No. 665,145. Patented Jan. 1, 1901.

J. STUMPF.

PUMP.

(Application filed July 9, 1900.)

(No Model.)

Fig. 1.

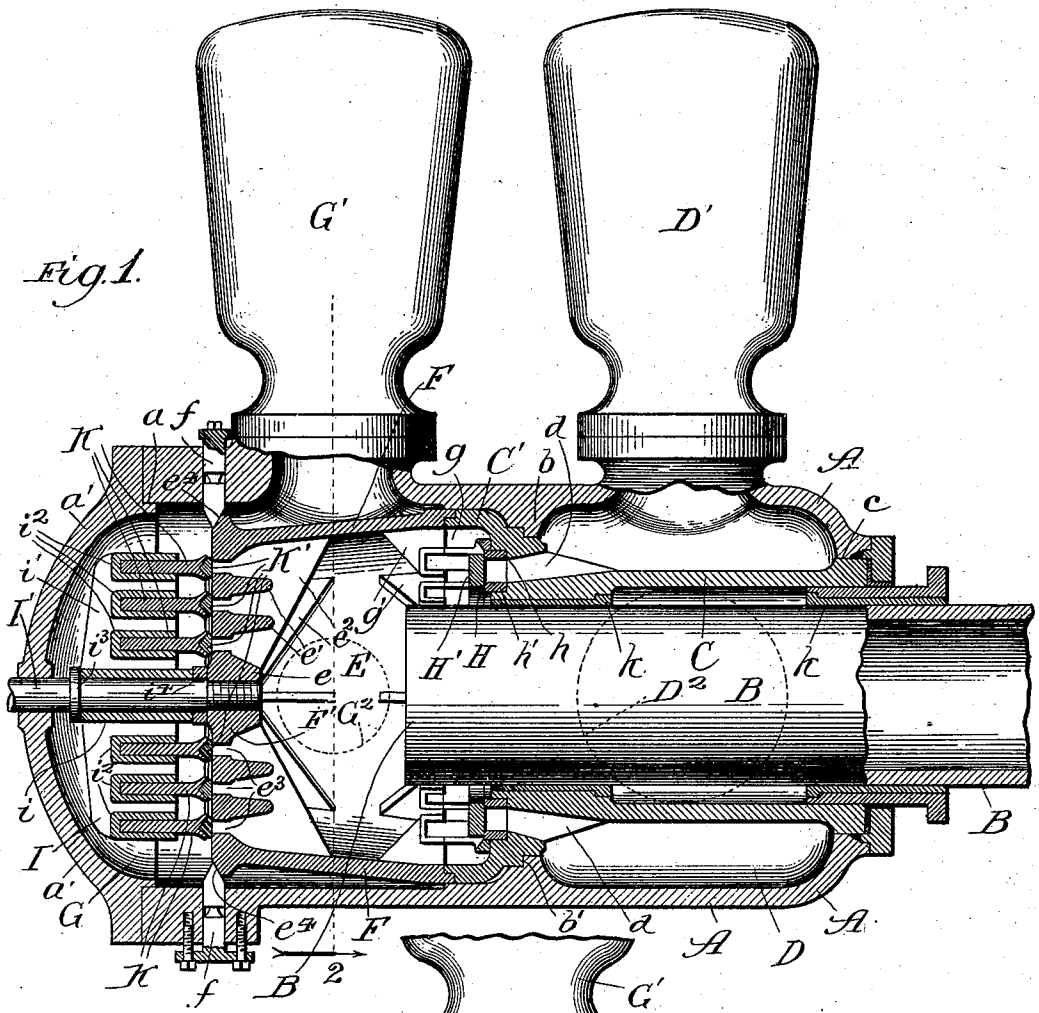
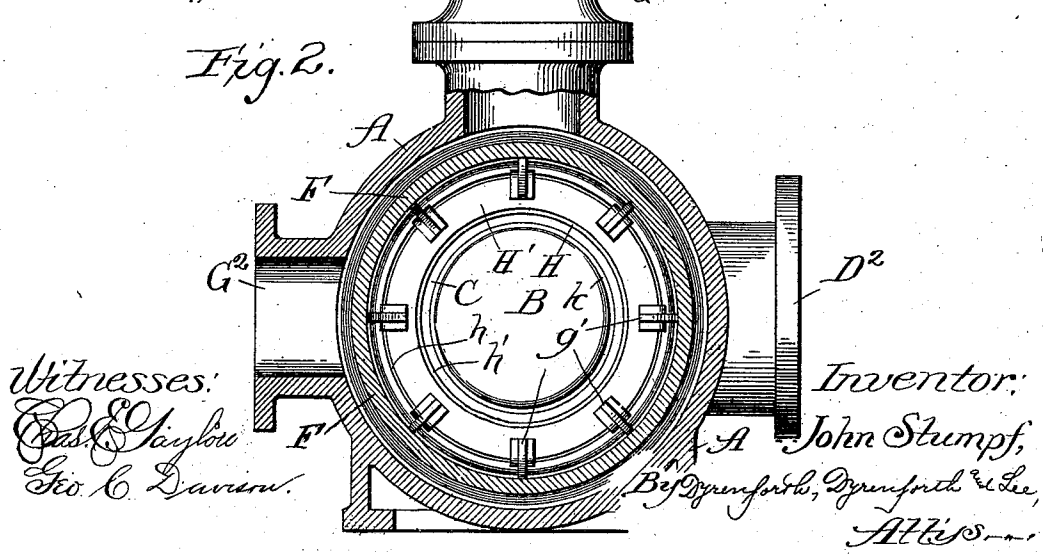


Fig. 2.



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UNITED STATES PATENT OFFICE.

JOHN STUMPF, OF BERLIN, GERMANY.

PUMP.

SPECIFICATION forming part of Letters Patent No. 665,145, dated January 1, 1901.

Application filed July 9, 1900. Serial No. 22,914. (No model.)

To all whom it may concern:

Be it known that I, JOHN STUMPF, a subject of the Emperor of Germany, residing at Berlin, Germany, have invented a new and useful Improvement in Pumps, of which the following is a specification.

My object is to provide certain improvements in the construction of the pulsation-chamber portion, more especially of hydraulic pumps, as well as in the arrangement of the valves, with a view to the production of a particularly simple, strong, durable, and compact construction possessing advantages over pumps of similar type as hitherto provided in the smoothness of operation, ease of repair, and other features.

In the drawings, Figure 1 is a broken and longitudinal section of the pulsation-chamber portion of the pump provided with my improvements, and Fig. 2 a broken cross-section taken on line 2 of Fig. 1 and viewed in the direction of the arrow.

A is the pump-casing, formed at its outer end with an opening *a*, fitted with a removable head *a'*.

B is the pump piston or plunger.

Forming an integral part of the casing is an annular rib *b*, presenting an annular shoulder *b'*. The piston works in a guide-cylinder C, which at its rear end fits an opening *c* in the casing A. On the forward end of the guide-cylinder is a ring C', carried by a spider, between the arms of which are the openings *d*, forming the passage or port from the suction-chamber D to the pulsation-chamber E.

F is a pulsation-chamber casing, preferably in the form of a hollow conic frustum, rabbeted at its inner end to fit a corresponding rabbet in the edge of the ring C'. The outer end of the pulsation-chamber casing is a grid or valve-seat F', consisting of a central boss *e*, rings *e'*, and radial ribs e^2, forming between them a series of outlets or ports e^3. The circumferential edge of the grid portion of the casing F is beveled off or provided with beveled sockets e^4, and passing through the casing A are pins *f*, having beveled end portions which as the pins are tightened in place bear against the beveled portions e^4 of the pressure-chamber casing to tighten it in place against the ring C'.

G is the pressure or force chamber of the pump, extending from the grid F' to the head *a'* and surrounding the frusto-conical casing F. On the chamber G is a discharge air-chamber G', and extending from one side of the chamber is the discharge opening or port G^2. The annular space about the guide-cylinder C is the suction-chamber D, surmounted by a suction air-chamber D' and having the inlet D^2. A suction-valve seat H is formed of concentric rings *h h'*. The ring *h* is fastened in a recess in the ring C', and the ring *h'* is fastened in a recess in the end of the guide-cylinder C.

H' is the suction-valve in the form of a ring, adapted to closely fit the valve-seat H and close the passage or port *d*.

Integral with the ring C' is a series of longitudinally-extending ribs *g*, forming guides for the valve H', and coincident with the ribs *g* are ribs or projections *g'*, integral with the pulsation-chamber casing F and forming stops to limit the distance of opening or lift of the valve H'.

In the chamber G is a valve-holder I, comprising a central sleeve *i*, radial ribs *i'*, and a series of annular concentric sockets i^2. The valve-holder is mounted upon a bolt I', which at its inner end is screwed into the boss *e* and at its outer end passes through an opening in the center of the head *a'*. The sleeve portion *i* is between a stop i^3 and collar i^4 on the bolt. In the sockets i^2 are annular rubber springs K, fitting at their ends over pressure-valve rings K', which close against the seat F', over the openings e^3. In the guide-cylinder C are the bushings *k*, in which the piston slides.

In operation in the outward movement of the piston or plunger B the suction-valve H' is opened and water is drawn from the suction-chamber D into the pulsation-chamber E. In the inward movement of the plunger the valve or valves K' are opened by the pressure and the water is discharged into the pressure or force chamber G and out at G^2. The guide-cylinder C, casing F, and valve-holder I, with the valves carried thereby, are placed in position by passing them through the opening *a*, and the parts all fit together and are tightened in position by means of the pins *f*. This construction is a particularly desirable

one, for the reason that it involves comparatively few parts and permits their ready removal and replacement. Furthermore, it is attended with peculiar advantages both in the saving of material and economy of operation, as hereinafter explained. In the first place the piston, suction-valve, and pressure-valve are coaxial, which arrangement makes it possible to render the construction particularly compact with large ports and to reduce the suction-lift to a minimum. In the second place by providing the pressure or force chamber about the chamber E pulsations—that is to say, expansion and contraction—of the pump-casing are avoided. In operation with each instroke and outstroke of the piston the wall of the pulsation-chamber is subjected alternately to internal pressure and relative vacuum. The tendency of this intermittent application of pressure, owing to the natural though limited elasticity of iron or steel, is to cause the casing or cylinder F to pulsate. Obviously unless means are provided for reducing the pulsations or stopping them altogether they are apt in time to effect such weakening of the casing as to result in fractures. Furthermore, with each pulsation there may be such a variation in the cubic contents of the chamber as materially to retard the action of the valves, particularly in the case of an "express" or high-speed pump. Hitherto it has been usual in order to avoid the pulsations to provide the chamber-casing of a thickness and with suitably-disposed reinforcements which would enable it to withstand without expansion the greatest pressure to which it may in use be subjected. In my improved construction the pressure or force chamber and outer surface of the casing F are subject at all times during operation to the steady pressure of the water column on the discharge side of the pump, and in each discharge-stroke of the piston the pressure against opposite sides of the casing F will be equal. This prevents any expansion of the pulsation-chamber, and owing to the fact that the casing F is short and perfectly round it is particularly well adapted to resist collapsing pressure during the suction-stroke of the piston. Thus the casing F may be of a comparatively light construction and still be sufficiently strong to prevent such pulsations under variations of pressure as would materially retard the opening of the suction-valve. As the pump-casing A in operation is subject at its pressure or force chamber only to the constant steady pressure of the water column and at its suction-chamber only to the steady relative vacuum, it will not pulsate to effect the operation of the pressure-valve and may be of much lighter construction than would otherwise be necessary with consequent saving in material and cost.

Hitherto it has been usual in hydraulic pumps to provide a single chamber in place of what I have herein termed the "pressure" or "force" and "pulsation" chambers and to locate the pressure or discharge valve above the chamber. As the suction-lift of the pump is always to the pressure or discharge valve, the present construction, which lowers the position of said valve, effects a material saving in suction-lift, with consequent advantages. The inlet and discharge nozzles D^2 G^2 may be at opposite sides of the pump-casing, as shown, or in any other convenient position above or below the plane of the plunger.

Although I have described my invention minutely as regards details of construction, I do not wish to be limited thereto unduly. I contemplate such changes in arrangement, form, and construction and such substitution of equivalents and omission of elements as circumstances may suggest or necessity render expedient without departing from the spirit of my invention as defined by the claims.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a pump, the combination with the pump-casing of a pressure or force chamber therein, provided with a discharge-opening, a pulsation-chamber casing within and surrounded by the pressure or force chamber, a piston working in the pulsation-chamber, a valved suction-port about the piston and a valved pressure-port leading to the pressure or force chamber, substantially as described.

2. In a pump, the combination with the pump-casing of a pressure or force chamber therein, provided with a discharge-opening, a pulsation-chamber casing within and surrounded by the pressure or force chamber, a piston working in the pulsation-chamber, a valved suction-port about the piston and a valved pressure-port, below the top of the pulsation-chamber, leading to the pressure or force chamber, substantially as described.

3. In a pump, the combination with the pump-casing of a pressure or force chamber therein, provided with a discharge-opening, a pulsation-chamber casing within and surrounded by the pressure or force chamber, a piston working in the pulsation-chamber, a valved suction-port about the piston and a valved pressure-port coaxial with the piston leading to the pressure or force chamber, substantially as described.

JOHN STUMPF.

In presence of—
HENRY HASPER,
WOLDEMAR HAUPT.