

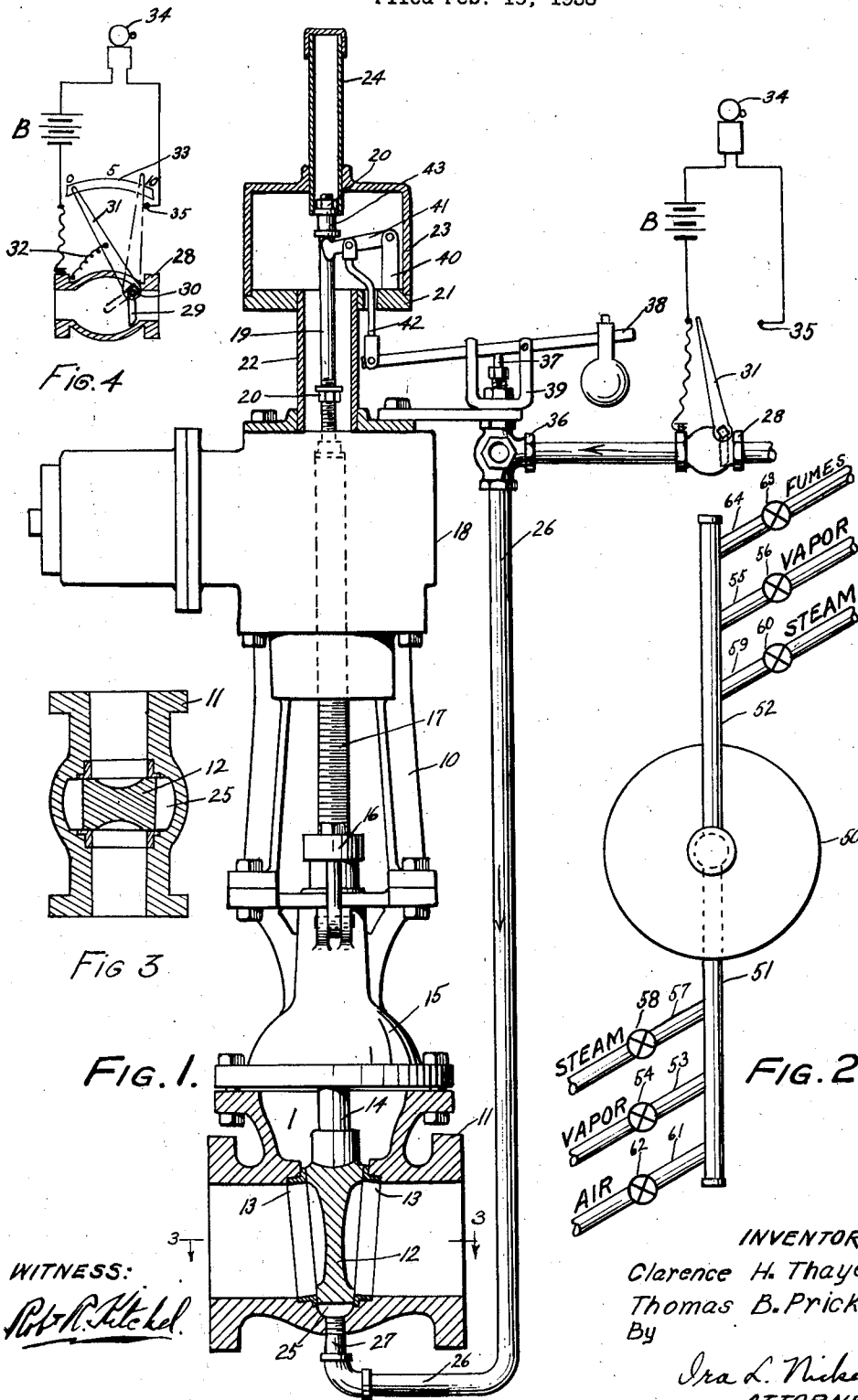
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APPARATUS FOR INDICATING LEAKAGE IN VALVES

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APPARATUS FOR INDICATING LEAKAGE IN VALVES

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1 Claim. (Cl. 251—59)

The present invention relates to control mechanism and is particularly concerned with a valve arrangement for controlling fluid volumes. It is applicable mainly to systems employing different reactant fluids which are discharged into a common receptacle for carrying out their respective functions, but in which a mixture of some of the fluids in the receptacle may be hazardous to the system generally. In such systems it is essential that the various fluids are controlled in such a manner that no detrimental or dangerous mixture occurs.

The invention finds great utility in a system for catalytically producing low boiling point hydrocarbons from the higher boiling point hydrocarbons. In such a system the higher boiling point hydrocarbon vapors are fed to a converter containing a contact mass, for a period of time, and due to the reaction of the vapors within the converter a deposit is formed on the mass which should be removed before more hydrocarbon vapors are fed to the converter. One method of removing the deposit is by subjecting the contaminated mass to an oxygen-containing gas in order to oxidize the contaminant and reactivate the mass. It has been found that any substantial mixture of certain of the vapors with the oxidizing gas may result in a fire or explosion in any part of the apparatus, where the two fluids have an opportunity of mixing.

It is the broad object of the invention to avoid this difficulty and eliminate the possibility of a detrimental mixture of the reactant fluids.

Another object of this invention is to provide, in a valve mechanism for controlling fluids, an arrangement for detecting any valve leakage.

Still another object is to provide, in a fluid valve mechanism, an arrangement for indicating any valve leakage.

Referring now to the drawing:

Fig. 1 is an elevation partly in section of a preferred form of valve arrangement embodying the invention.

Fig. 2 diagrammatically shows a system to which the invention is applicable.

Fig. 3 is a horizontal sectional view of the valve on the line 3—3 of Fig. 1 on a reduced scale.

Fig. 4 is a partially diagrammatic view of a detail of the invention.

By way of exemplifying the invention, and

generally indicated at 10 in Fig. 1, is a power actuated gate valve adapted particularly for use in control systems. From an understanding of the invention it will be appreciated that other types of valves may be employed and especially those of the type wherein a valve closure is actuated through the medium of a stem.

The gate valve comprises a body 11, valve gate 12 and seat 13—13, all of which are of ordinary construction. The valve gate 12 is provided with a stem 14, which extends upwardly through the dome shaped bonnet 15, packing gland 16 and terminates in a threaded portion indicated at 17. As heretofore mentioned, the valve is power actuated and for this purpose a motor is provided for driving suitable gearing in body 18, which coacts with the threaded portion of the valve stem to raise or lower the valve gate. Such motor operated equipment for valves is well known, and it is believed unnecessary to describe the particular arrangement in detail since it forms no part of the present invention.

Secured to the upper end of stem 14 is an extension 19, provided with abutments 20—20, which may take the form of nuts, so as to be readily threaded thereon and permit of easy adjustment. A support 21 is fixed above the gear housing 18 by means of a hollow standard or pipe 22 fixed thereto, which also encloses the extension 19. Mounted on the support 21 is a housing 23 containing mechanism to be later described in detail. A tube 24 extends through the upper wall of the housing 23, and is adapted to receive the extension 19 when the valve is in its open position and the valve stem raised.

In order to minimize the possibility of any leakage through the valve, a fluid blocking chamber 25, in the form of a channel, is provided adjacent the valve seat and may be formed by cutting a groove in the inner periphery of the valve body, as disclosed in Figs. 1 and 3, or by forming the groove in the outer periphery of the valve gate. The groove is continuous and provides a passageway for an inert fluid such as steam, flue gas or nitrogen from the line 26 to the compartment 1. The inert fluid acts as a seal for the valve and, if for any reason the valve does not completely close when the stem 14 is in its lowest position, the inert fluid may be conveyed to the chamber 25 at a pressure at least as

great and preferably greater than the pressure of the fluids on either side of the valve and prevent their intermingling. However, the inert fluid can intermingle with the other fluids without the slightest possibility of producing a dangerous mixture.

For the purpose of detecting any leakage around the valve seat 13 there is provided, as shown in Figs. 1 and 4, an arrangement for indicating the passage of an excessive amount of fluid through the line 26. The indicator comprises a pivoted member disposed in the line 26 and may take the form of a valve of the hinged check type having a body 28 which is provided with a flap 29 fixed to a pintle 30 having a free end extending outwardly of the body to receive an indicator arm 31 adapted to move with the flap 29. In order to accurately control the position of the flap 29 in accordance with the pressure or volume of the fluid passing through the valve body 28, the arm 31 may be provided with means for counteracting a sudden urge of the fluid. This may take the form of a spring 32, which maintains the flap 29 in closed position when there is no flow of fluid through the line 26.

A scale designated at 33 may be associated with the indicator 31 and show by its position thereon the relative open position of the hinged flap 29 and consequent amount of flow to the chamber 25. For example, 0 may denote "fully closed" and 10 "fully open", and an operator can visually tell when the flow to the chamber is in excess of that normally required to maintain the valve gate 12 sealed. In some instances it may be desired to provide an arrangement for an audible signal when the check valve is fully open or sufficiently open to indicate the existence of any leakage past the gate 12. As one such system, there is provided a battery B, having wiring connection with the valve body 28 and an alarm 34. The circuit is completed when the arm is moved sufficiently far to close the circuit through the contact 35.

When the valve is in closed position as shown in Fig. 1, an extraneous fluid may be directed through the pipe 26 to the chamber 25 at a pressure as great or greater than the fluid on either side of the valve, in order to check or block the flow of any fluid past the valve. The flow of blocking fluid for normally maintaining any valve in sealed condition may be determined for varying conditions of the reaction fluid to be controlled, and this normal amount will be indicated by the arm 31, when the fluid is directed to the chamber 25. When, however, a condition exists in the gate valve, which calls for a supply of blocking fluid greater than that normally required, it is immediately indicated through the flap 29 and indicator arm 31, and the condition may be corrected by the operator.

In order to control the flow of fluid through the line 26 and its admission to the blocking chamber 25 only when the gate 12 and stem 14 are in their lowermost positions, a valve 36 is provided in the line between the indicator valve 28 and gate valve 11. A slidable stem 37 extends outwardly of the valve 36, and actuates the valve to open position when it is depressed. As one arrangement for opening and closing this valve, there is provided counterweighted lever 38, pivoted on a fixed bracket 39.

Located within the casing 23 is a bracket arm 40, fixed to the support 21 and having pivoted at its free end an arm 41, which is in turn connected with the lever 38 and adapted to actuate

the same through a link 42. An abutment 43 may be provided on the valve stem extension 19, which cooperates with the pivoted arm 41 to depress the lever 38, when the valve stem is in its lowermost position, and open the valve 36.

In Fig. 2 the invention is diagrammatically shown as applied to a system for handling fluids used in the catalytic transforming of hydrocarbons. In this figure the numeral 50 designates a reaction chamber to which reactants are admitted through the manifold 51 and the reaction products removed from the top of the chamber through manifold 52. For the sake of illustration, it will be assumed that the reaction vessel 50 is a catalytic chamber containing a contact mass. The heated vapors of the oil to be treated are admitted through line 53 having valve 54 therein, to manifold 51, and thence passed through the contact mass in vessel 50 where they are transformed, and where, in the course of their treatment, the oil vapors build up a deposit of carbonaceous material on the contact mass. The reaction products are removed through manifold 52 and are carried from the system through line 55, having valve 56 therein. The carbonaceous material deposited on the contact mass in vessel 50 tends to deactivate, choke or otherwise interfere with the desired properties of the same, and after a time it is necessary that the mass be regenerated or reactivated in some simple manner, as by removing the deposit of material by oxidation with an oxygen-containing gas. Before regenerating the mass, any oil vapors remaining therein should be removed, and this may be done by admitting steam through line 57 and valve 58, after the valve 54 has been closed, passing it through the mass and drawing it off through line 59 and valve 60. When all the oil vapors have been removed from the mass in vessel 50, a heated or unheated oxygen-bearing gas, such as air, is admitted through line 61 and valve 62 to manifold 51, and thence flows through the mass to oxidize the deposit, after which the fumes pass outwardly through the valve 63 and line 64. It will, of course, be appreciated that the operation is reversible, and the reactant fluids admitted to the manifold 52, and the reactant products passed out through manifold 51.

In such a system, it is essential that the oil vapors and air should not be allowed to mix to any great extent in any parts of the apparatus, for a mixture might soon be formed which would result in a fire or an explosion. Similarly, care must be exercised that there is no back flow of treated vapors or products of combustion to the manifolds or chamber which might mix with the vapors or air and result in a hazardous condition. With a valve leakage detector and indicator of the type disclosed in the present invention, applied to the air, vapor, and fume lines of the system shown in Fig. 2, it will be apparent that there is little possibility of a hazardous mixture forming in the system. It is not necessary to equip the steam line with such an indicator, since steam is an inert fluid and its mixture with any of the fluids would not be hazardous.

The invention has been disclosed in a single embodiment and applied to one type of fluid handling system, but it will be appreciated that it may take various forms and find numerous applications other than those disclosed, and is to be limited in scope only by the appended claim.

What we claim is:

8 An assembly for preventing the intermingling of fluids in adjacent chambers comprising a valve body, valve seats therein disposed adjacent each of said chambers, a closure member movable into closed position in fluid sealing engagement with said seats, said body forming a chamber for blocking fluid with the closure member and between said valve seats when the valve

assembly is in closed position, a line for directing fluid from a source to the last named chamber, valve means normally in closed position located in said line and means associated therewith for indicating the flow of fluid through the line.

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