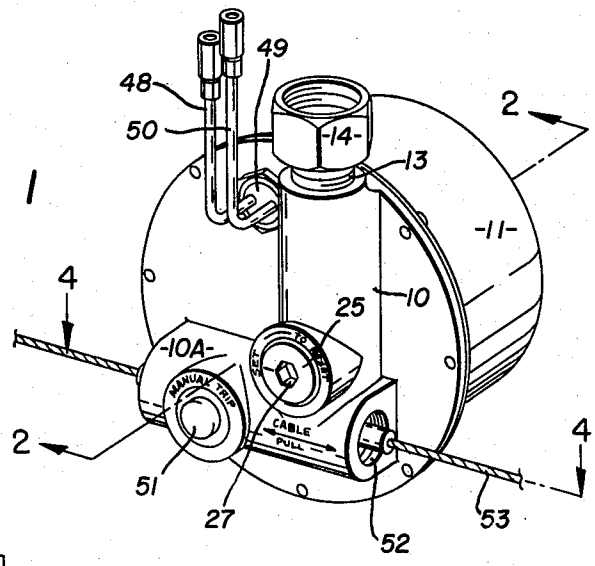
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FIG. 1



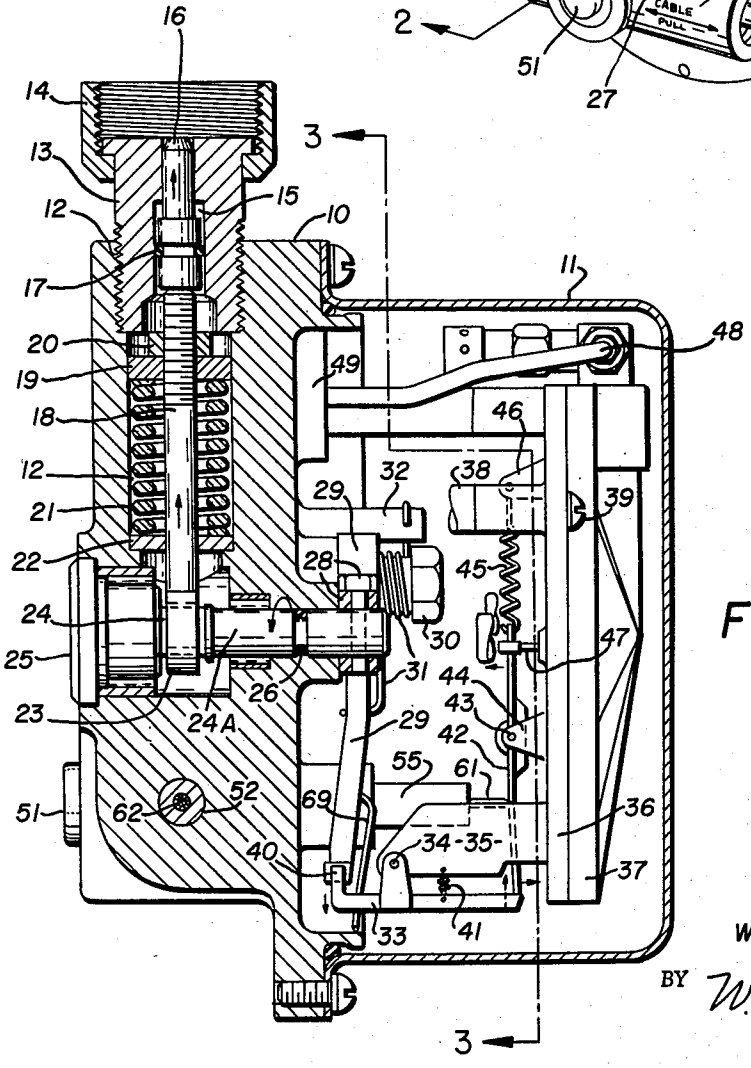


FIG. 2

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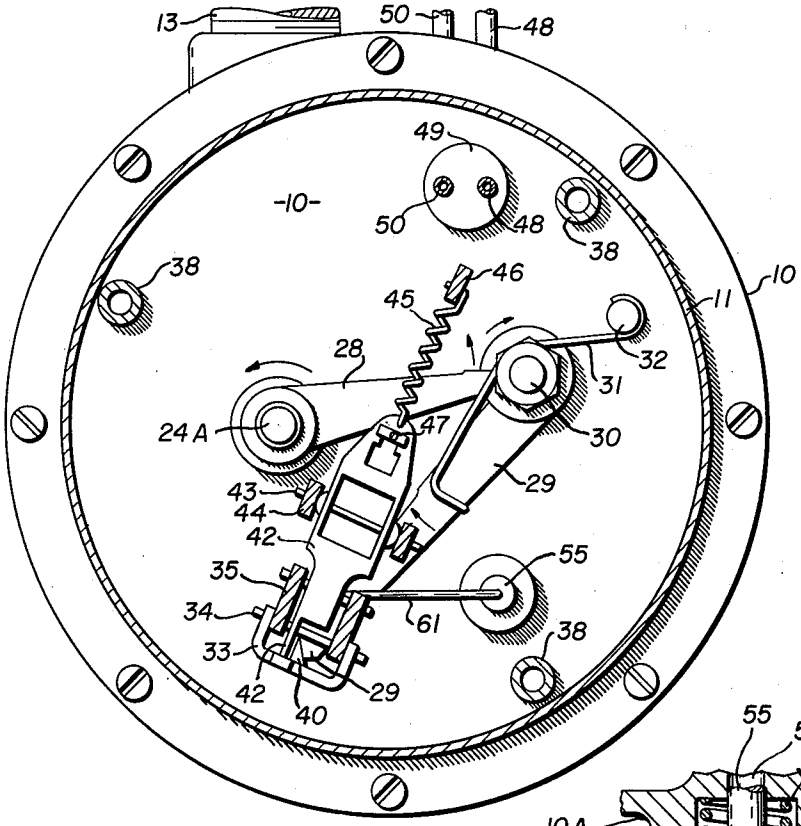


FIG. 3

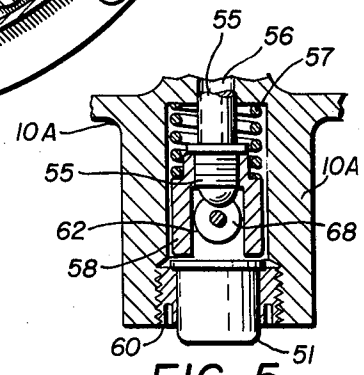


FIG. 5

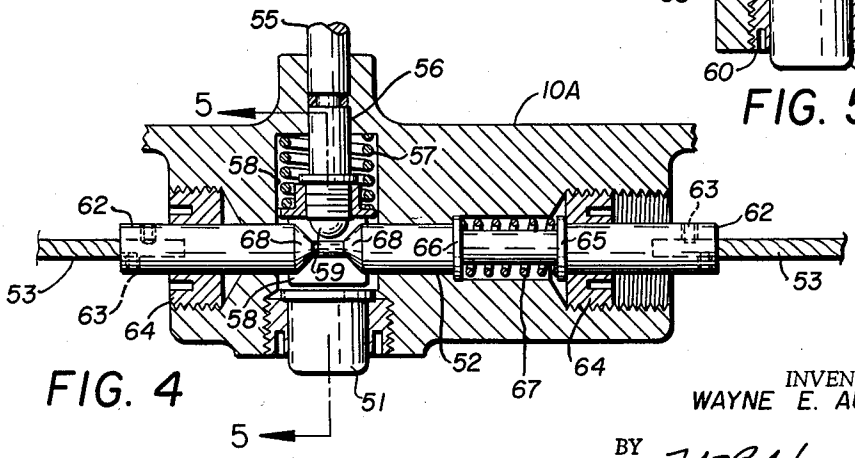


FIG. 4

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CONTROL DEVICE

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Application March 26, 1958, Serial No. 724,106

6 Claims. (Cl. 74—2)

This invention relates to automatic fire extinguishing systems and more particularly to a device for use with such systems designed to actuate the systems in response to a variety of predetermined conditions attending the beginning or which may be the cause of a fire.

The principal object of the invention is the provision of a control device adapted to be actuated by the application of a relatively slight force to operate the valve of a system for dispensing or discharging a medium stored under high pressure.

A further object of the invention is the provision of a control device adapted to be operated by air pressure supplied by a pressure medium or by mechanical actuating means.

A still further object of the invention is the provision of a control device adapted to be actuated locally or from a remote location.

A still further object of the invention is the provision of a control device which is positive and effective in operation, constructed of a minimum number of parts and one which can be economically manufactured and assembled.

A still further object of the invention is the provision of a control device which is sturdy in construction and requires a minimum amount of maintenance and repair.

A still further object of the invention is the provision of a control device of the spring stored energy type which is readily reset.

The present invention aims to provide a control device used in connection with the fire extinguishing sprinkler systems of the type where the distributing piping of the system is connected with a supply tank of suitable fluid which is adapted to be moved into the distribution system and thereby carried to the area of the fire to be extinguished through the medium of a high pressure gas released into the fluid storage tank. Such sprinkler systems are commonly used in areas where no domestic water supplies are available and/or where standpipes or the like are impractical or objectionable or where the fire extinguishing fluid must be protected from freezing temperature.

Such pressure tank sprinkler systems as known in the art have heretofore utilized various means for releasing a fluid pressure medium, such as nitrogen, from cylinders in which the compressed gas is stored. Such devices have been expensive to manufacture, difficult to maintain and sometimes are erratic in operation. The present invention relates to an improvement in such devices.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being the intention to cover all changes and modifications of the example of the invention herein chosen for purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention.

The invention is illustrated in the accompanying drawing, wherein:

Figure 1 is a perspective view of the control device.

Figure 2 is a vertical section on line 2—2 of Figure 1 on an enlarged scale.

Figure 3 is a vertical section taken on line 3—3 of Figure 2.

Figure 4 is a horizontal section taken on line 4—4 of Figure 1.

Figure 5 is a vertical section taken on line 5—5 of Figure 4.

By referring to the drawings it will be seen that a control device is disclosed which comprises a body member 10 having a housing 11 secured to one side thereof and enclosing certain apparatus connected to the body member 10. The body member 10 is provided with a threaded opening 12 in which a tubular portion 13 is engaged and which in turn supports a flanged coupling nut 14 for attaching the control device to a valve in a pressure medium dispensing or discharging system (not shown).

The tubular portion 13 has an axially extending passageway 15 therein in which a plunger 16 is slidably disposed. The plunger 16 is provided with an O-ring 17 thereabout and forms an adjustable extension of a plunger rod 18 which in turn extends into the opening 12 in the body member 10 inwardly from the tubular portion 13.

A nut 19 is threadably engaged on the plunger rod 18 and is supported by a lock nut 20, also threadably engaged on the plunger rod 18, and a helical coil spring 21 is positioned between the nut 19 and apertured disc 22 located in the body member 10 and defining an inner end of the opening 12.

The plunger rod 18 has an enlarged lower end 23 having an opening therethrough receiving a crank 24 formed on a shaft 24A which in turn is journaled in the body member 10 transversely of and in communication with the opening 12. An enlarged end portion 25 of the shaft 24A is located on the exterior of the body member 10 and the inwardly extending portion of the shaft 24A extends through the body member 10 and into the area within the housing 11. An O-ring 26 is positioned about the shaft 24A within the body member 10.

The crank 24 on the shaft 24A is so arranged that when it is moved to lowermost position, the plunger rod 18 is in the position illustrated in Figure 2 of the drawings and whereby the plunger 16 is at its maximum retraction and the helical coil spring 21 is compressed and storing energy. This is accomplished by inserting a resetting wrench in the enlarged end 25 of the shaft 24A, as best seen in Figure 1 of the drawings, wherein a socket 27 is provided for this purpose.

It will be understood by those skilled in the art that when the control device is secured to a source of a medium stored under high pressure, such as compressed nitrogen, the communicating system is controlled by a frangible disc which is adapted to be broken by the plunger 16 so that rotation of the shaft 24A causes movement of the crank 24 from lower to uppermost position, as seen in Figure 2 of the drawings, and permits the helical coil spring 21 to drive the plunger rod 18 and plunger 16 upwardly for the indicated purpose. In order that this will occur when desired, the shaft 24A is provided with an arm 28, the outermost end of which is engaged on an arm 29. The arm 29 is mounted on a stud 30 and is biased by a spring 31 which is positioned around and about the stud 30 with the opposite end of the spring 31 engaged over a member 32.

The arms 28 and 29 are held in stationary position, as is the shaft 24A and the crank 24 thereof, by a lever

33 which is pivoted midway between its ends by a pivot pin 34 to one end of a supporting bracket 35 which in turn is carried on a portion 36 of a diaphragm case 37. The diaphragm case 37, including the portion 36, is supported on boss-like extensions 38 of the body member 10 and secured thereto by fasteners 39.

It will be observed that an end 40 of the lever 33 is upturned and positioned immediately alongside the lowermost end of the arm 29 so that the arm 29 can not move about the axis of the stud 30 until and unless the end 40 of the lever 33 moves downwardly and away from the end of the arm 29

A spring 41 connected between the lever 33 and bracket 35 normally tends to move the end 40 of the lever 33 downwardly and away from its restraining engagement with respect to the arm 29. The lever 33 is normally held in such restraining engagement with respect to the arm 29 by reason of the positioning of a secondary lever 42 on the opposite end of the lever 33. The secondary lever 42 is pivoted by a pivot pin 43 to a bracket 44 formed on the diaphragm portion 36 of the diaphragm case 37. The upper or opposite end of the secondary lever 42 is engaged by a spring 45 which extends between said end and a bracket 46 positioned on the portion 36 of the diaphragm case 37.

A diaphragm pin 47 is movably positioned in an opening in the portion 36 and at right angles to the secondary lever 42 and has one end engaged against the upper end of the secondary lever 42. The other or inner end of the diaphragm pin 47 is attached to a diaphragm (not shown), such as known in the art, which is located in the diaphragm case 37 formed by the respective portions 36 and 37.

The diaphragm within the diaphragm case engaged on the diaphragm pin 47 is arranged so that air pressure introduced into the diaphragm case on the opposite side of the diaphragm as through a communicating tube 48 will move the diaphragm pin 47 to the left, as shown in Figure 2 of the drawings, which will cause the lower end of the secondary lever 42 to move to the right and permit the right end of the lever 33 to move upwardly while the left end 40 thereof moves downwardly and thereby frees the arm 29 which can then be revolved by the spring 31 on the stud 30 to free the arm 28 which can then revolve with the shaft 24A. Such motion moves the crank 24 to uppermost position with respect to the apertured end 23 of the plunger rod 18 and thereby permits the helical spring 21 to drive the plunger vertically.

It will occur to those skilled in the art that the actuation just described can be occasioned by a slight increase in air pressure in the diaphragm case as originated by an air thermostat which, as known in the art, comprises a hollow member containing a given quantity of air which expands under increasing temperature and which may be connected by suitable air tubing with the diaphragm case just described.

Several such air thermostats may be employed and connected to the control device disclosed herein through a suitable mercury check assembly, as known in the art, and which would communicate with the air tube 48 which extends outwardly of the body member 10 through a seal 49.

In Figures 1 and 3 of the drawings it will be observed that a secondary air tube 50 extends through the seal 49 and communicates with the interior of the housing 11 and this is provided to enable supervisory air pressure to be maintained within the control device so that rupture of any of the operating parts or the housing may be determined from a remote location, as will be understood by one skilled in the art.

It will thus be seen that the control device and more particularly the automatic operation thereof from an air thermostat has been described.

The control device incorporates a manual trip button 51 on the projecting portion 10A of the body member 10 and has a longitudinal passageway 52 through which a flexible cable 53 is positioned and which may be run to remote locations so that remote cable pull handles extend the manual trip arrangement to such remote locations. The device can thus be operated automatically, as hereinbefore described, or manually by the trip button 51 or from a remote location by way of the flexible cable 53.

By referring now to Figures 4 and 5 of the drawings the mechanism making the actuation possible by the manual trip button 51 and flexible cable 53 will be seen. A shaft 55 is movably positioned in a transverse passageway 56 in the projecting portion 10A. An enlarged area in the passageway 56 provides for the positioning of a coil spring 57 around the shaft 55 to engage a bifurcated yoke 58 threadably engaged on said shaft 55. The shaft 55 has a rounded end portion 59. The bifurcated yoke 58 extends across the longitudinal passageway 52 in an area at either side of the axial center line thereof.

The manual trip button 51 is movably caged in the transverse passageway 56 and retained therein by an apertured nut 60 so that inward motion of the manual trip button 51 (upward in Figures 4 and 5) will directly engage the yoke 58 on the shaft 55 and move it inwardly and compress the spring 57. Such inward motion of the shaft 55 causes a projecting pin 61 on the end thereof to engage the secondary lever 42, as seen in Figures 2 and 3 of the drawings, to move the lower end thereof to the right, off the lever 33, which permits the end 40 of the lever 33 to move downwardly and in turn permits the arms 29 and 28 to revolve along with the shaft 24A so as to actuate the control device. The same motion of the shaft 55 and pin 61 is used to actuate the device when the flexible cable 53 is moved in either direction with respect to the longitudinal passageway 52.

The flexible cable 53 is connected at either end of the longitudinal passageway 52 to a cam bar 62 as by fasteners 63—63. The cam bar 62 is movably positioned in the longitudinal passageway 52 by a pair of oppositely disposed threaded nuts 64—64, a pair of washers 65 and 66 being positioned around the cam bar 62 inwardly from one of the nuts 64—64 and a tension spring 67 is caged between the washers 65 and 66 so that the spring 67 normally biases the cam bar 62 to the position illustrated in Figures 4 and 5 of the drawings.

The portion of the cam bar 62 immediately adjacent the rounded end portion 59 of the shaft 55 is relatively smaller in diameter than the immediately adjacent portions of the cam bar 62, and which portions comprise conical cams 68—68 so that when the flexible cable 53 is moved either to the right or to the left, one or the other of the conical cams 68—68 will engage the rounded end portion 59 of the shaft 55 and cause it to move at right angles, which motion is imparted to the pin 61 which moves the secondary lever 42 with respect to the lever 33 as heretofore disclosed and described.

It will thus be seen that the control device is capable of actuation automatically as by the air thermostats, manually by the manual trip button 51, or manually from remote positions by means of the flexible cable 53.

Those skilled in the art will recognize that the simplicity of construction of the present device insures instantaneous response and hence release of a medium stored under high pressure.

In resetting the control device, the enlarged end 26 of the shaft 25 is revolved by a suitable wrench engaged in the opening 28, as heretofore described. When this motion is imparted to the shaft 25, the crank 24 is reset to lowermost position compressing the helical coil spring 21, retracting the rod 18 and plunger 16 and simultaneously moving the arm 29 against the coil spring 30 so as to re-tension the same. Simultaneously, a wire-like

extension 69 attached to the arm 29 moves partially in under the lever 33 so as to move the end 40 thereof upwardly, as best shown in Figure 2 of the drawings, and into position to again block the motion of the arm 29.

In the position illustrated in Figures 2 and 3 of the drawings, the arm 29 engages and holds the end of the arm 28, as best shown in Figure 3, which holds the shaft 24A against rotation.

It will thus be seen that a simple and efficient control device for high pressure mediums has been disclosed which meets the several objects of the invention.

Having thus described my invention, what I claim is:

1. In a device of the class described, an apertured plunger, a spring arranged to move said plunger and releasable means for restraining said apertured plunger and spring, said releasable means including a crank shaft having a crank engaged in said aperture in said plunger, stored energy means for rotating said crank shaft, secondary releasable means for holding said crank shaft in stationary position, said secondary releasable means including a diaphragm actuated escapement mechanism and a member arranged to trip said escapement mechanism, said member arranged for manual actuation.

2. The device set forth in claim 1 and wherein the secondary releasable means includes an arm on said crank shaft, a secondary arm rotatably mounted in said device and having a portion normally engaging said first-mentioned arm, spring means urging said secondary arm to release position with respect to said first-mentioned arm, and wherein said secondary arm is held against motion by said diaphragm actuated escapement mechanism.

3. The device set forth in claim 1 and wherein said member arranged to trip said escapement mechanism comprises a shaft having a pin extending therefrom, a spring normally urging said pin and shaft away from said escapement mechanism, and a push button for moving said pin and shaft toward said escapement mechanism.

4. The device set forth in claim 1 wherein the member arranged to trip said escapement mechanism comprises a shaft having a pin-like extension on one end thereof and a rounded end portion on the other end thereof, a spring normally urging said shaft and pin away from said escapement mechanism and a yoke secured to an end of said shaft adjacent said rounded end, a push button for moving said yoke and said shaft to compress said spring, a cam bar positioned through said yoke at right angles to said shaft, said cam bar arranged to engage said rounded end of said shaft for imparting movement to said shaft when said cam bar is moved transversely of said yoke.

5. In a device of the class described, a plunger, a spring arranged to move said plunger, an inner end of said plunger having an aperture therein, a crank shaft disposed through said aperture with the crank on said shaft engaging said plunger for controlling the motion thereof, means for urging said crank shaft to rotate, and means for restraining said crank shaft from rotation, said first-mentioned means including a spring about said crank shaft and said second-mentioned means including an arm on said crank shaft, a secondary arm in said device, said first-mentioned arm engaged with said secondary arm and retained thereby, a diaphragm actuated escapement mechanism including a member movable toward and away from said secondary arm, said secondary arm engaged on said member, means arranged for manual actuation for engaging said escapement mechanism to permit said member to move away from said secondary arm.

6. The control device as set forth in claim 5 wherein said means for engaging said escapement mechanism includes a shaft, a spring biasing said shaft away from said escapement mechanism, a push button movable with said shaft, a yoke positioned between said shaft and push button, and a cam bar movably positioned transversely of said yoke adjacent said shaft, flexible cables attached to the ends of said cam bar for moving the same, and cams on said cam bar adjacent the end of said shaft for imparting movement to said shaft at right angles to the axial direction of said cam bar when said cam bar is moved.

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