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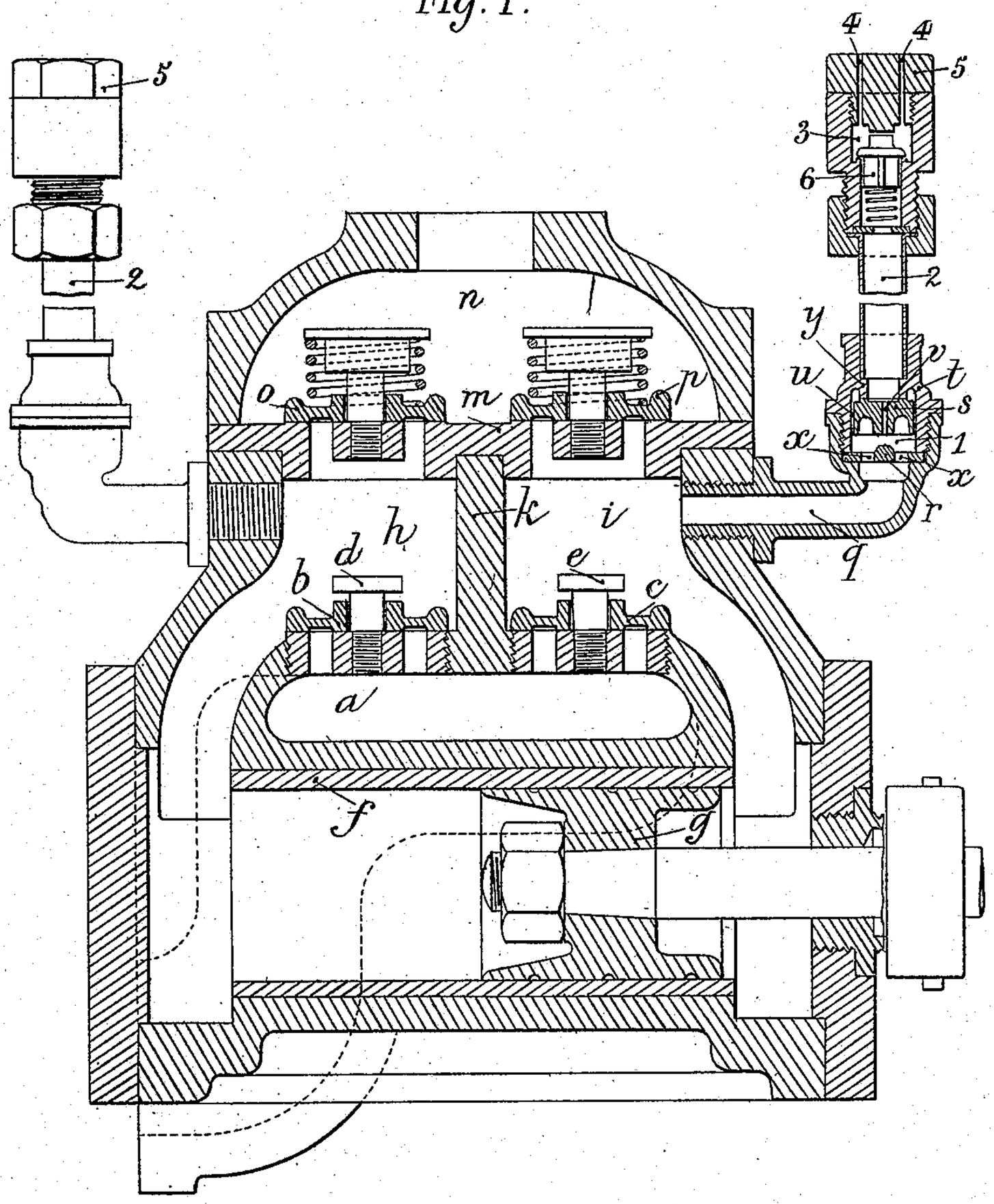
VALVE MECHANISM FOR HOT WATER PUMPS.

APPLICATION FILED MAR. 9, 1909.

**930,646.** **Patented Aug. 10, 1909.**

2 SHEETS—SHEET 1.

*Fig. 1.*

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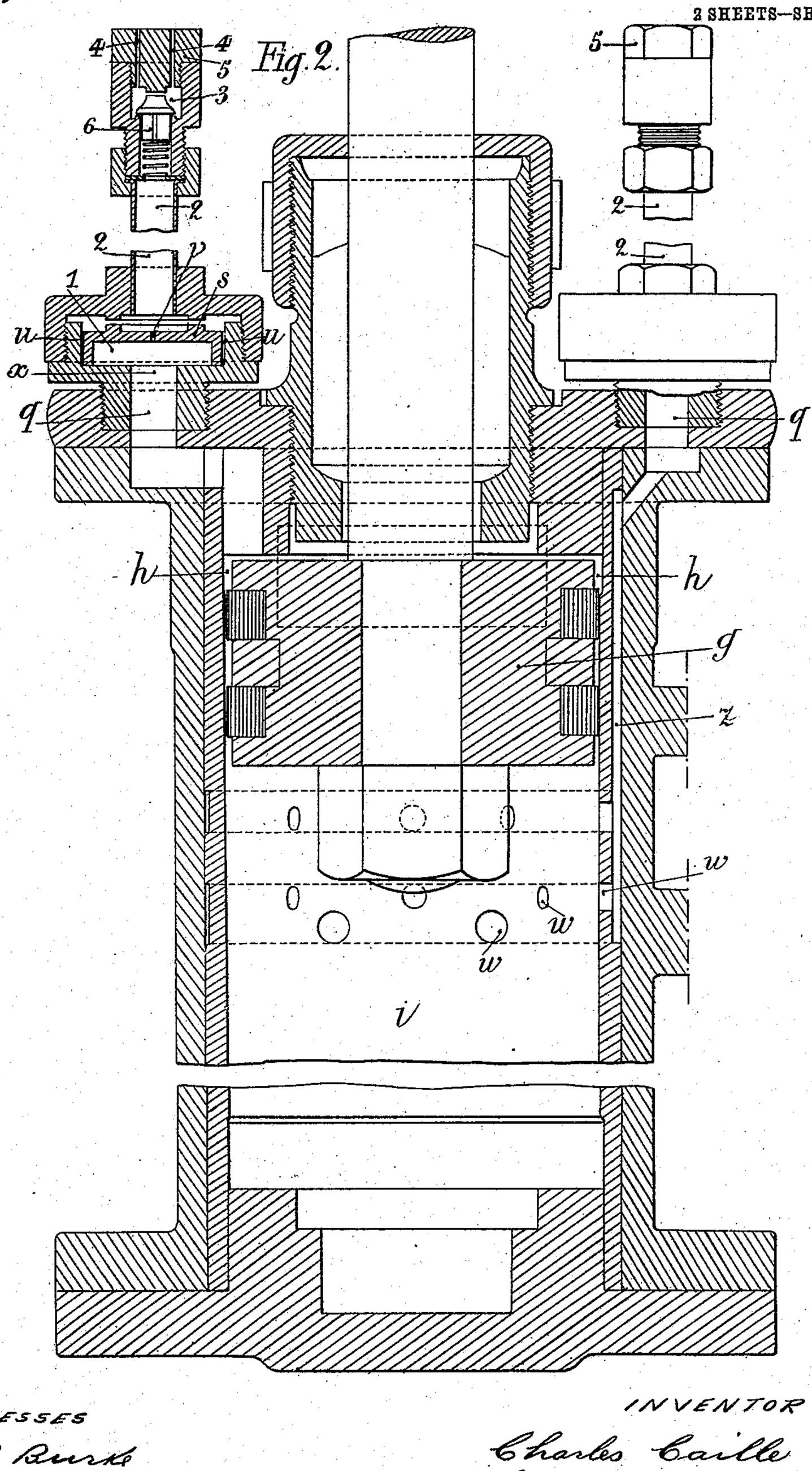
2 SHEETS—SHEET 2.

Fig. 2.

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# UNITED STATES PATENT OFFICE.

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## VALVE MECHANISM FOR HOT-WATER PUMPS.

No. 930,646. Specification of Letters Patent. Patented Aug. 10, 1909.

Application filed March 9, 1909. Serial No. 482,240.

*To all whom it may concern:*

Be it known that I, CHARLES CAILLE, of the Republic of France, residing at No. 24 Rue de la Gaite, Le Perreux, Seine, France, have invented new and useful Improvements in Valve Mechanism for Hot-Water Pumps, of which the following is a specification.

The present invention has for its object an apparatus adapted to be used in connection with single or double-acting pumps to insure their proper operation with water at a high temperature or at a temperature which approximates to that of vaporization.

Two practical methods of carrying out the invention are shown as representative examples in the annexed drawings.

Figure 1 is a longitudinal section of a double - acting horizontal pump furnished with the invention, and:—Fig. 2 is a section of a double-acting vertical pump.

The chamber *a* receives the liquid provided from a reservoir, not shown, situated at a height above the body of the pump. On the suction stroke, the entering liquid raises the valves *b* and *c*, which are simple non-return valves, whose lift is limited by the abutments *d* and *e*, and which close by their own weight on the delivery stroke. The working chamber, formed in the body of the pump, comprises the cylinder *f* in which works the piston *g*, and the two compartments *h* and *i* separated by a partition *k*. These compartments are separated by a plate *m* from the pressure-chamber *n*, and by two spring-loaded valves *o* and *p* constituting the delivery-valves which open and close alternately according to the direction of motion of the piston. At the upper part of each of these compartments *i* and *h* is situated the contrivance which forms the subject of the present invention. To a junction-pipe *q* leading from each of these chambers *h* and *i* is attached a contrivance comprising a passage divided into three compartments (1, 2, 3.) The upper compartment (3) communicates with the atmosphere for example, by means of holes (4) bored in the plug (5). This is in connection with the intermediate compartment (2) past an equilibrium float valve (6) closing inwardly.

The socket *t* connecting the compartments (2) and (1) provides an upper seating *v* for a float-valve *s*, of which the lower seating *r* is provided by a disk *x* formed with orifices, and secured between one edge of the tubular junction *q* and the socket *t*. The float-valve *s* is provided on its exterior surface with longitudinal channels *u* and it is pierced with a capillary passage *v*. The seating *v* is situated at a level slightly above that of the delivery valves *o* and *p*.

The water coming from the reservoir fills the compartments *i* and *h*. The upper portions of these compartments communicate, by means of the junction *q*, with the channel *u* and the capillary passage *v* of the float-valve *s* and thus with the compartment (2) which itself communicates with the atmosphere so long as the valve (6) is open. The steam formed is liberated by the channels *u* and the passage *v*, and for the greater part is condensed on the walls of the compartment (2) which can be cooled from without. The air and gases, in short all the volatile constituents not condensed, eventually find an outlet by means of the compartment (3) and the bore-holes (4). The compartments *i* and *h* are thus exclusively filled with hot water, and the float-valve *s*, actuated by the liquid which raises it, provides a constricted communication with the compartments (2) and (3), when in contact with its upper seating *y*, after the complete expulsion of the vapor and air. Communication of the pump with the compartments (2) and (3) and the atmosphere is then no longer possible except by the capillary passage *v*. On the delivery-stroke the corresponding valve *p* or *o* opens. During the whole of the delivery-stroke, the float-valve *s* presses against its upper seating *y*: it falls under its own weight to its lower seat as soon as the pressure of the piston ceases to be exerted. The small quantity of steam which may have remained in the body of the pump is driven out through the capillary passage *v*. It is true that a small quantity of water may be conveyed in this delivery stroke: but the compartment (2) is so dimensioned that this water never fills it, and is consequently completely recovered during the following suction-stroke. When this new suction-stroke takes place, if the steam has been entirely expelled from the body of the pump, suction occurs which closes the valve (6): in consequence of the partial vacuum produced, the corresponding valve *c* or *b* opens under a pressure greater than that of the source of supply. The chamber is thus filled more rapidly. The valve (6) (which is closed after the complete removal of the un-condensed steam, and the condensation of the greater part of the steam

below this valve) has the effect, on closing, of causing the pump to act as if unprovided with any contrivance for communicating with the atmosphere, and produces in the compartment (2) a partial vacuum facilitating the approach of the water on the suction-stroke.

Fig. 2 shows the invention applied to a vertical double-acting pump. One of the tubular junctions *q* (on which is mounted a three compartment contrivance (1, 2, 3,) similar in every respect to that in the preceding example) communicates directly with the upper suction chamber *h*. The other tubular junction *q*, that on the right, communicates with the lower chamber *i* by grooves *z* located in the liner of the body of the pump, opening with orifices *w*.

Instead of making the compartment (3) of the three compartment device open directly to the atmosphere it may be connected by a pipe, to the cold water supply, the whole of the escape steam then returning to the supply.

I claim:

1. For use in pumps for pumping liquids, the temperature of which approximates to that of vaporization, a contrivance for promoting the complete filling of the pump-chamber with liquid during the suction-stroke, comprising a passage leading upward from the upper portion of the pump-chamber, two valves in said passage, the outer valve opening outward and closing inward and the inner valve being a float-valve which by the buoyancy of the liquid closes outwardly with the exception of an orifice of fine bore, there being, between the two valves, a space sufficient to temporarily contain the small quantity of liquid which, in the delivery stroke, may be forced through the orifice of fine bore.

2. In combination with a hot water pump, a pipe in communication with the said pump, a float valve having a small aperture therein in said pipe, and a second valve at the free end of said pipe located a distance from the float valve.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES CAILLE.

Witnesses:
LOUIS GARDET,
HENRI MONIN.