

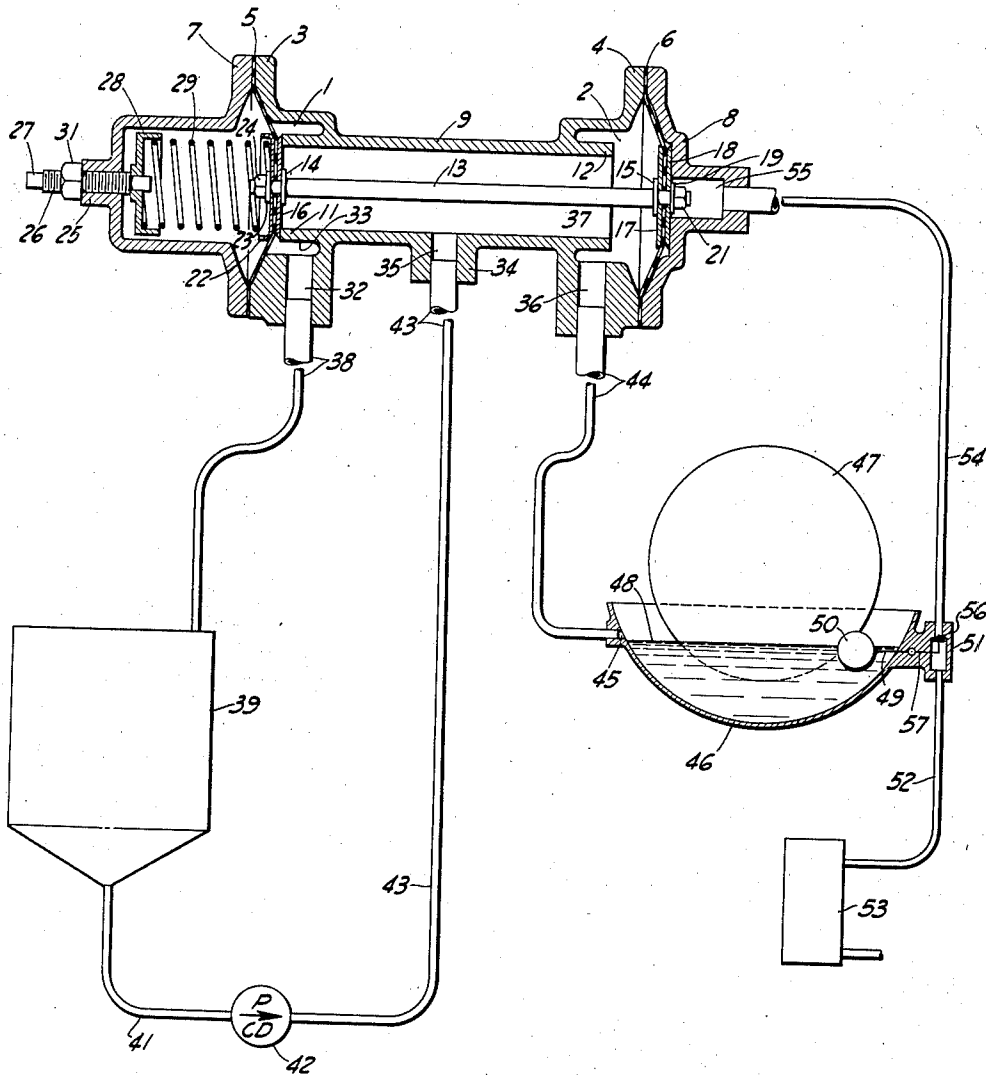
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VALVE FOR OVERFLOW SYSTEM

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VALVE FOR OVERFLOW SYSTEMS

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This invention relates to a valve arrangement for an overflow system for maintaining a tank under a constant predetermined liquor level.

In many industrial operations it is desirable to maintain the liquor in a tank at a constant predetermined level, this problem being encountered, for example, in the operation of continuous rotary drum and disc filters. Filters of this type generally include a filter element arranged to rotate within a body of liquor contained in a filter tank. Since the formation of the cake on a filter element depends to some extent on the hydraulic head in the filter tank, it is essential that the liquor in the tank be maintained at a constant and predetermined level. Ordinarily the required level is maintained by simply providing the filter tank with an overflow outlet and a conduit by which the overflow is returned to the supply tank or to some previous point in the system. This, however, is objectionable for the reason that in most cases the liquor being filtered contains a high percentage of solids, and since the desired and constant level in the filter tank is maintained by simply permitting the liquor to overflow by gravity, the overflow conduit frequently becomes clogged.

In general then, the object of this invention is the provision of an overflow system wherein the supply of liquor is delivered under pressure through a continuously operating constant displacement pump, either to the tank which is to be kept at a predetermined level or to the supply tank in the event that the level in the former tank is at or above the required predetermined level.

A further object of the invention is the provision of a diaphragm valve arranged to establish communication, through a constant displacement pump, between the outlet of a supply tank and a processing tank, or to establish communication between the outlet of the supply tank and the inlet of the supply tank in the event that the processing tank is at or above the desired predetermined level, means being provided for actuating the valve in response to the liquor level in the processing tank.

The invention possesses other advantageous features, some of which with the foregoing will be set forth at length in the following description where that form of the invention which has been selected for illustration in the drawing accompanying and forming a part of the present specification is outlined in full. In said drawing one form of the invention is shown, but it is to be understood that it is not limited to such form, since the invention as set forth in the claims may be embodied in a plurality of forms.

The single figure shown in the drawing accompanying and forming a part of this specification, diagrammatically discloses a system and valve

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embodying the objects of my invention, the valve per se being shown in the vertical cross section.

The valve as shown in this figure includes a pair of coaxial and opposed chambers 1 and 2, each provided with outwardly extending flanges 3 and 4. Disposed over each of the flanges 3 and 4 are flexible rubber or plastomer diaphragms 5 and 6, and bolted over the marginal edges of the diaphragms and to the flanges 3 and 4 are flanged covers 7 and 8. Connected to the chambers 1 and 2 coaxially therewith and forming an integral part thereof is a tubular valve body 9 having ends 11 and 12 respectively extending into the chamber 1 and 2 and serving as seats for the diaphragms 5 and 6. Extending through the tubular valve body 9 is a connecting rod 13 for interconnecting the two diaphragms so that they will move in unison. Secured to each end of the connecting rod 13 are washers 14 and 15, and seated respectively on these washers are closure discs 16 and 17 having a diameter substantially equal to the outer diameter of the valve body ends 11 and 12. Seated over the outer central face of the diaphragm 6 is a disc 18, the diaphragm 6 being clamped between the discs 17 and 18 by a washer 19 and a nut 21. Seated over the left hand diaphragm 5 is a spring retaining cup 22, the diaphragm 5 being clamped between this cup and the disc 16 by a washer 23 and a nut 24 threaded to the end of the rod 13. The length of the connecting rod 13 should be substantially longer than the length of the tubular valve body 9 so that the diaphragms 5 and 6 can be positioned to either close the valve body end 11 and open the valve body 12 or vice versa, or to maintain both of the valve body ends 11 and 12 partially open.

Formed on the outer end of the cover 7 is a threaded boss 25, and threaded into this boss is a stem 26 provided on its outer end with wrench faces 27. Mounted on the inner end of the stem 26 is a spring retainer cup 28, and disposed between this retainer cup and the opposed retainer cup 22 is a spring 29 for resiliently urging the diaphragm 5 to its closed position against the left end 11 of the valve body 9. The compression of the spring 29 is adjustable by the stem 26, a lock nut 31 being used to secure the stem 26 into any desired position.

Provided in the chamber 1 is a port 32 communicating with the annular space 33 surrounding the left end 11 of the valve body. Formed on the valve body 9 intermediate its ends is a boss 34 formed with a port 35 communicating with the interior of the valve body. Provided in the chamber 2 is a port 36 communicating with the annular space 37 surrounding the end 12 of the valve body 9.

Connected with the port 32 is a conduit 38 communicating with the upper end or inlet of a

supply tank 39, the supply tank 39 in turn communicating through a conduit 41 with the intake of a constant displacement pump 42. The discharge of the pump 42 communicates through a conduit 43 with the port 35 formed intermediate the ends of the valve body 9. Connected to the port 36 is a conduit 44 communicating with the intake 45 of a filter tank 46, a rotary drum 47 being arranged to rotate through the body 48 of liquor contained within this tank.

Pivoted to the tank 46 is a lever 49 and secured to the inner end of this lever is a ball float 50. Associated with the outer end of the lever 49 is a pilot valve 51 arranged to control communication between a conduit 52 connected to a pressure tank 53 and a conduit 54 connected with a chamber 55 formed in the cover 8. The valve closure member 56 of the pilot valve 51 is actuated by the outer end 57 of the lever 49 and consequently moves in response to the position of the ball float 50.

In the operation of this system the liquor contained in the supply tank 39 is delivered through the conduits 41 and 43 under the influence of the constant displacement pump 42, to the interior of the valve body 9. If the body of liquor 48 contained within the tank 46 is below the predetermined level for which the ball float 50 is set, there will be no flow of fluid through the conduits 52 and 54. Consequently the spring 29 will serve to maintain the diaphragm 5 closed against the left end 11 of the valve body and to maintain the right diaphragm 6 in its open position. It will therefore be seen that the supply of fluid from the tank 39 will pass through the right end of the valve body 9, through the port 36 and through the conduit 44 into the inlet 45 of the tank 46. If on the other hand the body of liquor 48 falls below the predetermined desired level, the ball float 50 will operate to open the valve closure member 56, thereby permitting the fluid under pressure to pass upwardly from the pressure tank 53 through the conduits 52 and 54 into the chamber 55. The pressure created in the chamber 55 will therefore serve to move the diaphragm 6 to the left. Since the diaphragms 5 and 6 are connected through the connecting rod 13 for conjoint movement, the diaphragm 5 will open as the diaphragm 6 closes. If the pressure within the chamber 55 is substantially equal to the pressure exerted by the spring 29, both of the diaphragms 5 and 6 will be maintained in their partially open positions. Under these conditions the supply from the tank 39 will split at the port 35, part of it returning to the supply tank inlet and part of it being delivered through the conduit 44 to the inlet 45 of the tank 46. If, however, the valve closure 56 is forced to its fully opened position, the pressure within the chamber 55 will be sufficient to force the diaphragms 5 and 6 to their extreme left hand position, thereby closing the diaphragm 6 on the right hand end 12 of the valve body 9. Under these conditions the supply of liquor from the tank 39 will simply be returned through the valve body, through the port 32, and through the conduit 38 to the intake of the supply tank.

In passing it should be noted that the pilot valve 51 is indicated only diagrammatically, that it is of standard construction and should obviously be provided with means for venting the conduit 54 to atmosphere when the closure member 56 is in its closed position so as to relieve the pressure within the chamber 55.

It will therefore be seen from the above description that I have provided a valve and system

whereby the liquor to be supplied to a constant level tank is always maintained under pressure, and whereby if the liquor level within the constant level tank rises above a predetermined level, the supply of liquor will be returned under pressure to the intake of the supply tank, thereby avoiding the accumulation of any solids in the return line.

I claim:

1. A valve comprising: a pair of opposed coaxial chambers each closed at its outer end with a flexible diaphragm and each connected at its inner ends to a common coaxial tubular member, the ends of said tubular member extending into said chambers and forming a seat for said diaphragms; a connecting rod extending through said tubular member for interconnecting said diaphragms so that the movement of one of said diaphragms will be imparted to the other of said diaphragms, the length of said connecting rod being substantially greater than the length of said tubular member; a port formed in each of said chambers and a port formed in said tubular member intermediate its ends; and means for subjecting one of said diaphragms to an external pressure.

2. A valve comprising: a pair of opposed coaxial chambers each closed at its outer end with a flexible diaphragm and each connected at its inner ends to a common coaxial tubular member, the ends of said tubular member extending into said chambers and forming a seat for said diaphragms; a connecting rod extending through said tubular member for interconnecting said diaphragms so that the movement of one of said diaphragms will be imparted to the other of said diaphragms, the length of said connecting rod being substantially greater than the length of said tubular member; a port formed in each of said chambers and a port formed in said tubular member intermediate its ends; means for externally spring-loading one of said diaphragms; and means for subjecting the other of said diaphragms to an external fluid pressure.

3. A valve comprising: a tubular valve body provided with a port intermediate its ends; a chamber surrounding each end of said body, the outer ends of each of said chambers being closed by a flexible diaphragm, and each of said chambers being provided with a port; a connecting rod extending through said valve body and connected at its ends to said diaphragms, the length of said connecting rod being greater than the length of said valve body; means for spring-loading one of said diaphragms; and means for subjecting the other of said diaphragms to an external fluid pressure.

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