

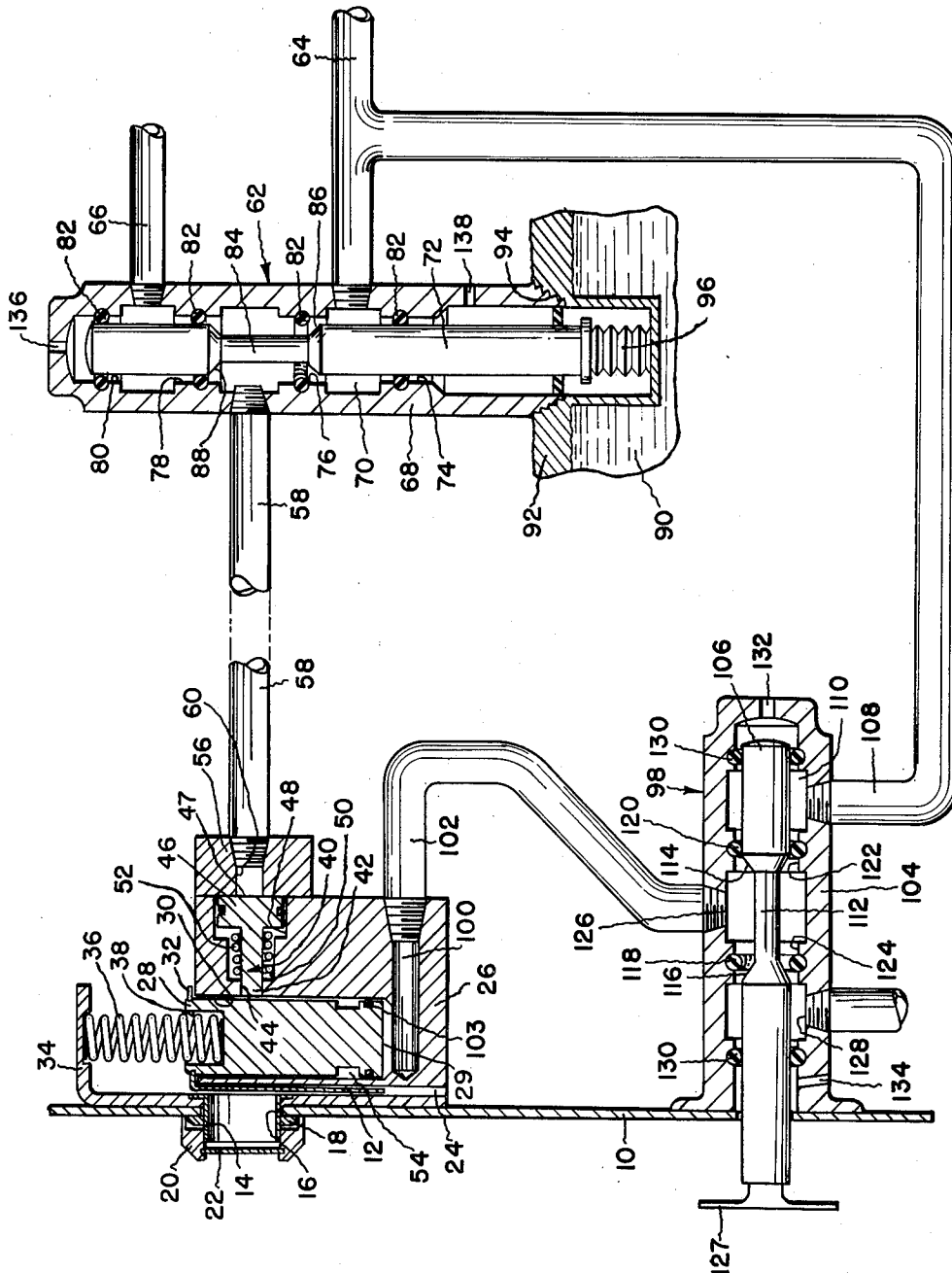
Nov. 13, 1962

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3,063,405

PNEUMATIC SIGNALING DEVICE

Filed June 15, 1960



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3,063,405

PNEUMATIC SIGNALING DEVICE

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Filed June 15, 1960, Ser. No. 36,386

5 Claims. (Cl. 116-65)

This invention relates to signaling devices and more particularly to a device for signaling conditions of danger.

In the operation of machinery many dangerous conditions may occur that are not readily apparent to the attendant operating the machinery. For example, these dangerous conditions may include excessive rotative speed, high voltages, lack of lubricating pressure, high cooling water temperature. Normally, when a dangerous condition occurs, the attendant's attention should be quickly directed to the condition, by visual, aural or some other alarm, in order for him to take action to relieve the dangerous condition.

It is an object of this invention to provide a signaling device which is easily mounted on a panel connected to the apparatus whose condition is to be indicated, provides an easily observable signal, is reliable in its operation, is inexpensive, and has other advantages which will be pointed out hereinafter or are obvious.

The sole FIGURE in the drawing is a longitudinal section of a preferred embodiment of the device particularly adapted for use in indicating high water temperatures in a cooling system.

The signaling device of this invention is shown in the drawing as being mounted on a panel 10. The signal to the operator is conveyed by a signal member 12 which slides up and down before an aperture 16 in the panel 10. The aperture 16 contains a hollow casing 14 extending through the aperture 16 and being secured thereto by a ring 18 surrounding the forward projecting portion of the casing 14. On casing 14 is also mounted a bezel 20 for supporting a window 22 over the aperture 16. The signal member 12 carries suitable indicia which is visible to the attendant through the window 22 to indicate its alternate up or down positions.

The signal member 12 is adapted to move up and down in a groove 24 in a body 26 mounted on the panel 10. A cylindrical plunger or piston 28 is slidably mounted in a cylindrical bore 30 in the body 26. Plunger 28 extends slightly from bore 30, and is attached to an inwardly turned flange 32 of the signal member 12. A bracket 34 extends upwardly from body 26 and forms an abutment for a biasing coil spring 36 which presses down against plunger 28 and seats in a bore 38 in the top of the plunger 28.

Plunger 28 is held in its uppermost position by a latch 40 which has a rod-like end 42 extending through corresponding small bore 44 in body 26 transverse to the axis of plunger 28. Latch 40 has a head portion 46 fitting closely in a large bore 48 which is coaxial with bore 44. An intermediate bore 50 is located in the body 26 between the large and small bores 48 and 44 and contains a coil spring 52 pressing against head 46 to bias latch 40 in a direction away from plunger 28. In its uppermost position, plunger 28 is engaged and locked in position by latch 40, a groove 54 being provided on plunger 28 to receive the rod-like end 42 of latch 40.

The latch 40 is placed into engagement with plunger 28 by air pressure applied to the outer face 47 of head 46. A head cover 56 is secured on body portion 26 to enclose the end of cylindrical bore 48. Air pressure is supplied to the outer face 47 of the latch head 46 through a pipe 58 threaded into an aperture 60 in head cover 56. A valve 62 controls the supply of compressed air from

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a source 64 to the pipe 58, and, alternatively, vents such air from pipe 58 by way of a pipe 66 leading to atmosphere. Valve 62 includes a hollow valve body 68 enclosing a chamber 70 containing an axially slidable valve plunger rod 72. At four points along the wall of the hollow chamber 70 are provided bridges 74, 76, 78 and 80. Each of these bridges supports an O-ring 82 slidably engaging and embracing the surface of rod 72. O-rings 82 at bridges 74 and 80 act as common sealing members around the rod 72 to prevent leakage into the ends of the hollow chamber 70. At a point intermediate its length, rod 72 is provided with a necked down portion 84 forming shoulders 86 and 88 adapted to slide past the O-rings 82 at the bridges 76 and 78, respectively, to permit the passage of air from pipe 64 to pipe 58 or exhaust air from pipe 58 to pipe 66. The axial movement of rod 72 is accomplished and controlled by the condition of danger which is to be indicated on panel 10.

In this instance, the valve rod 72 is controlled by the temperature of cooling water, as indicated at 90, within an engine water jacket having a wall 92. Accordingly, valve 62 is threaded into wall 92 at 94 and carries heat-expansible element 96 submerged in the jacket water 90. The heat-expansible element 96 expands when the temperature of the water 90 rises and pushes the valve rod 72 upwardly to shut off the supply of air pressure from pipe 64 to pipe 58 by closing communication at O-ring 82 mounted on bridge 76 and, simultaneously vents the air pressure in pipe 58 past the shoulder 88 to exhaust pipe 66. When the air pressure in the pipe 58 is vented, the latch 40 is released from plunger 28, permitting spring 36 to press plunger 28 downwardly to the position shown in the drawing, to also drop the signal member 12 to its lower position. The heat-expansible element 96 may, for example, be the type of heat-expansible bellows which is found in the conventional automobile radiator thermostat for controlling the flow of coolant through the radiator system.

In its lower position, the surface on the signal member 12 visible from the opposite side of panel 10 through window 22 is suitably colored red or inscribed to indicate to the attendant the dangerous high temperature of the jacket water 90. Presumably, the attendant will take action accordingly.

Means is provided by which the attendant may restore signal member 12 to its upper position indicating safe operating conditions. However, plunger 28 will not be able to remain in its upper position for such indication until valve 62 is in its former position to supply air pressure to force the latch 40 to its plunger engaging position. It will also be observed that failure of air supply at pipe 64 will also be indicated as a dangerous condition by this device.

Means is provided to restore plunger 28 to its upper position wherein it is latched by the latch 40. This means includes a manually controlled pneumatic means 98 for momentarily supplying air pressure from the pipe 64 to the lower end 29 of the plunger 28 in the bore 30.

For this purpose, the body 26 is provided with a passage 100 communicating between the bottom of the bore 30 and a pipe 102 which is threaded into the body 26. The plunger 28 is sealed within bore 30 by a piston ring 103. Manually controlled means 98 consists primarily of a valve body 104 containing a bore 110 holding an axially slidable plunger rod 106. A pipe 108, branching from pipe 64, is connected to the valve body 104 to admit air into the bore 110 of valve body 104. Rod 106 is provided with a necked down portion 112 forming shoulders 114 and 116 on valve rod 106 which slide in O-rings 118 and 120, supported on spaced bridges 122 and 124 of

the walls of the bore 110. The O-rings 118 and 120 straddle the inlet 126 of the pipe 102 connected to the valve body 104. Rod 106 projects from the front end of the valve body 104 and has a head 127 by which the operator is able to move valve rod 106 axially. When he pushes rod 106 in, air from pipe 108 is admitted past shoulder 114 to aperture 126 and thence to pipe 102 to actuate plunger 28. Pulling rod 106 to the left vents air from pipe 102, past shoulder 116 and out of an exhaust port 128 to atmosphere.

The ends of valve rod 106 are sealed in the bore 110 by suitable O-rings 130 to prevent leakage at its ends. Any leakage past the ends of the valve rod 106 is able to escape to atmosphere through vents, 132 and 134, at opposite ends of bore 110, so that no pressure can accumulate to unbalance rod 106. Similarly vents 136 and 138 are provided in valve 62.

The operation of the device is obvious from the above description of the various elements of the invention and their functions. It is to be noted that signal member 12 is normally in its upward position at which suitable indicia on the face of member 12 is observable through the window 22 to indicate normal or safe operation of the device being attended. In this position, latch 40 holds plunger 28 until an abnormal condition exists, in this case either overheating of water indicated at 90, or failure of air pressure in the air supply 64, whereupon latch 40 is released by the valve 62 closing off air pressure to the pipe 58, the supply of which is cut off at shoulder 86, and exhausting residual air from pipe 58 to pipe 66, past shoulder 88 of valve rod 72.

Upon return to normal conditions of air pressure or water jacket temperature, the depression of the button 127 on the valve 98 supplies air under pressure through pipe 108, past the shoulder 114 of valve rod 106 and through the pipe 102, to force the plunger 28 upward to again bring the annular groove 54 into registry with latch 40. If rod 72 has resumed its normal position, air pressure is admitted past the shoulder 86 and into pipe 58 to depress latch 40 into the plunger groove 54 to latch the plunger 28 in its raised position. In its raised position, the signal member 12 has its lower surface exposed at the window casing 14 and will indicate a normal and safe condition.

Thus, by the above construction are accomplished, among others, the objects hereinbefore referred to.

I claim:

1. A pneumatically operated signaling device comprising: a body; a signal member mounted on said body for movement between alternate positions and operative to alternately indicate safety and danger conditions in its alternating positions; means normally biasing said signal member to its danger indicating position; a latch movably mounted in said body for movement between a first position, wherein it latches said signal member in its safety indicating position, and a second position, wherein said signal member is unlatched; means normally biasing said latch to its second position; a first pneumatic means operative, when supplied with pneumatic pressure, to force said latch to its first position; means for normally supplying pneumatic pressure to said pneumatic means and

operative, in response to the occurrence of a danger condition which is to be indicated by the signaling device, to close off pneumatic pressure to said pneumatic means wherein said latch is biased to its second position to release the signal member and allow it to move to its danger indicating condition; pneumatic reset means operative, when supplied with pneumatic pressure, to return said signal member to its safety indicating position; and manually controlled means operative, in response to being actuated by an operator, to momentarily supply pneumatic pressure to said pneumatic reset means for causing said reset means to return said signal member to its safety indicating position.

2. The signaling device of claim 1 wherein: said signal member includes a piston slidably mounted in a first bore in said body and being spring biased inwardly toward the bottom of the first bore; and said latch is a second piston slidably mounted in a second bore located in said body to extend transverse to the first bore and being spring biased outwardly in said second bore, said second piston having an element arranged to extend through the bottom of said second bore and, when said second piston is moved inwardly toward the bottom of said second bore, to engage and latch said first piston in a position spaced outwardly from the bottom of said first bore.

3. The signaling device of claim 2 including: means for admitting pneumatic pressure to the bottom of said first bore to force said first piston outwardly in said bore; and means to apply pneumatic pressure to the outer end of said second piston to force it inwardly into said second bore.

4. The signaling device of claim 3 including: a signal indicating window mounted on said body; and said signal member includes a surface carrying indicia which is visible through the window to alternately indicate the danger and safety positions of said signal member.

5. A pneumatically operated signaling device comprising: a body; a signal member mounted on said body for movement between alternate positions and operative to alternately indicate safety and danger conditions in its alternate positions; a latch movably mounted in said body for movement between a first position, wherein it latches said signal member in its safety indicating position, and a second position, wherein said signal member is unlatched; a first pneumatic means operative, when supplied with pneumatic pressure, to force said latch to its first position; means normally biasing said latch to its second position and operative, when pneumatic pressure is closed off to said first pneumatic means, to move said latch to its second position to release the signal member; means normally biasing said signal member to its danger indicating position and operative to move said signal member to its danger indicating position when said member is unlatched; and pneumatic reset means operative, when supplied with pneumatic pressure, to return said signal member to its safety indicating position.

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