

March 7, 1933.

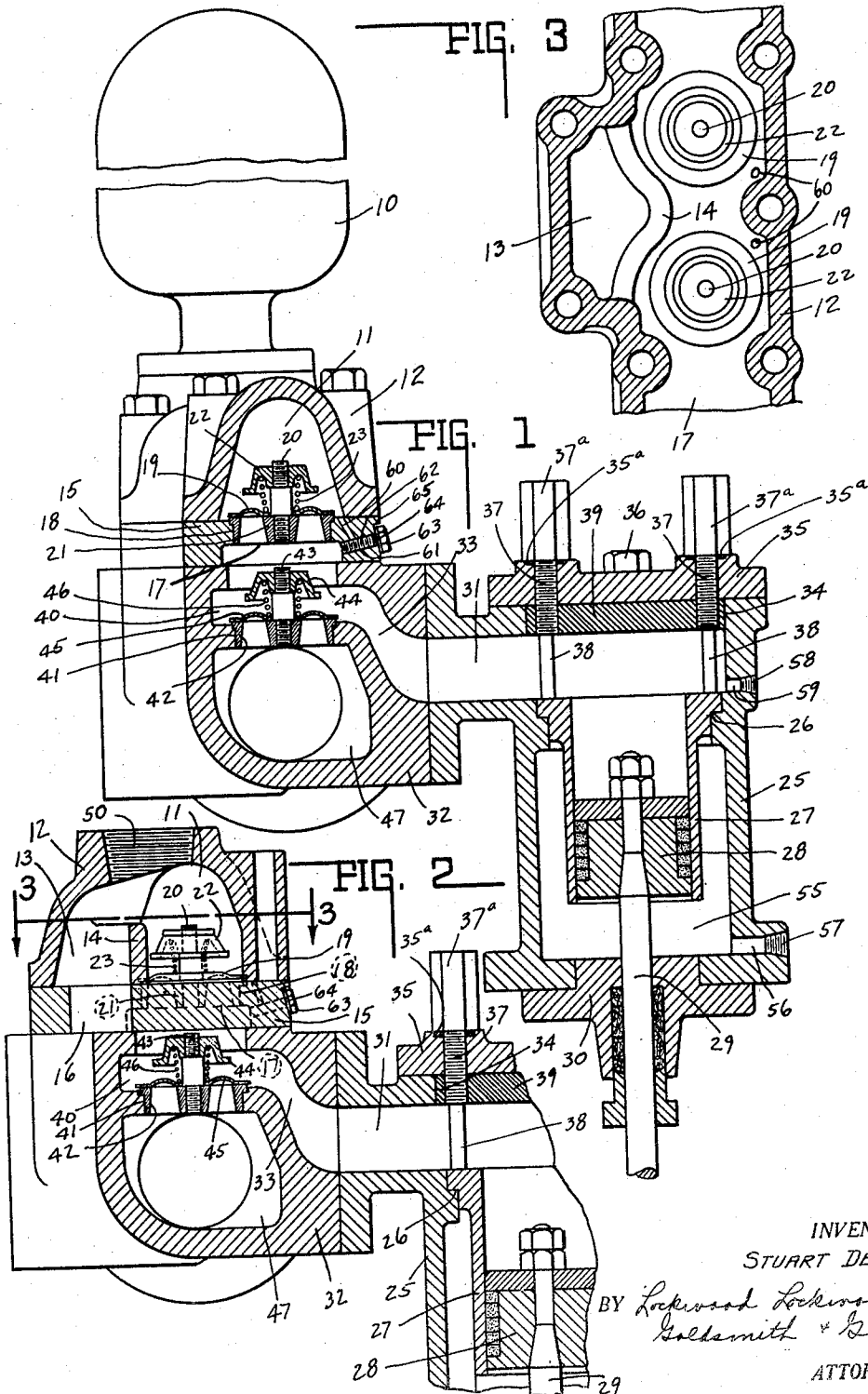
S. DEAN

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PUMP CONSTRUCTION

Filed March 30, 1931

2 Sheets-Sheet 1



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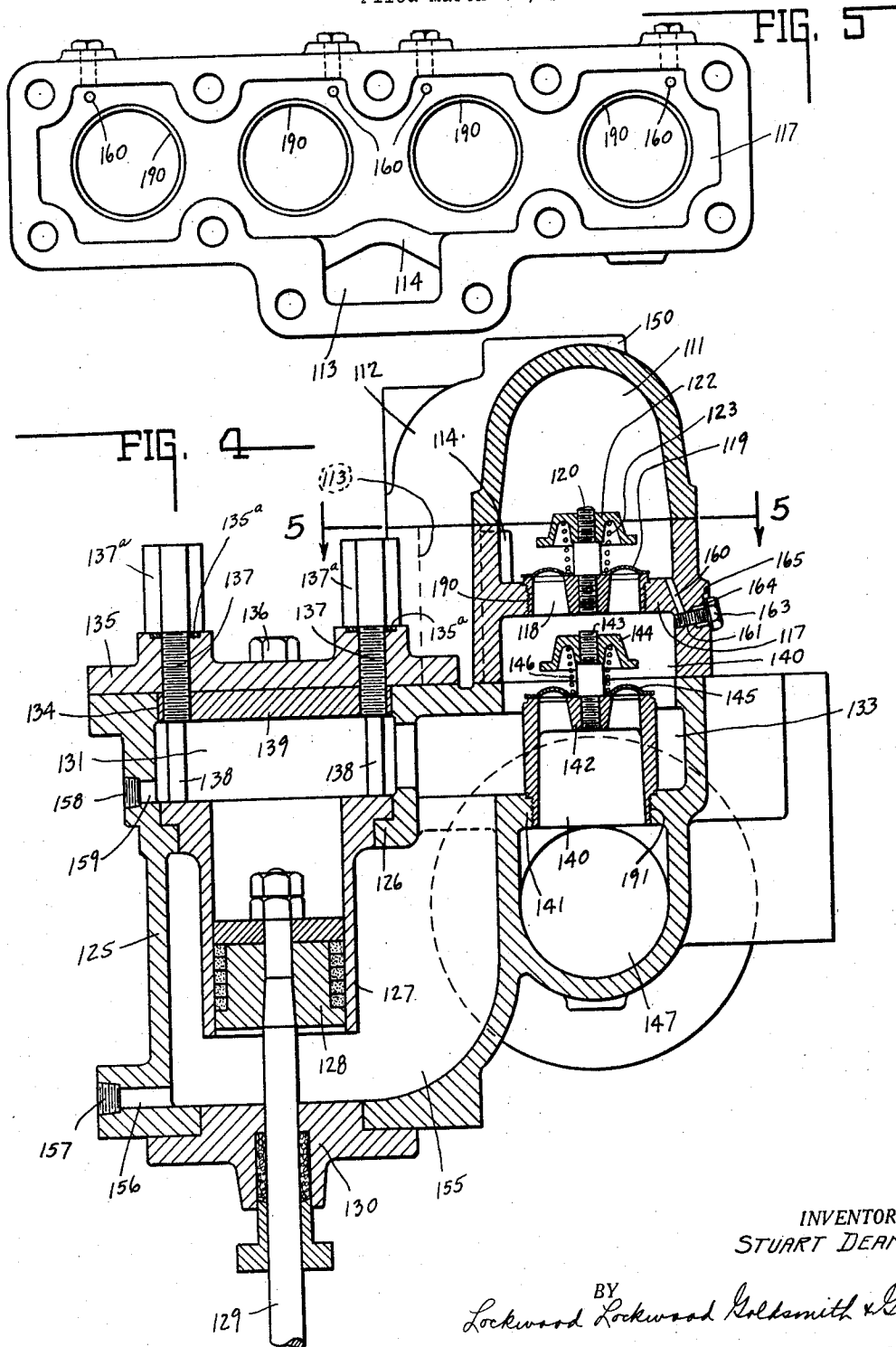
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## UNITED STATES PATENT OFFICE

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## PUMP CONSTRUCTION

Application filed March 30, 1931. Serial No. 526,272.

This invention relates to the liquid sealing of vertical pumps.

One object of the invention is to liquid seal the upper end of an upright pump cylinder.

Another object of the invention is to liquid seal part or all of the parts of an upright pump.

One feature of the invention consists in positioning at a higher elevation than heretofore positioned, the suction valve or valves.

Another feature of the invention consists in liquid sealing the discharge valves whereby they will not be drained dry should the pump at times handle nothing but air or air and water.

A further feature of the invention consists in the priming valve arrangement which may also serve as a drain.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:—

In the drawings, Fig. 1 is a vertical sectional view through a portion of a vertical pump showing one form of elevated suction valve, one form of liquid retaining dam for the discharge valves and a combination drain and priming valve.

Fig. 2 is a similar view to illustrate the dam construction.

Fig. 3 is a horizontal sectional view through the discharge valve cover, illustrating the dam in detail.

Fig. 4 is a view similar to Fig. 1 but of a modified form of elevated intake suction valve and a modified form of dam construction.

Fig. 5 is a plan view of the discharge valve elevating deck with the dam illustrated in detail and is taken on line 5—5 of Fig. 3.

In Figs. 1 to 3, inclusive, there is illustrated an upright or vertical pump adapted to handle liquid, such as water, and which at times may handle part water and part air and which at some time or other, may handle only air while supposedly pumping water.

In the drawings, 10 indicates the usual air dome employed with pumps of this character and said dome communicates with the dis-

charge chamber 11 formed in the discharge head 12. The discharge head 12 has the common discharge outlet 13 and formed in said head in the present invention is a vertical partition 14, herein termed the dam. The head in the present instance does not include the discharge valve deck but the same is formed in the casting 15 which also includes a registering outlet 16. The horizontal portion 17 of the deck includes the discharge ports 18. For each port is a disc valve 19 slidably supported by a stem 20 carried by the spider portion 21 in the valve opening or port 18. Said stem 20 adjustably mounts a spring retainer 22, against which bears one end of a spring 23 which normally retains the valve in seated position and closes the opening or port 18.

The main pump body is indicated at 25 and depending from an overhead seat portion 26 therein is the cylinder and liner 27. Mounted therein is the piston 28 carried by the piston rod 29 that passes through the gland construction 30 and is reciprocated by any suitable mechanism. The pump body 25 includes an overhead chamber 31 and herein the pump body is formed separate from the valve supporting portions. The valve supporting body 32 includes an upwardly inclined passage 33 which communicates with the chamber 31.

For liner insertion, there is provided the opening 34 in the upper portion of the body 25. A cap 35 is suitably secured as at 36 to the body 25. The cap 35 supports the hold-down studs 37 which terminate at one end in bearing members 38 that bear upon the flange of liner cylinder 27 and maintain the same upon the seat 26 in the main body of the casting and the other ends mount cap nuts 37a which bear on sealing ring gaskets 35a. In order to reduce the chamber volume, the hold-down studs may support an aligning disc and plug 39.

The valve supporting body 32 includes the upwardly inclined passage 33 which communicates with the overhead chamber 31, terminates in a chamber 40, the lower portion of which is apertured at 41 to form an intake port. The intake port mounts the spider

construction 42 similar to the spider construction 21 and the stem 43 carried thereby supports the spring retainer 44 and interposed between the intake disc valve 45 and said retainer 44 is the spring 46. The chamber 47 which communicates with the chamber 40 through the intake port 41 communicates with the liquid supply source to which the pump is attached.

As the piston moves down in the upper part of the liner cylinder, it creates a suction which seals the discharge valve 19 and opens the intake valve 45 and this pull permits the liquid and air or either of them, to enter the chamber 40. Upon the return and upward stroke of the piston 28, the liquid collected in the overhead chamber and passages 40, 33 and 31 is discharged through the exhaust valve for pressure applied through the spring and the piston 28 seats the intake valve so that the liquid and the air discharge into the discharge chamber 11. The air passes upwardly through the opening 50 into the dome 10 and the surplus liquid flows over the dam 14 to the discharge passages 13 and 16.

As a result of the aforesaid construction, there is trapped in the pump between the intake and discharge valves a large body of liquid thereby increasing the efficiency and effectiveness of the pump. This is because the air volume in this portion of the device is reduced to a minimum since the trapped liquid in the passage 33 and chamber 31 displaces that amount of air which heretofore has always collected therein and has been handled at each reciprocation of and by the pump piston with a resulting decrease in the performance or efficiency of the pump.

Briefly expressed, the offsetting or upward inclination of passage 33 results in an effect equal to the reduction of the zero air volume.

The liquid initially discharged through the discharge valves collects above said valves and said valves operate in a bath of liquid, said liquid being retained by the dam. In other words, the liquid behind the dam 14 is effective to seal the discharge valves during the intake stroke of the piston. In this manner, the efficiency of the pump is increased upon the intake stroke.

As shown clearly in Fig. 1, the discharge valve deck casting 15 includes a passage 60 which leads from the upper face thereof to a downwardly inclined drilled and tapped opening 61 that extends from the chamber beneath the deck to the exterior of the casting. A threaded bolt 62 having the head 63 is mounted therein and bears upon a gasket 64 that in turn bears against a counterbored portion 65 of the casting. Bolt 62 closes passage 60.

For initial priming of the pump, the bolt 62 may be removed and liquid supplied to chamber 31 and passage 33 to the desired level, then the bolt may be screwed down and

when it does, it completely closes the port 62 and cuts off the bypass between the intake chamber 40 and the discharge chamber 11 through passage 60.

After installation and when the pump is intermittently operated, the liquid trapped by the dam may be released by backing out for a portion of the distance, the bolt 62, thereby permitting the liquid trapped by the dam in the discharge chamber to escape through passage 60 and the portion of the threaded opening 61 that communicates with the intake chamber, thereby priming the intake chamber. After this priming, the bolt 62 is reseated and this substantially cuts off any further discharge through port 60. Should there be any leakage through this connection, the same will be very small and has no serious effect so far as the efficiency of the pump is concerned.

The lowest point of the intake chamber includes a drain port 59 closed by a plug 58. Likewise, the liner cylinder is liquid sealed as at 55 and for drainage, there is provided the passage 56 closed by a plug 57.

In Figs. 4 and 5 there is illustrated a modified form of the invention and this form of the invention is illustrated as an adaptation of a standard pump. In this form of the invention, the equivalent action is obtained by elevating the intake valve instead of employing an offset passage, such as shown at 33 in Fig. 1.

To accommodate the elevated inlet valve, the deck for the discharge valve is positioned in an elevated position and in the present form of the invention, instead of the dam being formed in the discharge head, the same is formed in the discharge deck member. In this form of the invention the discharge valves are sealed by the liquid trapped by the dam. The combination priming valve and bypass drain construction is also illustrated in this form of the invention. The operation of this form of the invention is substantially identical to that previously set forth relative to the embodiment illustrated in Figs. 1 to 3, inclusive. In Figs. 4 and 5, like or similar parts are indicated by numerals of the one-hundred series.

In this form of the invention, the spider 142 is provided with an integral depending wall which forms the elongated passage 140. This wall has threaded engagement 191 with partition 141.

With this construction reduction in zero air volume, liquid sealing, priming and draining all can be accomplished in a modification of a standard pump, i. e. by replacing the standard valves and spider—see Figs. 1 and 2—by the skirted or walled spider 142.

The invention claimed is:—

1. In a pump, the combination of an intake chamber having an intake port therein, an intake valve for the port, means detach-

ably associated with the port for elevating the valve to the highest operative position in the chamber, a discharge deck forming the top of said chamber and positioned above the body of the chamber, said deck including depending wall means forming a continuation of said chamber and into which the intake valve structure projects.

2. In a pump, an intake chamber, a discharge chamber, a discharge valve supporting partition therebetween, a passage leading downwardly from the discharge chamber, a passage leading outwardly from the intake chamber, said passages communicating with each other, one of said passages being extended for exterior exposure and the extension being threaded, and a threaded plug seatable in the extension for passage control purposes and removable for priming purposes.

In witness whereof, I have hereunto affixed my signature.

STUART DEAN.