(No Model.) 2 Sheets—Sheet 1.

B. THOENS.

PUMP AND EQUALIZING VALVE FOR PUMPS.

No. 590,173. Patented Sept. 14, 1897.

Fig. 1.

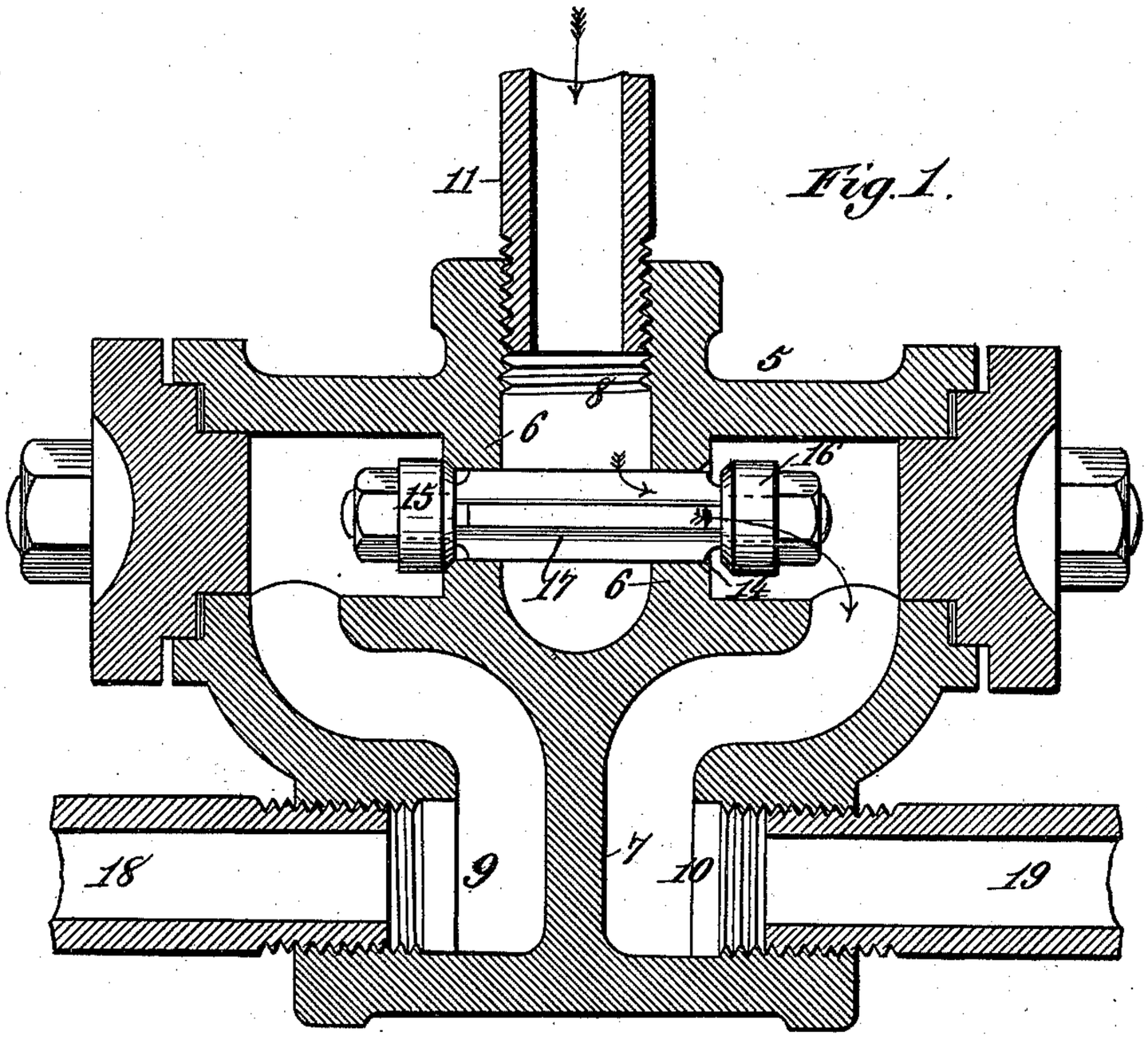
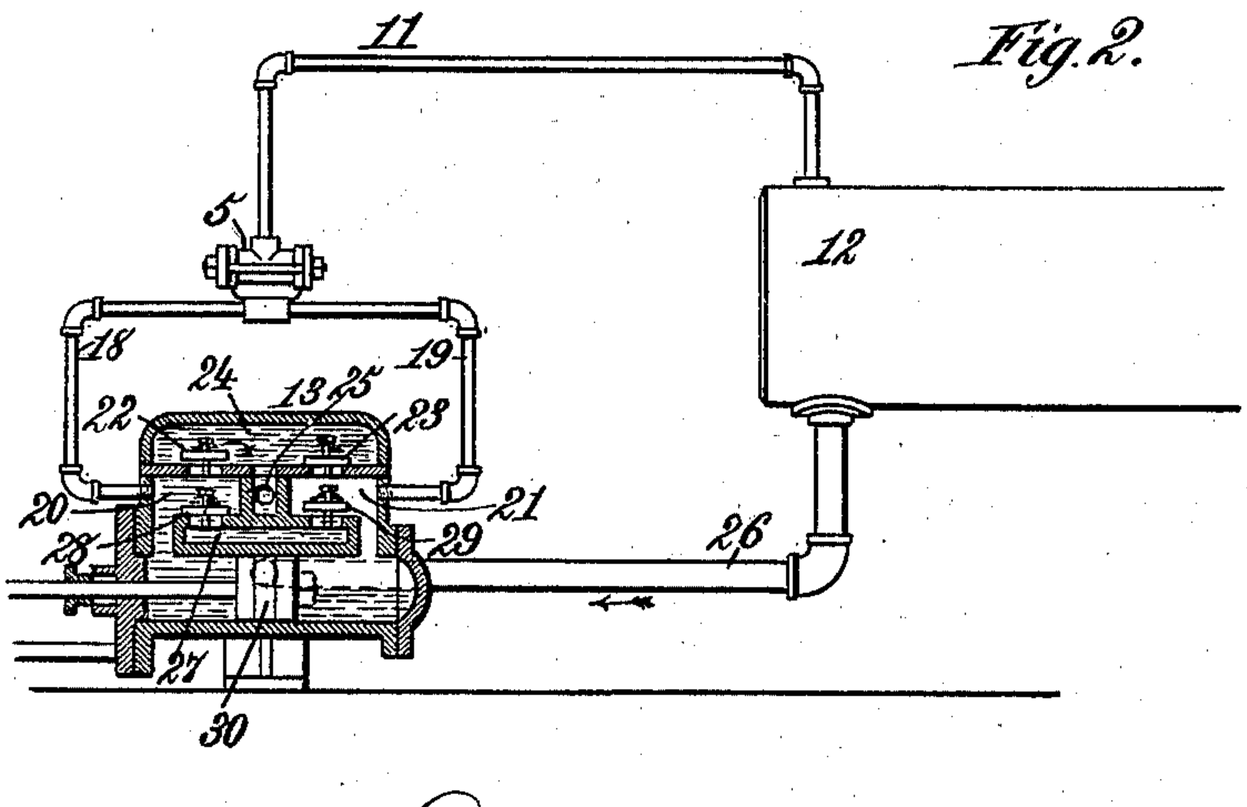


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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PUMP AND EQUALIZING VALVE FOR PUMPS.

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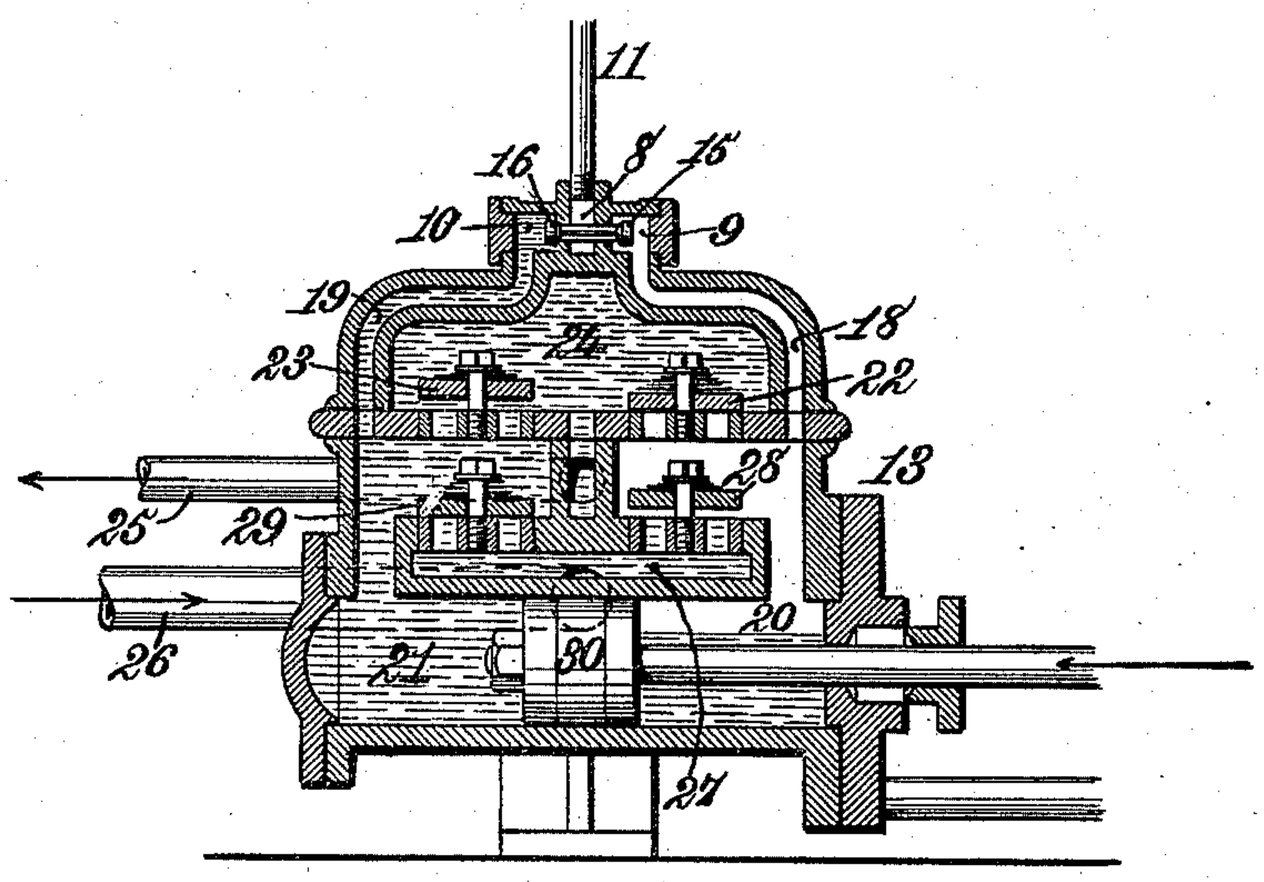
Fig. 3.



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UNITED STATES PATENT OFFICE.

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PUMP AND EQUALIZING-VALVE FOR PUMPS.

SPECIFICATION forming part of Letters Patent No. 590,173, dated September 14, 1897.

Application filed July 20, 1896. Serial No. 599,902. (No model.)

To all whom it may concern:

Be it known that I, BURCHARD THOENS, a subject of the Emperor of Germany, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Pumps and Equalizing-Valves for Pumps; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, and to the figures of reference marked thereon.

This invention relates to pumps and equalizing-valves for pumps, and has for its object to prevent the usual jarring and hammering action caused by accumulations of gases, air, or steam in the pump chamber or chambers below the discharge valve or valves and to insure a steady and reliable operation of the pump at its full capacity.

My invention has reference only to pumps that do not have to lift and wherein the liquid enters the pump by gravity only—as, for instance, pumps for conveying volatile liquids, ammonia-pumps for absorption ice-machines, boiler-feed pumps, which have to pump very hot water, pumps for pumping from a vacuum-chamber—as, for instance, in pumping condensed water from surface condensers or sweet water and syrup from defecating-pans and sugar-making machinery.

In pumps of the character above referred to it is my purpose to provide for establishing an automatic valve-controlled communication between the highest part of a pump below its discharge valve or valves and the highest part of the receiver or vessel from which the pump receives its supply, and to provide such an arrangement of equalizing-valves that this communication will be always open on the suction side of the pump during a stroke of the pump-piston and automatically closed at the same time on the discharge side of the pump, thereby equalizing the pressure in the pump chamber and receiver, so that the liquid can fill the pump completely without obstruction and consequent hammering from accumulations of gas, steam, or air in the pump-chambers. Such gas, steam, or air is usually liberated during the suction-stroke in many pumps and, becoming accumulated in the upper parts of the pump chamber or chambers, prevents the liquid being pumped from entering and filling the pump completely. In this way the capacity of the pump is reduced, the pump-piston has to make more strokes, and a jarring or hammering action is induced which is extremely annoying and very destructive.

To obviate the above-named difficulties and provide for a steady, uniform, and equalized action of the pump, my invention consists in the features of construction and novel combinations of parts in a pump and its equalizing-valve mechanism, as hereinafter more particularly described and claimed.

In the annexed drawings, illustrating the invention, Figure 1 is a longitudinal sectional elevation of my improved equalizing-valve for pumps. Fig. 2 represents a pump in sectional elevation connected with a receiver and showing an equalizing-valve and its pipe connections arranged to establish communication between the highest part of the pump below its discharge-valves and the highest part of the receiver or vessel from which the pump receives its supply. Fig. 3 is a sectional elevation showing how the equalizing-valve and valve-passages may be arranged or constructed in the pump-cover.

Referring to the drawings, the numeral 5 designates a valve-casing having partitions 6 and 7, Fig. 1, arranged to divide the said casing into an upper central induction-chamber 8 and two lateral eduction-chambers 9 and 10. The top of the induction-valve chamber 8 communicates, through a pipe 11, with the highest part of a receiver 12, Fig. 2, from which a pump 13 receives its supply of the liquid to be pumped.

The induction-chamber 8 is adapted to communicate, with the eduction-chambers 9 and 10, Fig. 1, through ports 14, arranged opposite each other in the partitions 6 and controlled alternately by check-valves 15 and 16 on the opposite ends of a connecting valve-stem 17, the said check-valves 15 and 16 being thus so arranged that when either one is open the other will be closed or seated to prevent the passage of liquid through the eduction-chamber on that side of the valve-casing.

The eduction-valve chambers 9 and 10 communicate through pipes 18 and 19, respectively, with the pump-chambers 20 and 21 at

the highest part of said chambers and below the pump discharge-valves 22 and 23, which alternately control the outflow of liquid to a discharge-chamber 24, having an exhaust-port 25, Fig. 2. A pipe 26 connects the lower part of the receiver 12 with a pump inlet-chamber 27, provided with valves 28 and 29 for controlling the flow of liquid from said chamber 27 into the chambers 20 and 21 alternately.

In the lower part of the pump, between the chambers 20 and 21, is a piston 30, operating in the said two chambers and driven by any suitable engine or motive power.

By reference to Fig. 1 it will be seen that the valve-stem 17 is of such length that when either valve 15 or 16 is closed onto its seat the other valve will be open, thus establishing communication between the upper part of the receiver 12 and the pump-chambers 20 and 21 alternately, so that the said receiver will be always open to the suction end of the pump and closed to its discharge end, the pump-chambers 20 and 21 being arranged for alternate suction and discharge of fluid.

The discharge-stroke of the piston 30 closes the check-valve 15 or 16, as the case may be, and thereby positively opens the other check-valve on the stem 17, so as to establish communication between the suction end of the pump and the upper part of the receiver 12, when the liquid to be pumped will fill the pump-chamber 20 or 21 completely. On the return stroke of the piston the same operation will be repeated through the chamber at the other end or side of the pump. By the automatic action of the valve or valves 15 and 16 the pressure in the receiver 12 and pump 13 is equalized in such manner that the pump-chambers will quickly fill without obstructive accumulation of steam, air, or gases and consequent kicking, pounding, or hammering. In many pumps this annoyance is very great when pumping volatile liquids or very hot water and often results in the breaking or loosening of joints in the pipe-lines and pump connections.

The use of this equalizing-valve mechanism affords decided advantages in connection with ammonia-pumps for absorption ice-machines. At present a stronger solution than twenty-eight per cent. cannot be easily pumped in summer, while with this equalizing-valve mechanism a solution of thirty-five per cent. or more may be circulated, requiring only about one-half of the liquid to be reheated in the generator, thereby effecting a large economy in the saving of nearly one-half the fuel.

What I claim as my invention is—

1. The combination with a pump and its source of supply, of a valve to equalize the pressure in said pump and prevent hammering from accumulation of gases, the said valve consisting of a casing having an induction-chamber for connection with the supply for the pump, two eduction-chambers for connection with the highest part of the pump below its discharge-valves, the said eduction-chambers being on opposite sides of the induction-chamber and adapted to communicate therewith through ports, and a double check-valve automatically operated from the discharge end of the pump to control communication between the pump-supply and the pump through the said induction-chamber of the valve and one or the other of its said eduction-chambers, alternately, substantially as described.

2. The combination with a pump and its inlet and discharge passages, of an equalizing-valve mechanism comprising an induction-chamber to connect with the highest part of a supply for the pump, two eduction-chambers connecting with the highest part of the pump below its discharge-valves at the suction end and discharge end, respectively, of said pump, and a double check-valve automatically operated from the discharge end of the pump to control communication between the pump-supply and the pump through the said induction-chamber of the valve mechanism and one or the other of its said eduction-chambers, alternately, substantially as described.

3. The combination with a pump, and a receiver from which the pump is supplied, of an equalizing-valve comprising an induction-chamber in communication with the highest part of said receiver, two eduction-chambers located on opposite sides of the induction-chamber and adapted to alternately communicate therewith through ports, pipes or passages that connect the said eduction-chambers with the highest part of the pump below its discharge valve or valves, and a double check-valve for the ports between the induction-chamber and eduction-chambers, the said check-valve being automatically operated from the discharge end of the pump to control communication between the upper part of said receiver and the highest part of the pump below its discharge valve or valves, substantially as described.

4. The combination with a pump having two chambers arranged for suction and discharge, alternately, each of said chambers being provided with an inlet-valve and a discharge-valve, of a receiver from which the said pump is supplied, and a double check-valve having its casing connected with the highest part of the said receiver and with the highest part of the pump-chambers below the discharge-valves of the pump and adapted to automatically control communication between said receiver and the said pump-chambers, alternately, substantially as described.

5. The combination with a pump and its inlet and discharge passages, and a receiver from which the pump is supplied, of an equalizing-valve comprising a valve-casing having an induction-chamber connected with the highest part of said receiver and two eduction-chambers connected with the highest part of

the pump below its discharge-valves and provided with a double check-valve automatically controlling communication between the said receiver and pump through the said induction-chamber of the valve-casing and one or the other of its said eduction-chambers, alternately, substantially as described.

In testimony whereof I have hereunto subscribed my name in the presence of two witnesses.

BURCHARD THOENS. [L. S.]

Witnesses:

JNO. J. WARD,

SINNEW HELD.