No. 753,361. PATENTED MAR. 1, 1904.

H. M. CHASE.

POWER PUMP.

APPLICATION FILED MAR. 27, 1902.

NO MODEL.

Fig. 3.

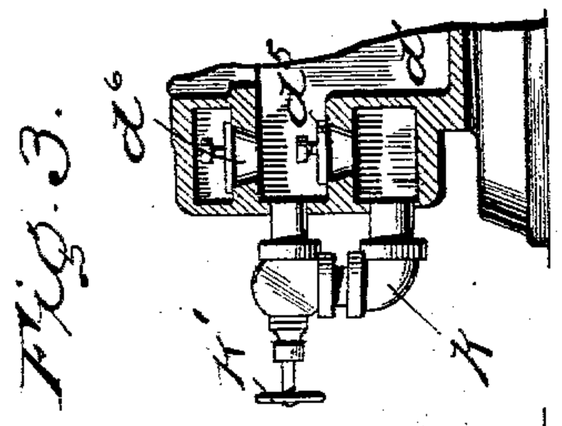


Fig. 2.

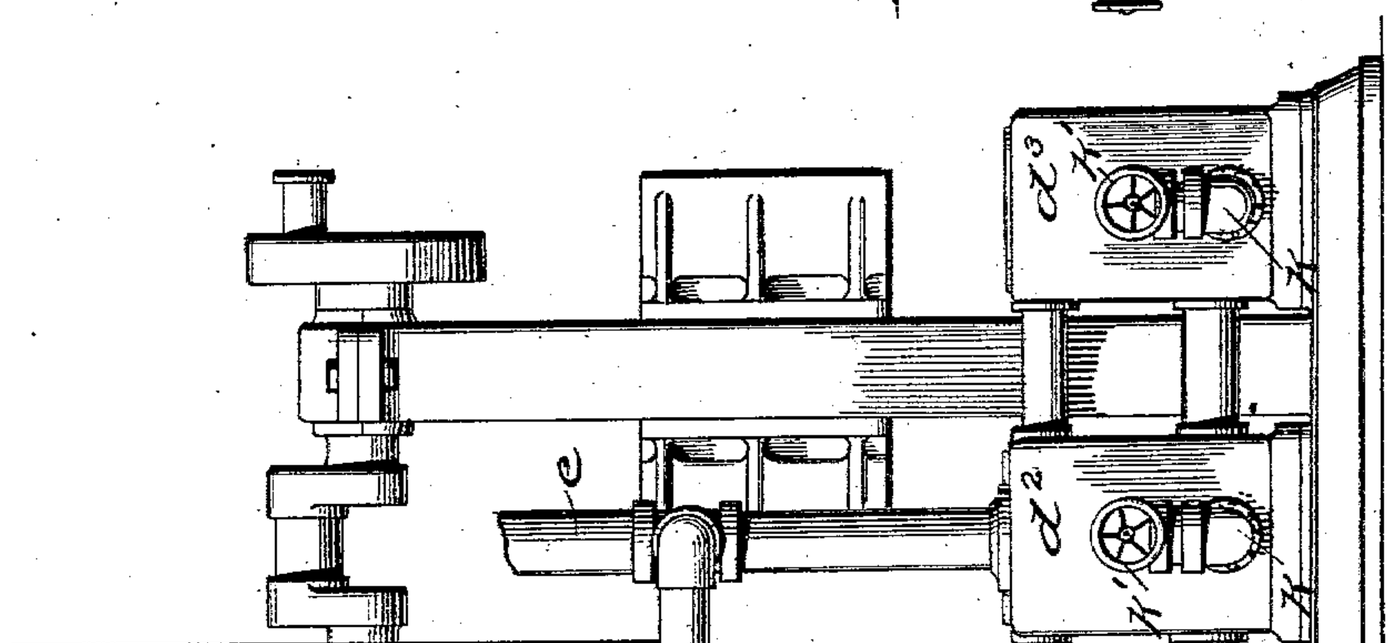
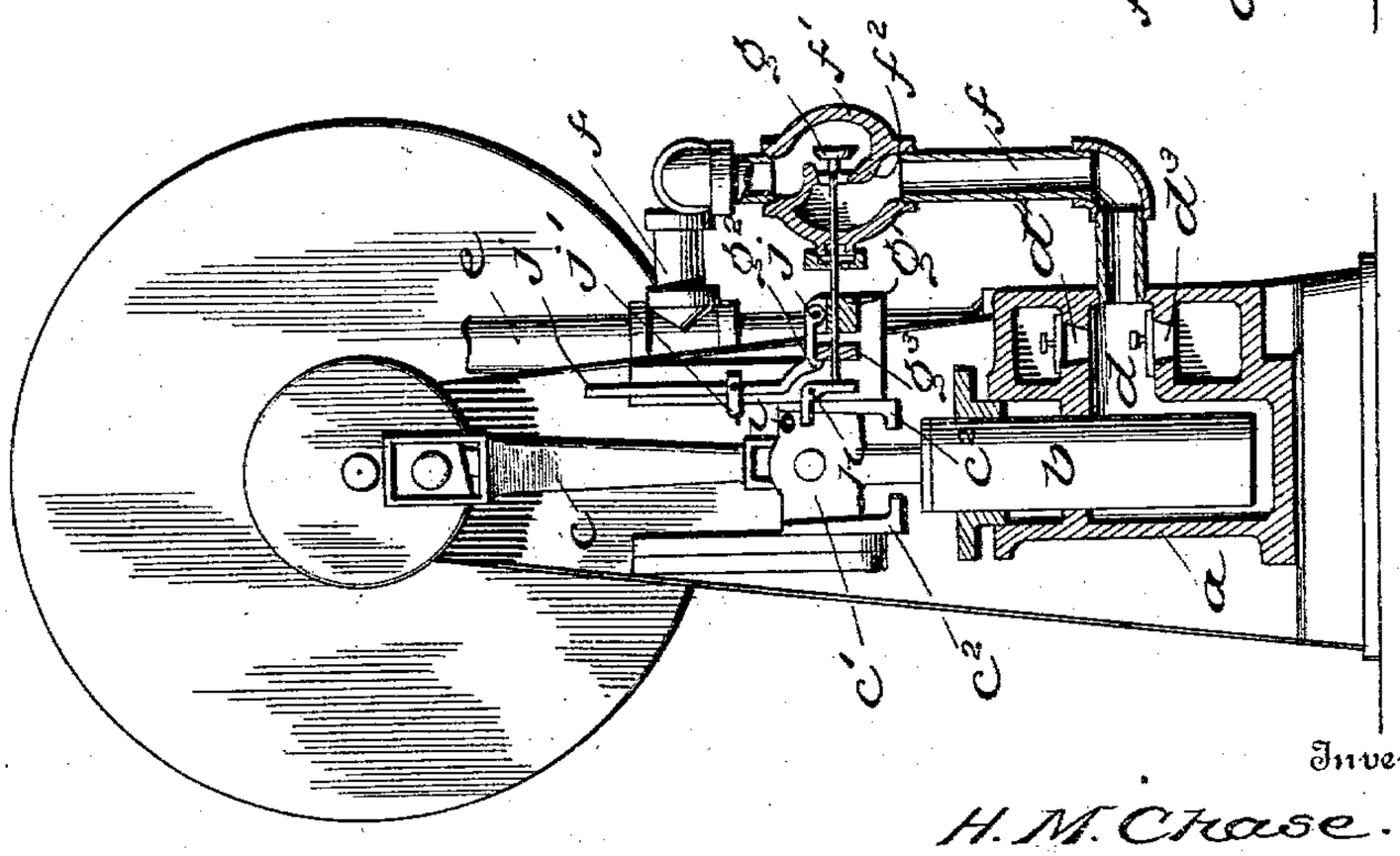


Fig. 1.



Witnesses

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No. 753,361. Patented March 1, 1904.

UNITED STATES PATENT OFFICE.

HENRY M. CHASE, OF HOLYOKE, MASSACHUSETTS.

POWER-PUMP.

SPECIFICATION forming part of Letters Patent No. 753,361, dated March 1, 1904.

Application filed March 27, 1902. Serial No. 100,236. (No model.)

To all whom it may concern:

Be it known that I, HENRY M. CHASE, a citizen of the United States, residing at Holyoke, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Power-Pumps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to power or force pumps; and it consists, essentially, of certain novel mechanism for controlling or regulating the volume or amount of water to be delivered by the pump, as will be hereinafter fully described, and particularly stated in the claims.

The principal object of the invention is the production of a simple, durable, and effective mechanism that may be readily applied to any type of power-pump, whereby communication may be established between the discharge-pipe and the "pulsating-chamber" through all or part of the stroke, so that a given quantity of water may be delivered without change of speed or shortening of stroke.

Other objects and advantages of the invention will become apparent in the course of the following description.

Heretofore it has been the usual custom to apply to pumps a small connection operated by hand between the force-chamber and the pulsating-chamber for the purpose of "priming" the pump. This same or similar connection has also been used for "turning over" the pump; but so far as I am aware there has never been a connection (of sufficient size) for regulating the amount of water discharged by the pump, especially such a connection as will establish communication between the discharge-pipe and the pulsating-chamber during any desired portion of the stroke and of sufficient size to fill the space made vacant by the withdrawal of the plunger.

In illustrating my invention I have shown it applied to a single-acting triplex power-pump; but it will be understood that it is equally applicable to any other type of pump or other number of cylinders. It may be applied to all of the cylinders of any pump; but in practice it may be desirable to apply it to only one of the cylinders and the other cylinders be provided with "by-passes" controlled by hand-operated valves between the pulsating-chamber and either the suction or discharge pipe, as hereinafter described.

In the drawings, Figure 1 is a side elevation of a single-acting triplex pump, showing the location of the several parts to which my improved connection is to be applied; Fig. 2, a front elevation, partly in section, showing my improvements applied thereto; and Fig. 3, a detail sectional view of one of the by-pass connections to be employed between the suction-chamber and the second and third pulsating-chambers.

In the several views the letter *a* indicates one of the cylinders of a single-acting triplex pump, *b* the plunger, and *c* the plunger-rod. The plunger-rod is provided with the usual cross-head c', working in guides c^2 c^2.

While I have shown but one cylinder, plunger, and plunger-rod, it will be understood that each pulsating-chamber communicates with a cylinder, as is evident by the crank-arm shown in Fig. 1.

The letter *d* indicates the pulsating-chamber communicating with the cylinder *a*, and d' and d^2 the other pulsating-chambers communicating, respectively, with the second and third cylinders. (Not shown.) The pulsating-chamber *d* is connected with the discharge-pipe *e* by a pipe *f*, and located at any suitable point is a chamber f', divided into two compartments by a diaphragm f^2, one compartment being in direct communication with the pulsating-chamber *d* and the other in direct communication with the discharge-pipe. Communication between the two compartments is had by means of a valve *g*, the stem of which projects out through the casing of the chamber f' and is guided in its operation by a guide-block g', secured to any fixed part of the pump-frame.

Preferably pivoted on one of the cross-head guides is a bell-crank or angle lever *h*, one arm of which is adapted to contact with or engage the end of the stem of valve *g* and the other arm to be engaged by a stud or projection *i* on the cross-head.

The letter j indicates a bell-crank lever pivoted at one end on the guide-block g' and is provided with an adjustable stop or projection j'', said stop adapted to be engaged by the stud i on the cross-head. The horizontal arm of the lever j is provided with a stop g^2, adapted to engage a collar g^3 on the valve-stem and lock the valve in open position until released, as hereinafter described.

The pulsating-chamber is provided with the usual suction-valve d^3 and delivery-valve d^4, and the chambers d' and d^2 with similar valves d^5 and d^6. The cylinders (not shown) communicating with the pulsating-chambers d' and d^2 are provided with by-pass connections k, controlled by hand-operated valves k'.

In operation the stud i just before the cross-head reaches the end of its stroke engages the horizontal arm of the bell-crank lever h and forcing it downward causes the vertical arm of said lever to engage the end of the stem of the valve g, forcing said stem outward and opening the valve. Since at this time the pulsating-chamber d will be discharging water against the discharge pressure, there will be pressure on both sides of the valve g, and all the power necessary to open the valve is due to the difference in area caused by the area of the stem. When the valve is opened, the lever j drops, and the stop g^2, engaging the collar g^3, holds the valve g against backward movement, as shown in Fig. 2. Through the open valve water is admitted under pressure to the pulsating-chamber on the return or suction stroke of the plunger, and this pressure acting on the plunger provides a power to assist in driving the pump. The amount of water delivered by the other plungers is reduced by the amount passing through the valve g, and whatever power is required to be applied to the other plungers to discharge this amount of water is recovered through the power obtained in the cylinder to which the pipe from valve g is connected.

As I prefer to apply my invention to but one cylinder, the other cylinders would be provided with a by-pass from the suction-chamber r to the pulsating-chamber d'. The opening of the valve k' throws the corresponding plunger out of commission or action, and the water churns back and forth through the valve, so that the regular suction and delivery valves d^5 and d^6 are inoperative. When the cross-head has traveled a part of its return or suction stroke, the stud i engages the stop j'', throwing back the lever j and releasing the valve g by disengaging the stop g^2 from the collar g^3. The water-pressure closes the valve g, owing to the difference in area of the two sides, as previously noted. The collar g^3, sliding under the stop on the lever j, prevents any further movement of the valve until on the downward stroke of the plunger, when the stud i will again engage the horizontal arm of the bell-crank lever h and repeat the operation of opening the valve. The closing of the valve again cuts off communication between the discharge-pipe and the pulsating-chamber d, and through the remainder of the return or suction stroke the pump operates in the regular way. The stop j'' may be so adjusted on the lever j that water will be admitted to the pulsating-chamber for any desired part of the return stroke.

By means of the by-passes in connection with the arrangement of my improved connection the capacity of the pump may be varied from nothing to full capacity, and aside from the friction of the machine the power required will be directly in proportion to the amount of water delivered.

Various modifications or changes may be made without departing from the spirit of my invention or sacrificing the principle thereof—as, for instance, the bell-crank lever may be so constructed as to be removed from the plane of the valve-stem, if desired, so as to throw the arrangement out of commission.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a power-pump, the combination with two or more cylinders and pulsating-chambers, and a discharge-pipe, of an auxiliary chamber situated between one of the pulsating-chambers and the discharge-pipe, an automatically-operated valve arranged in the auxiliary chamber, whereby communication may be established between said pulsating-chamber and discharge-pipe through all or any part of the stroke, and by-pass connections between one or more of the cylinders and the suction-chamber or pipe.

2. In a power-pump, the combination with the pulsating-chamber and discharge-pipe, connected together by a suitable pipe, of a valve arranged to admit and cut off the supply of water to the pulsating-chamber, an angle-lever pivoted on a fixed part of the pump-frame, with one arm arranged to engage the stem of the valve, a projection on the cross-head of the plunger-rod arranged to strike the other arm of the angle-lever to open the valve, and means automatically operating to lock said valve in open position.

3. In a power-pump, the combination with the pulsating-chamber and discharge-pipe, of a valve situated between said pulsating-chamber and discharge-pipe, said valve arranged to admit and cut off the supply of water to the pulsating-chamber, an angle-lever pivoted on the fixed part of the pump-frame, having one arm arranged to engage the stem of the valve, a projection on the cross-head arranged to strike the other arm of said angle-lever, to open the valve, means automatically operating to lock said valve in open position, and means automatically operating to release the valve at any desired part of the return stroke to cut off the supply of water.

4. In a power-pump, the combination with the pulsating-chamber and discharge-pipe, connected together by a suitable pipe, of a valve arranged in said pipe to admit and cut off the supply of water to the pulsating-chamber, means automatically operating to open the valve, a pivoted lever arranged to automatically engage the stem of the valve and lock said valve in open position, and means automatically operating said lever to release the valve, at any desired part of the stroke, to cut off the supply of water.

5. In a power-pump, the combination with the pulsating-chamber and discharge-pipe, connected together by suitable pipe, of a valve arranged in said pipe to admit and cut off the supply of water to the pulsating-chamber, a pivoted angle-lever having one arm adapted to engage the stem of the valve, a pivoted lever arranged to lock the valve in open position, an adjustable stop on said lever, and a projection on the cross-head of the plunger-rod adapted to engage the free arm of the angle-lever on its downward stroke to open the valve, and to engage the adjustable stop on the return stroke to release the valve to cut off the supply of water.

In testimony whereof I affix my signature in the presence of two witnesses.

HENRY M. CHASE.

Witnesses:
ROBERT K. MORTON,
F. L. BIRDWELL.