluid system for automatic closing of an electrical circuit actuating a warning indicator, said switch comprising a housing, a diaphragm in said housing, said housing having an opening opposite one side of said diaphragm for communication with said fluid in said closed fluid system, a bimetallic member in said housing adjacent the opposite side of said diaphragm, said bimetallic member being insulated from said housing and said diaphragm, a first contact member supported by said diaphragm and engageable by said bimetallic member upon a predetermined increase in temperature, a second contact member in said housing insulated therefrom and spaced from said first contact member, said second contact member being engageable by said first contact member on flexing of said diaphragm, and an electrical conductor between said bimetallic member and said second contact member.

4. A switch as set forth in claim 3 connectable in an electrical circuit at said second contact member and at a point on said housing.

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