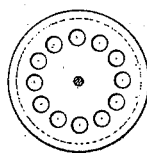
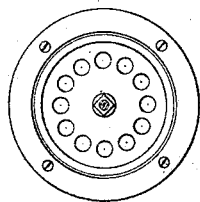


Safety Valve.

No. 113,517.

Patented Apr. 11. 1871.



Witnesses:

Witnesses.
R. D. Langshell
J. N. Campbell.

Inventor

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UNITED STATES PATENT OFFICE.

BIRDSILL HOLLY, OF LOCKPORT, NEW YORK.

IMPROVEMENT IN REGULATING AND SAFETY VALVES.

Specification forming part of Letters Patent No. **113,517**, dated April 11, 1871.

To all whom it may concern:

Be it known that I, BIRDSILL HOLLY, of Lockport, in the county of Niagara and State of New York, have invented a Combined Safety-Valve and Regulating-Valve for Water-Works; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing making part of this specification, in which—

Figure 1 is a vertical section taken centrally through the improved apparatus. Fig. 2 is a top view of the valve. Fig. 3 is a bottom view of one of the valves and its casing.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to an apparatus which is designed more particularly for use in conjunction with my improved system of water-works, for which Letters Patent of the United States were granted to me on the 14th day of September, 1869, wherein forcing-engines are employed as a means for impelling the water through the pipes instead of elevated reservoirs. The object of my invention is to regulate or control the speed of the engines and pumps, so as to produce and maintain the required pressure of water in the mains, and also to prevent any derangement or injury to the engines, pumps, or pipes, by relieving them from any undue pressure consequent upon the sudden shutting off of water—as, for instance, the closing of fire-hydrants or the stoppage of several service-pipes at or nearly at the same time—as will be hereinafter explained.

To enable others skilled in the art to understand my invention, I will describe its construction and operation.

In the accompanying drawing, B B² represent two valve-boxes, which are bolted down upon a foundation, N, on opposite sides of a fulcrum-standard, S, for a lever, E. The valve-box B has an inlet-pipe, b¹, communicating with its interior through its bottom, and an outlet-pipe, b, leading out of one side, above its bottom. Within this valve-box B is an inverted cup-shaped valve, A, of a cylindrical form, which has its upper end perforated, and which works in an inverted cup, B¹, and is surrounded by a suitable packing. Beneath valve A, and surrounding the upper end of the inlet-pipe b¹,

is a seat, s, for valve A, when this valve is down, as shown in Fig. 1. The inverted cup B¹ is held centrally and rigidly within the box B by means of wings b². The valve-rod c, which is secured to valve A, extends up through the ends of cup B¹ and box B through suitable stuffing-boxes, and is connected to the lever E by means of a pin, a, which is passed through a vertically-oblong slot, a'. The valve-box B² is provided with an inlet-pipe, b³, and an outlet-pipe, b⁴; and within this box is the precise form, size, and arrangement of parts as described in the valve-box B—that is to say, in box B² there is a valve, A', working in a cup, B³, which is secured to the box by wings b³. The valve A' is arranged directly over a seat, s', which surrounds the upper terminus of the inlet-pipe b³. The valve-rod c' of valve A' is pivoted at its upper end to the shorter arm of lever E. Both valve-rods c c' are connected to lever E equidistant from the fulcrum f of this lever. Near the extremity of the longest arm of lever E a piston-rod, r, is pivoted to it, which rod extends down into a small cylinder, P, and carries on its end a piston, p. To the extremity of the longest arm of lever E a chain-weight is attached, which partly rests upon the foundation N. The pipe b¹ and the lower end of cylinder P are both in communication with the water-mains. The pipe b is a waste or outlet pipe for carrying off water from the valve-box B. The pipe b³ is in communication with a steam-boiler, and the pipe b⁴ is in communication with the engine which works the pumps.

It will be seen that both valves A A' are balanced—that is to say, the pressure above and below each is equal; consequently they can be easily controlled by the movements of the piston p in cylinder P, which piston is actuated by the variations of pressure in the main with which the cylinder P and pipe b¹ are in communication. Suppose, for illustration, the required pressure in the mains is forty pounds per square inch, and the water-valve A closed, as shown in Fig. 1. It will be observed that there is a pin, a, in the lever E, which has play in the slot a' of valve-rod c, and permits the movement of lever E to a limited extent without raising the water-valve A. This limited movement of the lever E will, however, oper-

ate the steam-valve A', so as to change the speed of the engines and pumps, and either increase or diminish the supply of water sufficiently for ordinary purposes; but, in case of sudden greatly-increased change of pressure in the mains from any cause, the piston in cylinder P would be forced rapidly upward, and, after reaching a certain point, cause the opening of the water-valve A, thereby reducing the pressure, until the chain-weight D carries longest arm of the lever E down sufficiently to close the valve A again. If the regular working-pressure is reduced from any cause, the longest arm of lever E will be carried still farther down by the chain-weight D, and the steam-valve A' thereby opened, so as to increase the speed of the engines and the pumps.

Thus it will be seen that slight changes in the pressure of the water in the mains will be modified by the action of the piston *p* on the steam-valve A' without affecting the water-valve A; but when the pressure of the water is suddenly greatly augmented the piston *p* will be forced up high enough to raise the water-valve and allow a quantity of water to escape from the mains through valve-box B at the same time that the steam-valve A' is depressed and less steam admitted into the engines.

I have represented the valves A and A' as both pivoted to the same lever, E, which is the arrangement I prefer, as being most simple and convenient; but substantially the same result may be produced by pivoting these valves to separate levers, acting either in concert or independently, or in some other equivalent manner.

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

1. The balanced steam and water valves A A', working in boxes B B², in combination with piston *p* and its cylinder P, substantially as described.

2. The slot *a'* and pin *a*, connecting the rod *c* of the water-valve A to the lever E, whereby the steam-valve will receive a slight movement from piston *p* independently of the water-valve, substantially as described.

3. The chain-weight D on lever E, in combination with the balanced valves and the piston *p*, substantially as described.

BIRDSILL HOLLY.

Witnesses:

R. T. CAMPBELL,
J. N. CAMPBELL.