

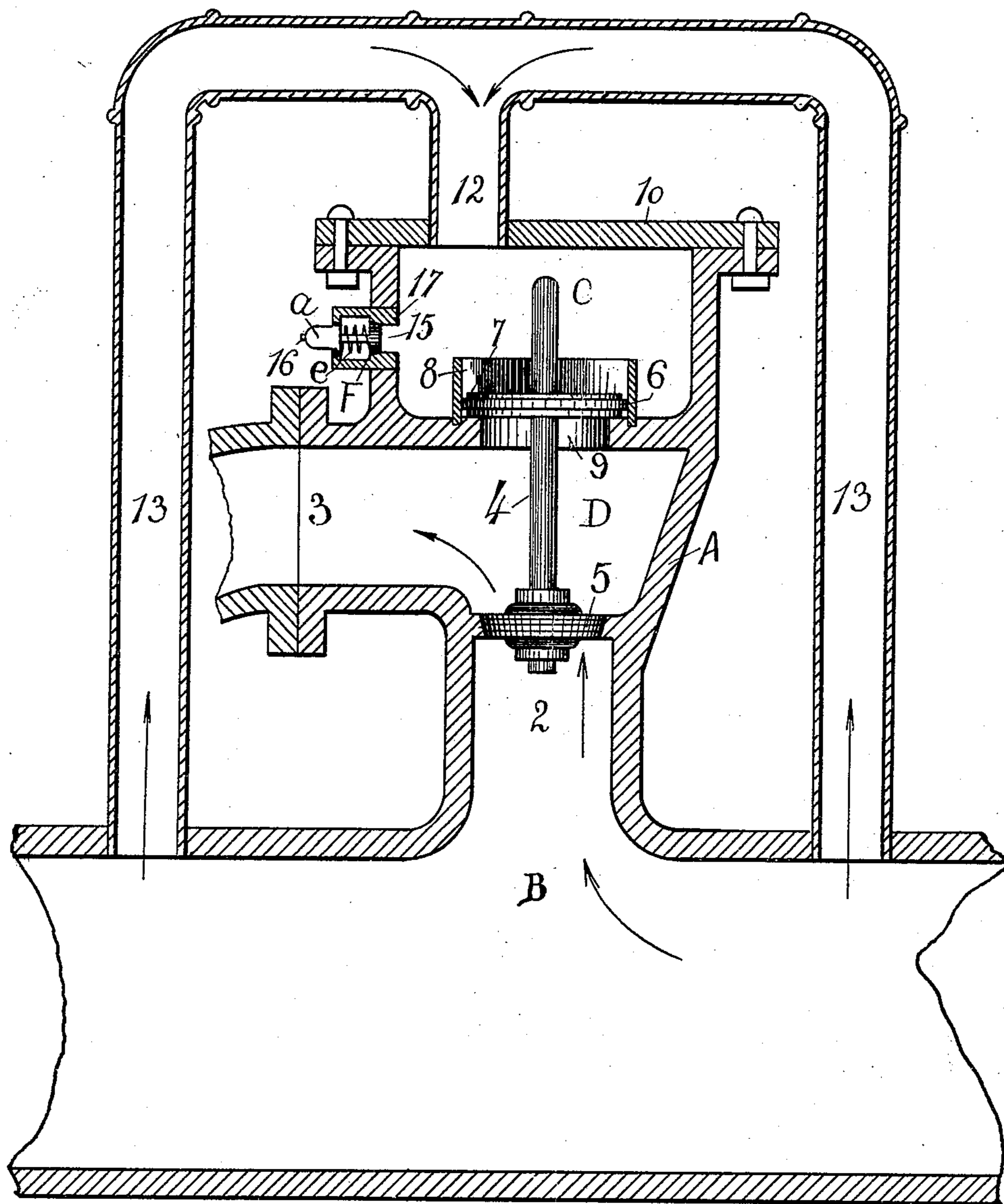
No. 618,903.

Patented Feb. 7, 1899.

G. T. PRINCE.
PRESSURE RELIEF VALVE.

(Application filed Sept. 28, 1897.)

(No Model.)



WITNESSES:

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GEORGE T. PRINCE, OF OMAHA, NEBRASKA.

PRESSURE-RELIEF VALVE.

SPECIFICATION forming part of Letters Patent No. 618,903, dated February 7, 1899.

Application filed September 28, 1897. Serial No. 653,388. (No model.)

To all whom it may concern:

Be it known that I, GEORGE T. PRINCE, residing at Omaha, in the county of Douglas and State of Nebraska, have invented certain useful Improvements in Pressure-Relief Valves; and I do hereby declare that the following is 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, reference being had to the accompanying drawing, which forms a part of this specification.

This invention has relation to a novel improvement in pressure-relief valves.

The object of my invention is to provide a simple device by means of which a pipe or its connections may be relieved of the injurious effects due to a sudden stoppage of the contained flowing liquid or gases.

In the accompanying drawing I have shown a sectional view of a pressure-relief valve embodying my invention.

In my invention I will describe the same as if used in a water system, though it should be understood that the relief-valve could be used in conjunction with any pipe system conducting either liquid or gas, as desired.

It is a well-known fact that flowing water or other liquids if suddenly checked in their progress by means of a valve cause a highly-increased pressure, which often results in the fracture of the pipes. To overcome this is the object of my invention, in which I provide a pressure-relief valve which as soon as the flowing of the liquid is stopped the relief-valve will be automatically opened to permit the escape of a certain amount of the fluid and the same shock that opens my relief-valve is utilized in retarding the same to again close the valve.

In the accompanying drawing I have shown at B a main pipe adapted to contain any suitable liquid or gases, which is provided with an extending escape-way 2, which terminates in a valve-seating closed by means of a valve 5, which valve works upon a stem 4, and this stem in turn is provided above with a piston 7, containing a suitable packing-ring 6, which works within the valve-pot 8 in communication, by means of the escape-way 9, with the valve-chamber D. Extending from this chamber D is an escape-way 3,

while the pressure-relief housing A is further provided above with a second chamber C, within which is secured the pot 8 and from which upper chamber extends a pipe-opening 12 in communication with the pipes 13 13, which are returned to enter the pipe B. Communicating with the chamber C is an ordinary relief-valve comprising the seating 17, which is provided with a guiding-sleeve a, within which works the stem 16, forming part of the valve F, and this valve F is normally forced into its seating by means of the spring e.

Under ordinary conditions my pressure-relief valve is closed, as is also the auxiliary relief-valve F within the upper chamber C. Now should this pressure-relief valve be used in conjunction with a water system and should the water flowing within the pipe B be suddenly checked the excess of pressure caused by the sudden checking of the flowing water would press upward the valve F to permit a partial escape of the water within the pipe B. As the upward movement of this valve F would also carry with it the piston 7, the water which would be in the chamber C, as this chamber is in open communication with the main pipe B, would be brought under strain; but the relief-valve F would have been set to a certain pressure, and as soon as that pressure would be exceeded by any cause whatever this valve would open to permit an escape of the fluid within this upper chamber, so that a portion of the water within the pipes 13 13 would also be withdrawn, providing a practically duplex and automatic relief.

The water escaping from the chamber D out of the escape-way 3 could be led to any suitable point, and, if desired, the water escaping out of the relief-valve F could also be given direction. However, the same shock that made itself felt upon the lower valve 5 would in retarded form be exerted up the column filling the pipes 13 13, and entering at 12 and extending into the chamber C and exerting its force upon the piston 7 would act to force down this piston to close the valve 5, the pressure required to open the valve F being greater than that required to force this piston 7 into its normal position. The piston 7 and the valve 5 would ride upwardly a distance according to the pressure, but the valve

would be prevented from going upward any farther than the upper end of the rod 4, which acts as a stop in abutting against the top plate 10, so that a check is offered the upward movement of the valve and piston.

It will be seen that I utilize the pressure of the liquid or gases contained in the main pipe to close the relief-valve, retarding its action until after the main pipe and its connections have been given relief and then bringing the same pressure to stop further waste by closing the valve.

The plunger-valve 5 is in direct communication with the main pipe and receives the water hammer or blow, and in consequence is forced out, allowing some of the contained liquid or gases to escape through the discharge-outlet, providing an instantaneous reduction of the pressure, and the retarded pressure, throttled in its passage through the pipes 13 13, later begins to act on the larger surface of the piston 7 in the upper chamber to close the same.

In the drawing it will be noticed that I have shown in the upper chamber a cylinder open above, within which reciprocates an ordinary piston, forming, in effect, what is known as a "dash-pot." In this connection, however, it should be understood that an ordinary diaphragm secured around its peripheral edges and working over the opening 9 could be used in place of this piston and cylinder, in that in the use of the diaphragm, however, the movement is necessarily limited, so that the lower valve 5 would not be carried up very far. In order to provide a prompt and full action of this lower valve, I employ the device as shown; but it should be understood

that I do not wish to exclusively confine myself to the use of this piston, as in a great many cases a diaphragm could be employed with equal success; and now,

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

1. The combination with a pipe-section provided with an escape-way, of a valve within said escape-way, a chamber extending from said escape-way, a housing in communication with said chamber by means of an open-ended valveway, an escape-way leading from said chamber, a piston reciprocating within said valveway, a second unvalved escape-way leading from said housing to said pipe-section, and means to unite said valve and piston substantially as and for the purpose set forth.

2. The combination with a pipe-section provided with an escape-way, of a valve within said escape-way, a chamber extending from said escape-way, a housing in communication with said chamber by means of an open-ended valveway, an escape-way leading from said chamber, a piston reciprocating within said valveway, a second unvalved escape-way leading from said housing to said pipe-section, means to unite said valve and piston and a relief-valve within said housing substantially as and for the purpose set forth.

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

GEORGE T. PRINCE.

Witnesses:

GEORGE W. SUES,
ANE M. ELKJER.