

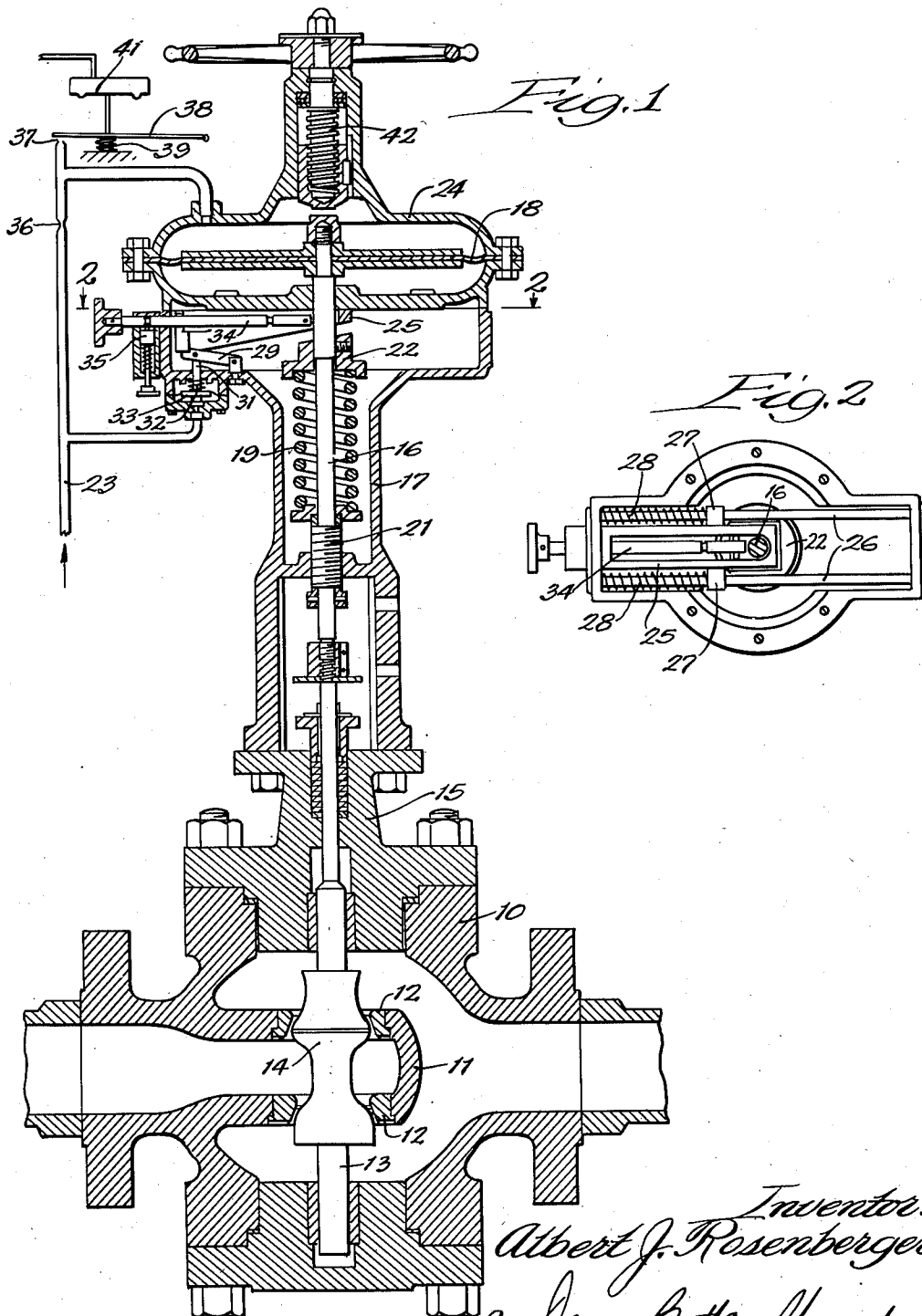
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SAFETY MEANS FOR VALVES

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SAFETY MEANS FOR VALVES

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This invention relates to valves and more particularly to safety controlling means for fluid pressure-operated valves.

Fluid pressure operated valves have the undesirable characteristic in locations such as boiler feedwater lines, various chemical processes and the like of going either full open or full closed upon failure of the controlling pressure source. In a boiler feedwater control either of these valve positions would quickly result in severe damage to the boiler or even possibly destruction thereof, and equally disastrous results might follow in the case of many chemical processes or in other environments.

It is one of the objects of the present invention to provide a valve controlled by fluid pressure which will be latched in its existing position in the event of pressure failure.

Another object is to provide a valve which is engaged by a wedge and held against movement in the event the valve operating pressure falls below a predetermined minimum.

Still another object is to provide a valve in which a latching means for holding the valve against movement is normally held in inoperative position in response to the valve operating pressure and is released to latch the valve when the operating pressure fails.

A further object is to provide a valve which is normally operated by fluid pressure but which can be operated manually, if desired.

The above and other objects and advantages of the invention will be more readily apparent from the following description when read in connection with the accompanying drawing in which—

Figure 1 is a vertical section through a valve embodying the invention; and

Figure 2 is a horizontal section on the line 2—2 of Figure 1.

The valve as shown is of the variable throttling or reducing type including a hollow body 10 formed internally with a hollow projection 11 formed with oppositely facing valve seats 12. A valve stem 13 is slidable in the body and carries an enlarged spool-like portion 14 cooperating with the seats to vary the effective flow area therethrough thereby to control the rate of flow through the valve. Valves of this general type are employed in boiler feedwater lines, in various types of steam lines and in connection with numerous chemical processes.

The stem 13 extends upward through a bonnet 15 secured to the top of the valve body and is connected to a stem extension 16 extending upward through a housing 17 and connected to a flexible diaphragm 18. The valve is urged upward to its closed position by a spring 19 seated at its lower end on a tubular screw 21 threaded into a partition in the casing 17 and at its upper end on a collar 22 secured to the stem extension 16. The tension of the spring can be adjusted by turning the screw 21 so that any de-

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sired seating force is exerted on the valve. The valve is adapted to be opened by fluid pressure supplied through a conduit 23 acting on the upper surface of the diaphragm 18. Preferably the diaphragm is enclosed in a two part housing 24 and the lower part of the housing may be vented to atmosphere.

During normal operation the position of the valve will be controlled by the pressure exerted on the diaphragm 18 so that the valve will be more or less open depending upon the control pressure. In the event of a pressure failure, with the valve as so far described, due, for example, to line breakage, to pump failure or to any other cause, the valve would immediately be seated by the spring 19. When the valve is used in an environment such as a boiler feedwater line, it will be seen that this operation could quickly damage or destroy the boiler.

To prevent this and to retain the valve in its existing position in the event of pressure failure, a latching device shown as an elongated wedge 25 formed with a central slot therein through which the stem 16 projects is provided immediately below the housing 24. The wedge normally slides against the lower flat surface of the housing 24 and is adapted to engage the upper surface of the collar 22, the upper end of the collar being cut at an angle equal to the wedge angle, as shown. The wedge angle is preferably less than the angle whose tangent equals the coefficient of friction so that it will be self-locking although, if desired, a sharper angle could be used and the surfaces of the wedge, the housing and the collar roughened or serrated to produce a locking effect. The wedge is guided by guide rods 26 in the housing over which ears 27 on the wedge slidably fit and is urged toward the stem to its latching position by springs 28.

The wedge is normally held in its retracted or released position as shown by a pivoted latch 29 engaging the wedge and holding it against movement. The free end of the latch 29 is connected to a stem 31 which is urged downward to release the latch by a spring 32 and which is urged upward by a flexible diaphragm 33. The lower surface of the diaphragm is connected to the pipe 23 so that as long as pressure above a predetermined minimum amount is available in the pipe 23, the latch will be held in its engaged position. In the event of pressure failure the latch will be swung down by the spring 32 to release the wedge so that the springs 28 can move it to the right into engagement with the collar 22.

During normal automatic operation, the valve is controlled by any desired type of instrument which receives fluid under pressure from the pipe 23 and transmits a variable pressure to the diaphragm 18. As diagrammatically illustrated, the pipe 23 is formed with a restriction 36 above its connection to the diaphragm 33 and terminates at its upper end in an open nozzle 37, the connection to the diaphragm 18 being between the re-

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striction and the nozzle. The nozzle is variably restricted by a pivoted vane 38 urged away from the nozzle by a spring 39. A diaphragm 41 responsive to a condition affected by the valve such as temperature, pressure or the like urges the vane toward the nozzle.

As the vane approaches and recedes from the nozzle, the pressure supplied to the diaphragm 18 will be varied to move the valve. However, this pressure is always less than that supplied to the diaphragm 31. In the event the source pressure fails or drops dangerously low, the spring 32 will release the latch so that the wedge will engage the collar 22 to hold the valve against closing. It will be noted that this action occurs before diaphragm 18 loses its pressure so that the valve will be held in the position it occupied when the pressure failure occurred.

The wedge can be retracted by a manually operable plunger 34 which is slidable through an opening in the wedge and which carries a pin at its inner end adapted to engage the wedge to pull it back against the springs 28. The plunger may be held in either its inner position shown or in an outer position in which the wedge is retracted by means of a spring detent 35 engageable with either of two annular notches in the plunger. When the plunger is held out by the detent, the wedge will be held in inoperative position so that the valve can be controlled manually or otherwise without interference from the wedge.

For manual control and for releasing the pressure on the valve to permit retraction of the wedge, a screw 42 may be threaded into the top of the casing 24 to engage the top of the valve stem 16. By turning this screw down against the valve stem, pressure may be taken off of the wedge so that it can be retracted manually, and with the wedge retracted the valve may be controlled manually, if desired.

While one embodiment of the invention has been shown and described in detail herein, it will be understood that this is illustrative only and is not to be taken as a definition of the scope of the invention, reference being had for this purpose to the appended claims.

What is claimed is:

1. A safety controlling means for a mechanism having a stem and a fluid pressure responsive device to move the stem comprising latching means engageable with the stem to hold it in any one of a plurality of positions, a latch engageable with the latching means to hold the latching means away from the stem, and pressure responsive means connected to a source of pressure which supplies the pressure responsive device for moving the stem to hold the latch engaged with the latching means in response to pressure and to permit it to release when the pressure drops below a predetermined value.

2. In combination with a mechanism including a slidable stem, a spring urging the stem in one direction, and fluid pressure responsive means urging the stem in the other direction, safety controlling means comprising latching means engageable with the stem to hold it against movement in said one direction, a latch to hold the latching means away from the stem, and pressure responsive means connected to a source of pressure which supplies the first named pressure responsive means to hold the latch engaged in response to pressure.

3. In combination with a mechanism including a slidable stem, a spring urging the stem in

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one direction, fluid pressure responsive means urging the stem in the other direction, means including a conduit to connect said means to a source of fluid pressure, safety controlling means comprising latching means engageable with the stem to hold it against movement in said one direction, means responsive to the pressure in said conduit to hold the latching means away from the stem when the pressure is above a predetermined value, manual means to hold the latching means away from the stem, and manual means to urge the stem in said other direction.

4. A safety controlling means for a mechanism having a slidable stem, a collar on the stem, a spring urging the stem in one direction, fluid pressure responsive means to urge the stem in the other direction, and means including a conduit to connect said means to a source of fluid pressure, said safety control means comprising a wedge slidable transversely of the stem and engageable with the collar to hold the stem against movement in said one direction, and means responsive to the pressure in said conduit to hold the wedge away from the stem when the pressure is above a predetermined value.

5. A safety controlling means for a mechanism having a slidable stem, a spring urging the stem in one direction, fluid pressure responsive means to urge the stem in the other direction, and means including a conduit to connect said means to a source of fluid pressure, said safety control means comprising a wedge slidable transversely of the stem and engageable therewith to hold the stem against movement in said one direction, a spring urging the wedge toward the stem, a latch engaging the wedge to hold it away from the stem, and means responsive to the pressure in the conduit to hold the latch engaged when the pressure is above a predetermined value.

6. A safety controlling means for a mechanism having a slidable stem, a collar on the stem, a spring engaging the collar and urging the stem in one direction, fluid pressure responsive means urging the stem in the other direction, and means including a conduit to connect said means to a source of fluid pressure, said safety control means comprising a slotted wedge fitting over the stem and engageable with the collar to hold the stem against movement in said one direction, and means responsive to the pressure in the conduit to hold the wedge away from the collar.

7. A safety controlling means for a mechanism having a slidable stem, a collar on the stem, a spring engaging the collar and urging the stem in one direction, fluid pressure responsive means urging the stem in the other direction, and means including a conduit to connect said means to a source of fluid pressure, said safety control means comprising a slotted wedge fitting over the stem and engageable with the collar to hold the stem against movement in said one direction, a spring urging the wedge toward the collar, a latch holding the wedge away from the collar, a spring urging the latch to its released position, and means responsive to the pressure in the conduit urging the latch to its engaged position.

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