No. 884,769. PATENTED APR. 14, 1908.

W. H. SHAFER.

FORCE PUMP.

APPLICATION FILED JUNE 13, 1906.

2 SHEETS—SHEET 1.

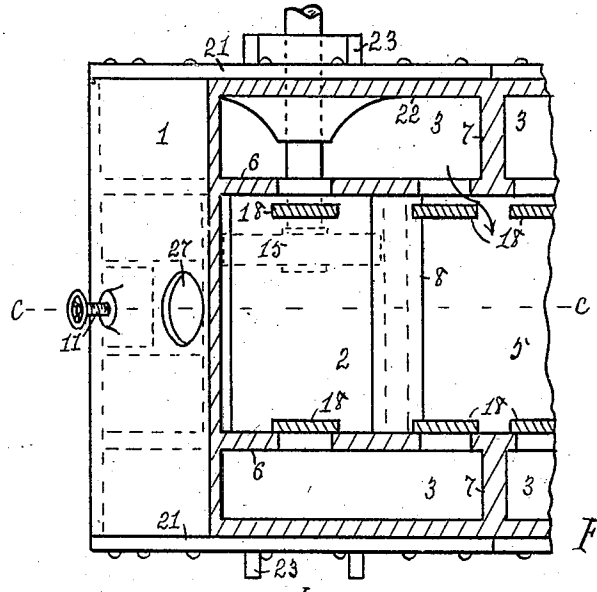


Fig. 2.

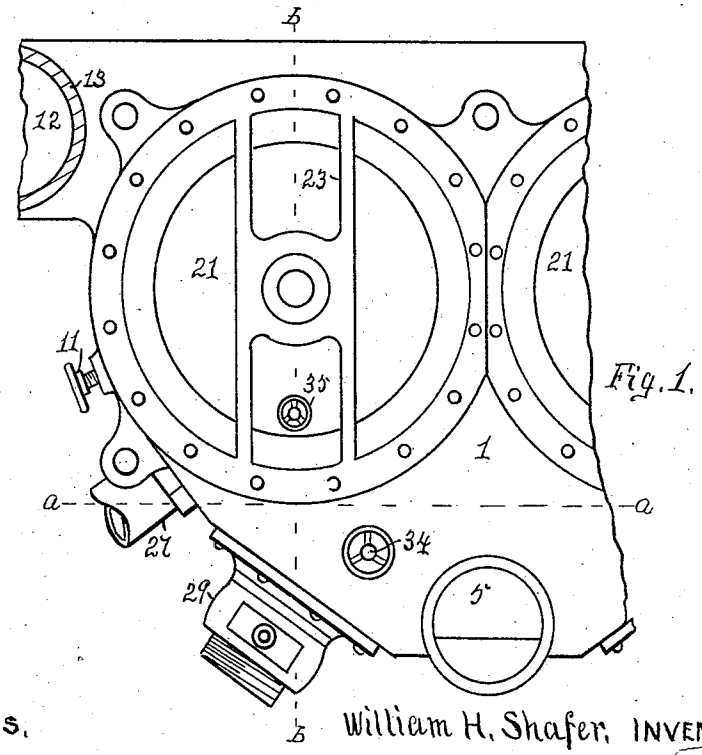


Fig. 1.

WITNESSES.

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William H. Shafer, INVENTOR.

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THE NORRIS PETERS CO., WASHINGTON, D. C.

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2 SHEETS—SHEET 2.

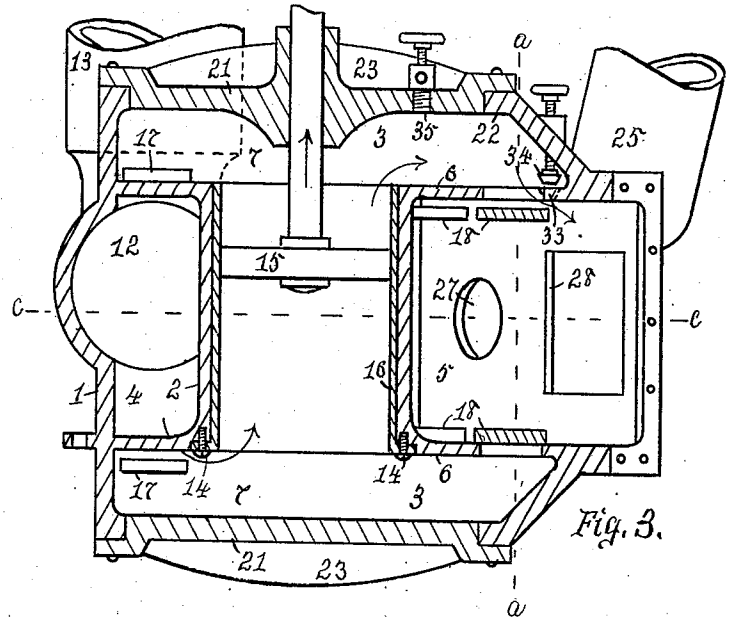


Fig. 3.

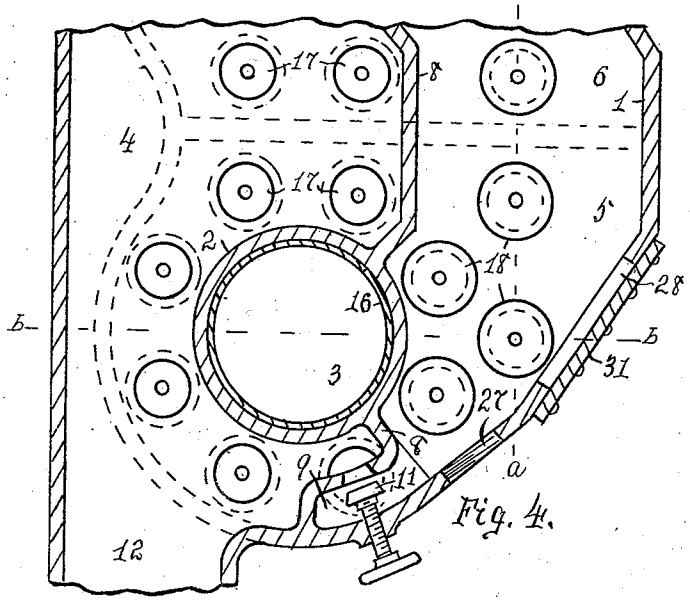


Fig. 4.

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UNITED STATES PATENT OFFICE.

WILLIAM H. SHAFER, OF CINCINNATI, OHIO.

FORCE-PUMP.

No. 884,769. Specification of Letters Patent. Patented April 14, 1908.

Application filed June 13, 1906. Serial No. 321,438.

To all whom it may concern:

Be it known that I, WILLIAM H. SHAFER, a citizen of the United States, residing at Cincinnati, Ohio, have invented a new and useful Improvement in Force-Pumps, of which the following is a specification.

My invention relates to force pumps of the class adapted for use in fire engines or elsewhere, and which may be either multiplex or single and either double or single acting, and the objects of my improvement are to emplace the suction and discharge valves in the same decks and in the same planes with the ends of the pump barrels for obtaining more direct passages for the water from the suction to the discharge chamber; to form the pulsation chambers without any obstructing flanges, bolts or posts around the pump barrels that tend to obstruct, form eddies and produce more turbulence of the water in its passage therethrough; to provide a valve controlled priming passage for the upper pulsation chamber from the force chamber; to dispose the various chambers in such relation to each other as to provide the most direct and unobstructed passages between and through them for the water, whereby a maximum capacity and efficiency is obtained with a minimum expenditure of power; and in construction to secure compactness, rigidity, and durability. These objects are attained in the following described manner as illustrated in the accompanying drawings, in which:—

Figure 1 is a plan with parts broken away of a duplex double acting force pump embodying my improvement; Fig. 2 is a vertical section on the line *a*—*a* of Figs. 1, 3 and 4; Fig. 3 a vertical section on the line *b*—*b* of Figs. 1 and 4 and Fig. 4 a horizontal section on the line *c*—*c* of Figs. 2 and 3.

In the drawings, 1 represents the pump body containing the pump barrels 2, the pulsation chambers 3, the suction chamber 4 and the discharge chamber 5. The horizontal valve decks or partitions 6 formed integral with the body inclose between them the suction and discharge chambers and separate therefrom the pulsation chambers. The pulsation chambers are separated from each other by means of partitions 7 and the suction chamber is separated from the discharge chamber by means of partitions 8 said partitions 7 and 8 being formed integral with the pump body. A pocket 9 formed in partition 8 contains a by-pass or churn valve 11 adapted to control the passage therethrough of the water between the suction and discharge chambers.

Suction inlets 12 provided with vacuum chambers 13 are formed in the pump body in a line tangent to the rear side of the pump barrels. Said barrels formed integral with the body are each provided with a plunger 15 and with a lining 16 which is removably secured therein by means of cap screws 14 and which terminates at its ends flush with the surface of the valve decks, as does also the ends of the barrels. Said valve decks are each provided with series of suction valves 17 adapted to admit the water from the common suction chamber to the respective pulsation chambers and it is also provided with series of similar discharge valves 18 adapted to admit the water from the respective pulsation chambers to the common discharge chamber.

The circular heads 21 are removably secured to the pump body flush with the inner surface of the outer walls 22 of the pulsation chambers. Said heads are reinforced and strengthened with outside ribs 23 that the usual stay bolts or posts may be omitted from the interior of the pulsation chambers around the pump barrel openings therein, whereby an unobstructed passage is obtained for the water through the pulsation chambers.

The discharge chamber 5 communicates with the usual air chamber 25 and is provided with removable main discharge gates 27, and with intermediate discharge openings 28 wherein auxiliary gates 29 may be removably secured.

Blind plates 31 serve to securely close either of said openings 28 when the auxiliary gates are not attached thereto.

Valved vent openings 35 are provided in the top pump heads for the escape of the air from the upper pulsation chambers, and priming passages 33 formed in the top valve deck between the discharge chamber and the respective upper pulsation chambers are controlled from the outside of the pump body by means of priming valves 34. The suction inlets are placed near the upper deck that the pump may retain as much water as possible when not in action. The valves in the lower deck being thus submerged and primed are in better condition for immediate action than are the dry valves in the upper deck. This also applies correspondingly to the respective

lower and upper portions of the plungers. In starting the pump some of the water thus retained is forced through the priming passages into the upper pulsation chambers for priming the valves in the upper deck and facilitating their action before the water can reach them from the suction chamber. The advantages of thus quickly priming or water sealing the valves in the upper deck becomes more apparent when the valves are worn, and it serves to prevent what is known as "water hammer" and enables the pump to deliver its full capacity in a shorter time after being started than is otherwise possible.

In operation, the plungers are preferably set quartering to maintain a more constant stream of water from the pumps and they may be synchronously driven from a motor (not shown). The upward stroke of either plunger directs the flow of the water from the suction to the corresponding lower pulsation chamber and simultaneously from the corresponding upper pulsation chamber through the discharge chamber. The downward stroke of either plunger in like manner directs the flow of water simultaneously to and from the corresponding upper and lower pulsation chambers respectively.

The plane valved decks permit the most direct flow of the water from the pump barrels to the discharge chamber, and the pulsation chambers being constructed without any projecting barrel flanges, interior head bolts or posts, form unobstructed passages for the water therethrough which materially increases the efficiency of the pump's action with a less expenditure of power than would otherwise be possible.

To surpass the high standard of the present state of the art even to a small degree in pumps of this class adds very materially to their value and desirability.

Having fully described my improvement, what I claim as my invention and desire to secure by Letters-Patent of the United States is:—

1. In a vertical double acting pump, a body having in combination an upper and a lower valved deck, said decks being emplaced in respective horizontal planes, said upper deck being provided with a valve controlled priming passage, a barrel extending between the decks and terminating its ends flush with the surface of the decks, and a partition extending between the decks from the barrel to opposite sides of the body.

2. In a duplex double acting pump, a body consisting of a single casting provided with suction and discharge openings, with upper and lower plane decks each having a series of suction and a series of discharge valve openings, with partitions between the respective said decks and the ends of the body, with barrels communicating between the decks on opposite sides of the said partitions and terminating flush with the surface of the decks, with a partition extending between the decks and connecting the barrels together and to the sides of the body.

3. A pump body consisting of a single casting and formed with transverse upper and lower decks in respective parallel planes for separating the end pulsation chambers from the intermediate suction and force chambers, with a barrel communicating between the pulsation chambers and terminating its ends flush with the opposite surface of the decks, with a partition provided with a bypass opening and extending between the decks from the barrel to the sides of the body for separating the suction from the force chamber, said decks each being formed with a series of valve openings between the corresponding pulsation chamber and the respective suction and force chambers, said upper deck being also formed with a priming passage between the force chamber and the upper pulsation chamber for the purpose specified.

4. In a vertical double acting pump, the combination with a body of a suction, a pulsation and a discharge chamber therein, a horizontal partition formed integral with the body and separating the pulsation chamber from the suction and the discharge chambers, said partition being provided with a series of valved passages between the suction and the pulsation chambers, and also with a series of valved passages between the said pulsation and the discharge chamber, said partition being also provided with a valve controlled priming passage between the said pulsation and discharge chambers, for the purpose specified.

W. H. SHAFER.

Witnesses:
GRACE SHAFER,
ROBERT SHAFER.