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CHEMICAL FEED PUMP MECHANISM

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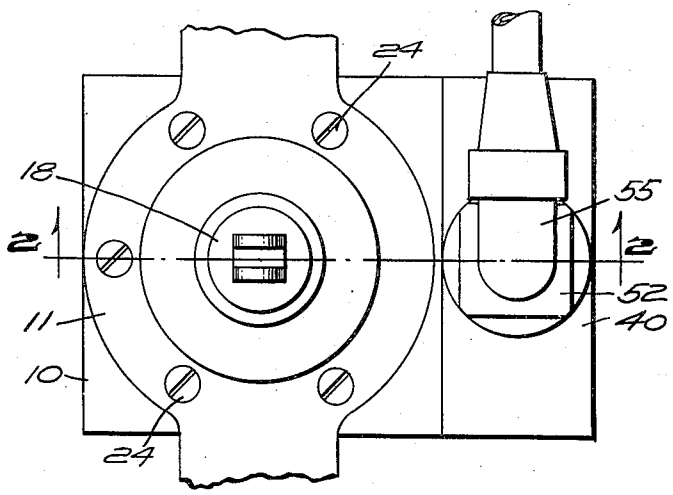


Fig. 1

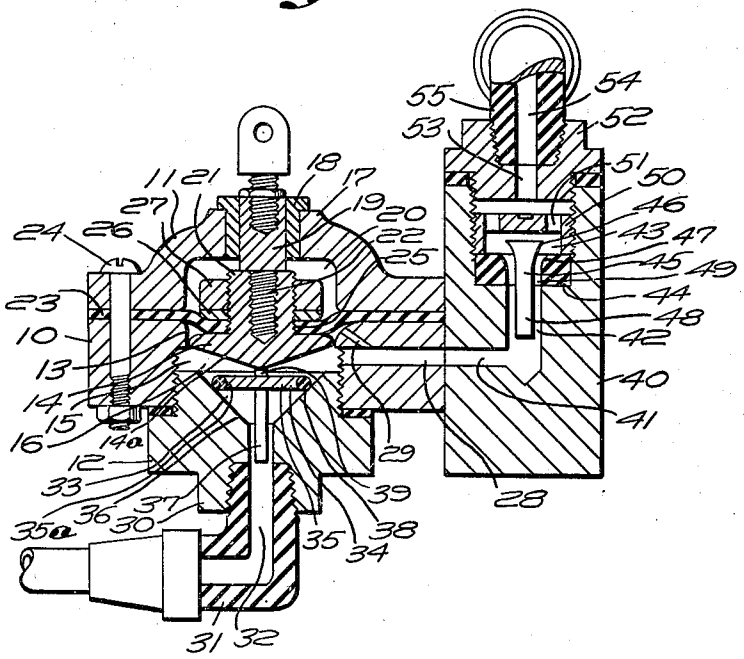


Fig. 2

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CHEMICAL FEED PUMP MECHANISM

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2 Claims. (Cl. 103—153)

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The present invention relates to fluid processing systems and arrangements, and has particular reference to a novel piston construction for a chemical feed pump.

The principal object of the invention is to provide a piston arrangement in a chemical feed pump which facilitates elimination of entrained air.

A further object of the invention is to provide a fluid pump cylinder having an air vent, with fluid pump piston having a conical face.

With the above and other objects and advantageous features in view, the invention consists of a novel arrangement of parts more fully disclosed in the detailed description following, in conjunction with the accompanying drawings, and more specifically defined in the claims appended thereto.

In the drawings:

Fig. 1 is a top plan view of a novel chemical feed pump; and

Fig. 2 is a vertical section on the line 2—2 of Fig. 1.

It has been found desirable to provide a novel arrangement for eliminating entrained air in a chemical feed pump, in order to ensure full uniform volumes of pump discharge. To this end, I have utilized an air vent in the upper portion of the pump cylinder and a piston which has a conical face, as I have found that entrained air will collect on a conical piston face which is directed downwardly and will move upwardly along the conical face to the upper portion of the cylinder, from which it is readily vented.

The preferred pumping mechanism is of the piston pump type, and includes a pump cylinder 10, a cylinder cap 11, and a cylinder base 12. The cylinder 10 has a central piston bore 13 in which a piston 14 reciprocates, and an enlarged lower recess 15 which functions as a pump chamber 16, the base 12 being removably secured within said lower recess, as by threading.

The cylinder cap 11 is cup-shaped, as illustrated, the upper portion 17 being bored to receive a bushing 18 in which the piston pump rod 19 is slidingly received, and the lower portion 20 of the cap being sufficiently large to house the upper end 21 of the piston 14, this upper end being reduced in thickness and internally bored and threaded to receive the correspondingly reduced and threaded end portion 22 of the piston rod.

A flexible seal sheet 23 is mounted between the cylinder and its cap, and is locked in place by the cap and cylinder bolts 24, the seal sheet

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having a central opening 25 which seats over the upper end 21 of the piston and being clamped to the piston by a lock washer 26 and a lock nut 27 which threadedly engages the correspondingly threaded outer surface of the upper piston end 21.

The pump cylinder is provided with a lateral outlet passage 28 which freely communicates with the pump chamber 16. The piston 14 is shaped to provide a conical piston face 14a, and fits within the walls of the cylindrical bore 13. Any air accumulated in the space between the piston and the seal sheet acts as a damping device or a dash pot, with resultant interference with the accuracy of feed volumes and possible stoppage of the pumping action because of the alternate compression or expansion of the trapped air. The downwardly directed conical face of the piston acts as an air eliminator, the entrained air moving up the conical sides until adjacent an air duct or vent 29 which is provided at the top portion of the pump cylinder to communicate the upper portion between the piston and the seal sheet with the outlet passage 28 and eject or release any accumulated air. The base 12 has a depending boss 30 to which an inlet nipple 31 is attached, as by threading, for conveying treatment fluid to a vertical inflow passage 32 which communicates with a conical inlet chamber 33.

An inlet check valve 34 is positioned in the inlet chamber with its valve disk 35 adapted to seat on the conical walls 36 of the inlet chamber, which form a valve seat, the valve stem 37 of the check valve depending downwardly into the vertical inflow passage 32, which acts as a guide for the valve stem. The valve disk 35 has an annular rim 35a in which an annular bead 38 of circular cross section is seated, the bead forming the disk edge and being preferably of rubber or other resilient and chemically resistant material, secured to the periphery of the disk in any suitable manner.

The valve disk 35 is provided with a central upstanding abutment or projection 39 which is positioned directly in the path of the piston movement. The use of the upstanding abutment reduces the clearance between the lower surface of the piston and the inlet valve; the inlet valve cannot lift too much and is contacted by the piston on down movement, thus ensuring quick correspondence of the piston and inlet valve movements and preventing valve flutter or lag.

An out-flow casing 40 is secured to one side of the pump cylinder, provided with a flow pas-

sage 41 communicating with the pump cylinder outlet passage 38 and leading to a vertical passage 42 for conveying the treatment fluid to an out-flow chamber 43. A valve seat 44 is positioned in the out-flow chamber over the upper portion of the vertical passage 42, the valve seat being preferably of rubber or similar resilient and chemical resistant material, and a check valve 45 is mounted in the casing with its valve head 46 adapted to engage the preferably conical walls 47 of the valve seat, the stem 48 of the valve extending through the central opening 49 of the valve seat and depending into the vertical passage 42, which acts as a valve stem guide.

A valve loading disk 50 is provided with flow passages 51 and is threaded or otherwise secured to the inner walls of the out-flow chamber, and a closure top 52 is threaded into the upper portion of the out-flow chamber, the closure top having a flow opening 53 which communicates with the flow conduit 54 of an out-flow nipple 55 which is threaded into the upper portion of the closure top. The valve loading disk ensures valve closing even if no back pressure is available to seat the outlet check valve, and thus provides proper operation even when feeding with negative pressures.

The improved piston pump mechanism is particularly suitable for constant stroke operation at variable high speeds, from 150 strokes per minute, up.

Accurate and uniform volumes of chemical feed are ensured by the combination of the downwardly directed conical faced piston and the air vent, which cause an upward travel and shift and a discharge of entrained air and thus prevent accumulation of dead air in the cylinder. Although a conical face is preferred, the face of the piston may be shaped with a central projecting point or area and receding sides.

While I have described a specific constructional embodiment of the invention, it is obvious that changes in the size, shape and material of the pump parts, and in their relative arrangement, may be made to suit the requirements for different pumping systems, without departing from the spirit and the scope of the invention as defined in the appended claims.

I claim:

1. In a pump mechanism for high speed fluid feeding, a vertical cylinder, a piston movable in said cylinder and connected to a power source for reciprocation thereby, said piston having a downwardly directed conical face, a base for said cylinder having an inflow chamber, an inlet check valve in said inflow chamber positioned directly below said piston, said cylinder having a check valve controlled outflow passage, and having an air vent passage in the upper portion thereof communicating with said outflow passage, whereby entrained air in said cylinder travels up the conical face of the piston and into the air vent passage.

2. In a pump mechanism for high speed fluid feeding, a vertical cylinder, a piston movable in said cylinder and connected to a power source for reciprocation thereby, said piston having a projecting central portion and receding sides, a base for said cylinder having an inflow chamber, an inlet check valve in said inflow chamber positioned directly below said piston, said cylinder having a check valve controlled outflow passage, and having an air vent passage in the upper portion thereof communicating with said outflow passage, whereby entrained air in said cylinder travels up the receding sides of the piston and into the air vent passage.

LOUIS R. MANNHEIM.

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