W. SELLERS.

HYDRAULIC POWER-REGULATOR.

No. 186,172. Patented Jan. 9, 1877.

Fig. 1.

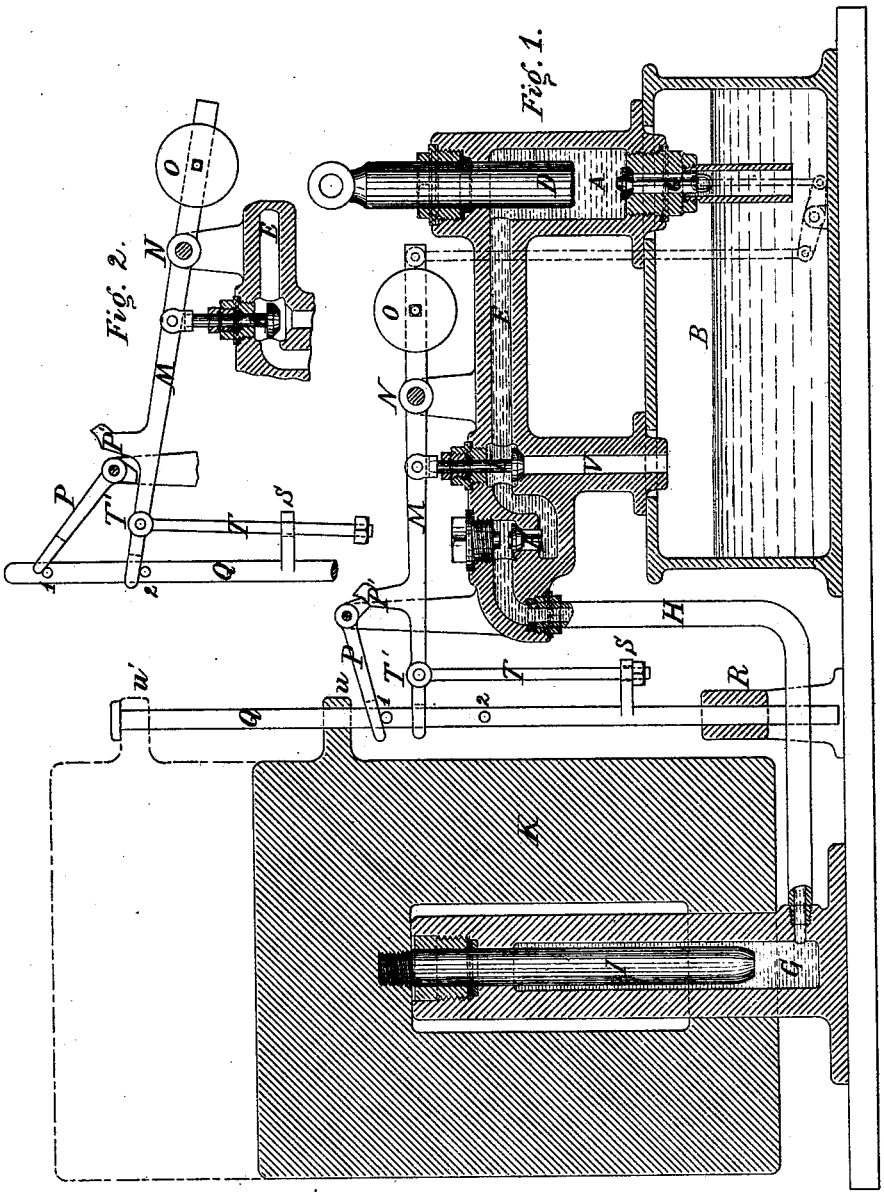

Fig. 2.

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IMPROVEMENT IN HYDRAULIC-POWER REGULATORS.

Specification forming part of Letters Patent No. **186,172**, dated January 9, 1877; application filed May 31, 1876.

To all whom it may concern:

Be it known that I, WILLIAM SELLERS, of the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in the Application and Regulation of Hydraulic Power, of which improvements the following is a specification:

My invention appertains to that class of hydraulic machines in which power is produced by a pump operating continuously, but is applied through mechanism operating intermittently, and consequently requiring provision for wasting the fluid during the intermissions.

It is the object of my invention, while maintaining the pump in continuous operation, and at all times ready to meet the demands upon it from the mechanism, to relieve it from work at all other times, and while thus relieved to maintain such a circulation of water through the pump-chamber as to prevent any accumulation of air therein; and to these ends my invention consists in combining with the inlet-valve of the pump a system of levers and weights arranged and operating so that the defined movements of the mechanism determine the duration of the pressure upon the pump; and it further consists in interposing between the inlet and outlet valves of the pump a supplemental valve, which, when closed, will be held upon its seat by pressure within the pump-chamber, and when open will permit the free escape of the fluid from the pump chamber, in such manner as to prevent any accumulation of air therein, and in combining with such valve the system of levers and weights arranged and operating as aforesaid; and it further consists in using said system of levers and weights to regulate the speed of the pumping-engine.

The accompanying drawings, which form part of this specification, show, in vertical section, a plunger-pump, its inlet and outlet valves, my improved system of levers and weights, and my supplemental valve, and as an exemplification of my invention I have combined them with an accumulator.

Figure 1 represents, in vertical section, a plunger-pump with its inlet and outlet valves, the supplemental valve, an accumulator, and my system of levers and weights in the position they assume when the pump is discharging into the accumulator. Fig. 2 represents the supplemental valve and the system of levers and weights in the position they assume when the pump is discharging into the tank from which it takes its supply.

The pump-chamber A is filled from tank B through valve C as the plunger D rises. As the plunger descends the water is forced through the passage E, and, lifting the valve F, will pass into the accumulator G through the pipe H, and, acting on plunger I, will raise the weight K. L is my supplemental valve, the stem of which projects upward through a stuffing-box, and is controlled by M, a lever working about a fulcrum, N, the short end of this lever being loaded with a weight, O. A latching-lever, P, is shown at Fig. 1 as latching the lever M down, and consequently pressing the valve L onto its seat. The latching end of lever P slides onto an incline, P′, on lever M, so as to wedge it down. A counter-weight rod, Q, guided by the accumulator-weight K and a stand, R, at its lower end, is provided with pins 1 and 2, and a projection, S, engaging with rod T, dependent from a point, T′, on lever M. As the accumulator fills with water the weight K rises, and when it has reached a height indicated by dotted lines, a stop, *u*, will have reached a point, *u′*, and will then be in position to lift the counter-weight rod Q by means of an enlargement on its upper end. As the rod Q is lifted, pin 1 will raise the long end of lever P and relieve the lever M—*i. e.*, unlock it. (See Fig. 2.) The weight O will then raise valve L off its seat, and allow the water from pump-chamber A to pass into tank B through pipe V. If, by reason of any pressure on valve L, the weight O cannot lift it, as the rod Q continues to rise, stop 2 will engage under lever M and lift it, as shown in Fig. 2.

The supplemental valve L is located in a passage-way, E, leading from the pump-chamber A, between the inlet and outlet valves of the pump. This passage-way is alternately under pressure, or not, as the plunger forces water into the accumulator on its descent, or is lifting water from the tank as it rises. During the upstroke of the plunger the valve

L can be readily lifted by the weight O, and will, when opened, remain open, permitting a free escape of the water from the pump-chamber at each stroke. It will not close until the water is drawn from the accumulator and the weight K begins to descend, when the rod Q descends with it. The projection S, by means of rod T, will draw down the lever M, seating valve L, the rod Q being heavy enough to overbalance weight O. When the lever M is in this position, the latching-lever P will fall into place and wedge the lever M down, forcing the valve L upon its seat, and prevent the escape of water into the tank, so that it must then be discharged into the accumulator. And a system of levers and weights having the above-described operation I designate as a system of automatic relief levers and weights.

For convenience of illustration, I have shown my supplemental valve L as part of the pump proper, all being included in one casting. This arrangement is not always convenient. I preferably arrange my supplemental valve L and the system of levers in a separate case, and place them near to the accumulator, leading the water, by a pipe, from the pump to the valve, and thence into the accumulator; but wherever placed, it is necessary to have the valve L and the passage from the pump-chamber leading to it as high as the highest part of the pump-chamber, so as to prevent any accumulation of air in the pump-chamber when the pump is lifting and merely discharging again into the tank.

In many cases the inlet and outlet valves may be so arranged that any air entering the pump-chamber may be discharged through the inlet-valve while this valve is held open; and I contemplate applying my system of levers and weights directly to this valve, and have indicated one method of such application by dotted lines on Fig. 1. I have shown, in connection with the lever M, two modes in which it may be applied to relieve the pump from pressure—one by the supplemental valve L, and another through the inlet-valve of the pump; but if the pump is driven by a pumping-engine, and should be suddenly relieved from pressure, its speed would be greatly, perhaps dangerously, accelerated; and in such case I contemplate connecting the lever M with the throttle-valve of the engine, so that when the pressure is taken off the pump the steam shall be shut off the engine to such extent as to reduce its speed to any desired point.

When the throttle-valve of a pumping-engine is controlled by the accumulator, as the water rises the steam will be shut off until the engine is gradually stopped; but in this case the steam is never entirely shut off, and a comparatively large surface is exposed, upon which condensation will take place. To remedy this difficulty, I contemplate using my system of levers and weights to shut the steam off from the pumping-engine entirely at any desired point; and this I effect by connecting the lever M with a suitable throttle or puppet valve, regulating the flow of steam to the pumping-engine, which would be closed by the weight O whenever the accumulator raises the lever P, and opened whenever the accumulator permits the rod Q to move the lever M in the opposite direction, this application of my system of levers and weights being a substitute for the applications to the valves, as hereinbefore described.

I also contemplate applying my system of levers and weights to a variety of hydraulic machines, not only to determine the quantity of water to be admitted, (as to the accumulator in the instance shown,) but also to determine the pressure at which the pump shall cease to supply; as, for example, a weighted plunger or a hollow curved spring, which the required pressure will cause to move, may be arranged to operate the system of levers and relieve the pump from pressure, or to stop the pumping-engine.

Having thus set forth the objects and nature of my invention, and having described and indicated several of the various modes in which it may be applied, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination, a lever having a constant weight at one end, and a counter-weight and a latching-lever at the other, and hydraulic mechanism operating the counter-weight and latching-lever, the combination being and operating substantially as and for the purposes set forth.

2. The combination of a system of automatic relief levers and weights, substantially as described, with the inlet-valve, for the purposes set forth.

3. The combination of the pump, a supplemental valve, and a system of automatic relief levers and weights, the combination being and operating substantially as and for the purposes set forth.

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Witnesses:
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