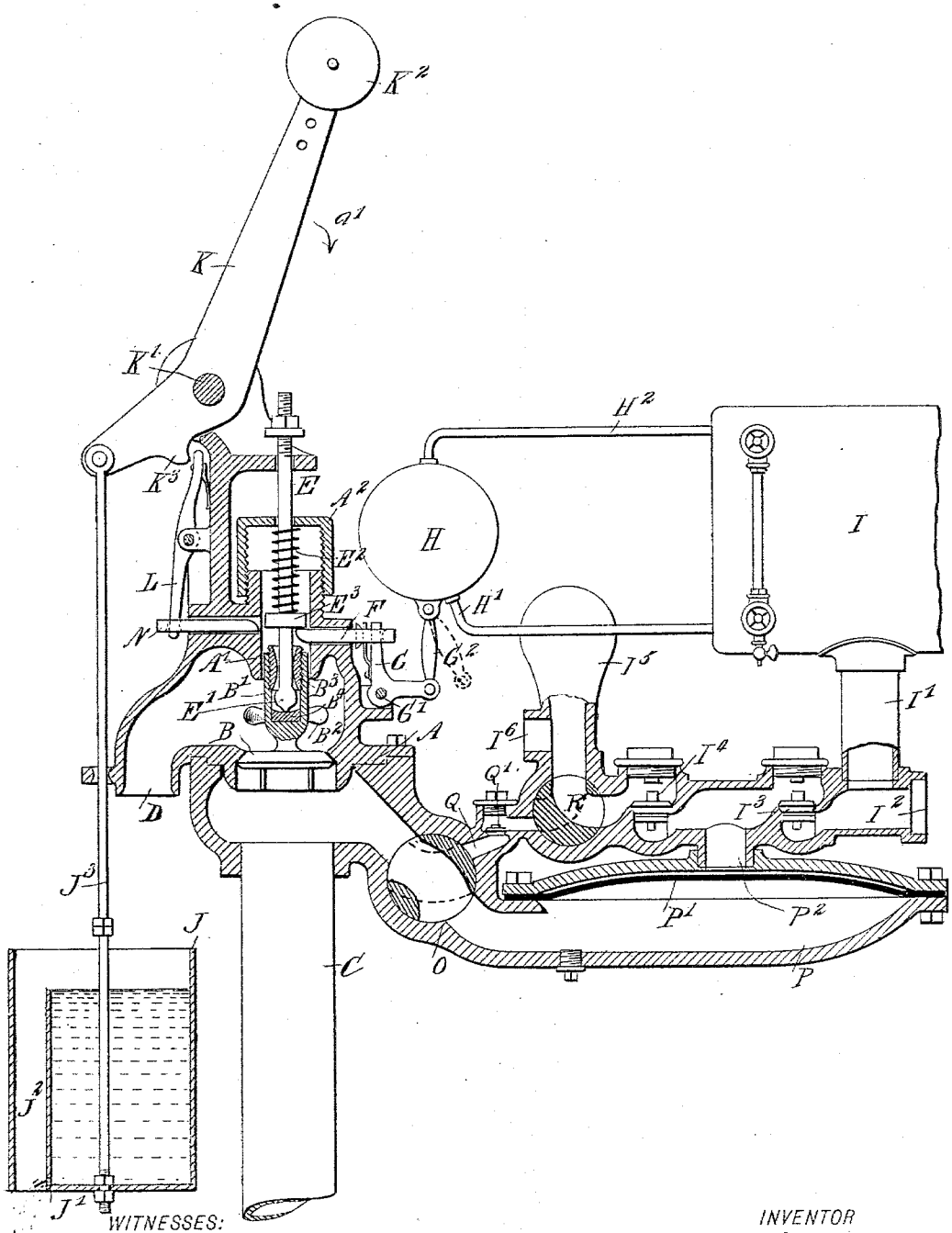
(No Model.)

# H. D. PAYNE.

## HYDRAULIC ENGINE.

No. 571,621. Patented Nov. 17, 1896.

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## HYDRAULIC ENGINE.

SPECIFICATION forming part of Letters Patent No. 571,621, dated November 17, 1896.

Application filed August 5, 1895. Serial No. 558,217. (No model.)

*To all whom it may concern:*

Be it known that I, HORACE D. PAYNE, of Thompson, in the county of Susquehanna and State of Pennsylvania, have invented certain new and useful Improvements in Hydraulic Engines, of which the following is a full, clear, and exact description.

The object of my invention is to provide certain new and useful improvements in hydraulic engines, whereby the action of a ram or momentum valve is rendered automatic and whereby the momentum of water is utilized to handle other fluids or gases, as in a pump.

My invention consists principally in a construction by which a ram or momentum valve is controlled, and in the combination with a ram-valve of peculiar construction having a water supply, of an incased diaphragm, or of a cylinder and piston, the space beneath said diaphragm or piston having connection with the said water supply and the space above the said diaphragm or piston adapted to receive and handle a fluid or gas separate from the said water supply. As will be seen, the diaphragm is so arranged as to have a fluid on each side or a fluid on one side and a gas on the other side. In either case the pressure will be nearly equalized, thereby insuring durability in the said diaphragm.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawing, forming a part of this specification, in which the figure is a sectional side elevation of the improvement.

The valve-casing A, containing the valve B, is provided with a water-supply pipe C and with an outlet D. The valve B is provided with a stem B′, having wings $B^2$, so that the water flowing from the valve will act on the wings $B^2$ and turn the valve B, so as to insure at all times a proper grinding and seating of the valve.

The valve-stem B′ is provided in its top with a recess into which fits or screws a bushing $B^3$, engaged by a rod E, provided at its lower end with a pointed head E′, engaging with its point a steel step $B^4$, placed in the bottom of the hollow stem B′. The upper end of the rod E is guided by an arm on an extension of the valve-casing A and passes through a cap $A^2$, screwing on the cylindrical part A′ of the valve-casing, the said cylindrical part forming the guide for the stem B′, as will be readily understood by reference to the drawing.

A spring $E^2$ is coiled on the rod E and presses with its upper end on the cap $A^2$ and with its lower end on a collar $E^3$, fastened on the rod E. The under side of the collar $E^3$ is adapted to be engaged by a bolt F, fitted to slide through a transverse opening in the cylindrical part A′ of the valve-casing A to hold the rod E in an uppermost position, and consequently the valve B to its seat in the valve-casing.

The outer end of the bolt F is engaged by one arm of a bell-crank lever G, pivoted at G′ on the valve-casing and having its other arm connected by a link $G^2$ with a closed tank H, preferably made spherical and supported on the outer ends of small flexible pipes H′ and $H^2$, extending from the end of a receiving-tank I, connected by a pipe I′ with a feed connection $I^2$, so that the liquid passing into the said tank I also flows into the tank H by the lowermost pipe H′, as the liquid will seek the same level in the tank H as it has in the tank I. A spring is secured at one end to the vertical arm of the lever G and bears at the other end against the bolt F. The bolt F is curved on its lower inner end, and, as it has a slight lost-motion connection with the lever G, it is obvious that the spring will allow the outward movement of the bolt as the collar $E^3$ engages with it on its upward movement, thus allowing the valve to rise, and when the collar is above the bolt the spring will force the bolt to its position under the collar. Now by the liquid accumulating in the tank H it will be weighted to such an extent as to move downward and cause the link $G^2$ to actuate the bell-crank lever G, which latter will then act on the bolt F to withdraw it from under the collar $E^3$. The spring $E^2$ on the rod E, together with the weight hereinafter described, will act on the rod E to press on the valve B and force the latter open to cause the water flowing through the pipe C to the casing A to pass through the valve-seat and through the outlet D. The outflowing water passes from the outlet D into a

receptacle J, provided at its lower end with a small discharge-opening J′, and through the outflow $J^2$. This receptacle J is supported on a rod $J^3$, pivotally connected at its upper end with a lever K, fulcrumed at K′ on an extension or bracket attached to the valve-casing A. The upper end of the lever K carries a weight $K^2$, and the said lever is arranged in alinement with the rod E, so that when the liquid has run out of the receptacle J by the small opening J′ then the weight $K^2$ causes the lever K to swing downward in the direction of the arrow $a'$ and press on the upper end of the rod E to hold the valve B open, as previously explained.

On the lever K is formed a lug $K^3$, adapted to engage one end of a spring-pressed lever L, fulcrumed on the casing A and engaging with its lower end a bolt N, fitted to slide in the cylindrical part A′ of the casing A almost opposite the bolt F, previously described. This bolt N is adapted to engage the top of the collar $E^3$ when the latter is in a lowermost position; that is, when the valve is open, so as to lock the valve B in the open position. A spring on the upper end of the lever L serves to force the bolt N into locking position.

Now it will be seen that when the valve is opened in consequence of the rising of the liquid in the tanks I and H, and water flows through the outlet D into the receptacle J, then the latter sinks and draws the lever K into the position shown in the drawing, whereby pressure is removed from the rod E, and the force of the water entering the pipe C and flowing against the valve B causes the latter to seat itself. The momentum of the water having been overcome after a quantity shall have passed the check-valve Q′ or forced beneath the diaphragm P′, as the case may be, the valve B falls from its seat by gravity and the pressure of the spring $E^2$, only to be forced upward to its seat again by the escaping water. This action continues the outflow of water at D, keeping the receptacle J full, and thus holding the weighted lever K out of reach of the rod E until the bolt F is inserted beneath the collar $E^3$, thereby shutting the water off from the outlet D. The water in the receptacle J now gradually discharges through the opening J′ to permit the lever K to swing downward again upon the rod E, the latter, however, being locked in position by the bolt F engaging the under side of the collar $E^3$.

In the inlet part of the casing A is arranged a three-way valve O, leading to a diaphragm-casing P, containing a diaphragm P′ and connected at its top by a short pipe $P^2$ with the inlet-pipe $I^2$, containing two check-valves $I^3$ and $I^4$, between which extends the said pipe $P^2$. The three-way valve O is adapted to connect with a channel Q, containing a check-valve Q′ and leading to a second three-way valve R, arranged in the pipe $I^2$, between the check-valve $I^4$ and the air-chamber $I^5$, having an outlet $I^6$ leading to a boiler or other device to be fed by the pipe $I^2$ or channel Q.

The operation is as follows: As shown in the drawing, the device is arranged as a combined boiler-feeder and pump for conducting the water from steam coils or radiators of a heating system situated below the water-line of the boiler. The change from boiler-feeder to pump is instantly effected by the operator turning the three-way valves O and R. As a boiler-feeder the action resembles that of the hydraulic ram with the exception of the automatic starting and stopping device. The tank H being separated from the bell-crank lever G by disconnecting the link $G^2$ when the bolt F is drawn from underneath the collar $E^3$ and the weight of the lever K now resting on the rod E cause an opening of the valve B, being held in this open position by the bolt N passing on the top of the collar $E^3$. When the receptacle J now fills with water, it finally sinks and swings the lever K into the position shown in the drawing and causes the lug $K^3$ to act on the lever L to draw the bolt N outward out of engagement with the collar $E^3$. The valve B, being thus released, is forced to its seat by the momentum of the escaping water. The three-way valves O and R being properly set, a quantity of the water, having now no other outlet, its pressure due to its momentum being sufficient, is forced through the channel Q, check-valve Q′, valve R into the air-chamber $I^5$, and, by way of the opening $I^6$, to the boiler. The momentum of the water having thus been expended, the valve B falls, only to be again forced to its seat by the escaping water, as before described. This ram-like action continues until the bolt F is inserted beneath the collar $E^3$.

When the tank H and bell-crank levers G are connected by the link $G^2$, as shown, the three-way valves O and R being properly set, I may use the device to handle other fluids or gases than that operating the valve B. The fluid passing through the pipe $I^2$ and past the check-valve $I^3$ can pass through the pipe $P^2$ into the top of the casing P to press the diaphragm P′ therein downward and thereby fill the space in the casing P above the diaphragm. The water in the casing P is now forced through the valve O to escape by way of the valve B. The momentum of the water coming in through the pipe C having become sufficient, the valve B is forced to its seat, and, as the water has no other escape, it passes into the casing P to the under side of the diaphragm P′ to push the latter upward and to drive the fluid above the diaphragm out through the check-valve $I^4$ into the air-chamber $I^5$ and out through the opening $I^6$ to its destination. The momentum of the water beneath the valve B having thus been overcome, the valve B falls from its seat, so as to allow the water beneath the diaphragm P′ in the casing P to escape, as above described, and to again permit the fluid

entering the pipe $I^2$ to press the diaphragm downward. This action continues until the fluid is pumped from the pipes $I^2$ I′ and tanks I and H to such an extent that the diminished weight in the tank H will allow the latter to rise and thereby force the bolt F underneath the collar $E^3$ to lock the valve B in a closed position, as previously explained. The valve B now ceases to act until such time as the fluid in the tanks I and H shall rise, and by its weight in the tank H again draws the bolt F from underneath the collar $E^3$. The valve B is now driven from its seat by the weighted lever K, as previously explained, and the above-described operation is repeated.

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

1. A hydraulic engine comprising a valve-casing having an inlet and outlet, a valve adapted to be seated in said casing by the water-pressure, a stem extended upward from the valve, a bolt movable transversely in the casing and adapted to engage with the valve-stem to hold the valve open, a pivoted lever for moving said bolt out of engagement with the valve-stem, an overflow vessel having connection with the lever and adapted to receive an overflow from the valve-casing, a bolt adapted to hold the valve in a closed position, and a water-receiver having connection with said bolt, substantially as specified.

2. A hydraulic engine comprising a valve-casing, a valve in said casing, a stem extended from the valve, a weighted lever pivoted to a bracket on the valve-casing, a pivoted lever adapted to be moved in one direction by the weighted lever, a bolt connected to the pivoted lever and adapted for engagement with the valve-stem to hold the valve in an open position and a vessel connected to the weighted lever and adapted to receive water discharged from the valve-casing, substantially as specified.

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Witnesses:
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