

No. 816,216.

PATENTED MAR. 27, 1906.

A. W. CASH.
BACK PRESSURE VALVE.
APPLICATION FILED MAY 2, 1905.

2 SHEETS—SHEET 1.

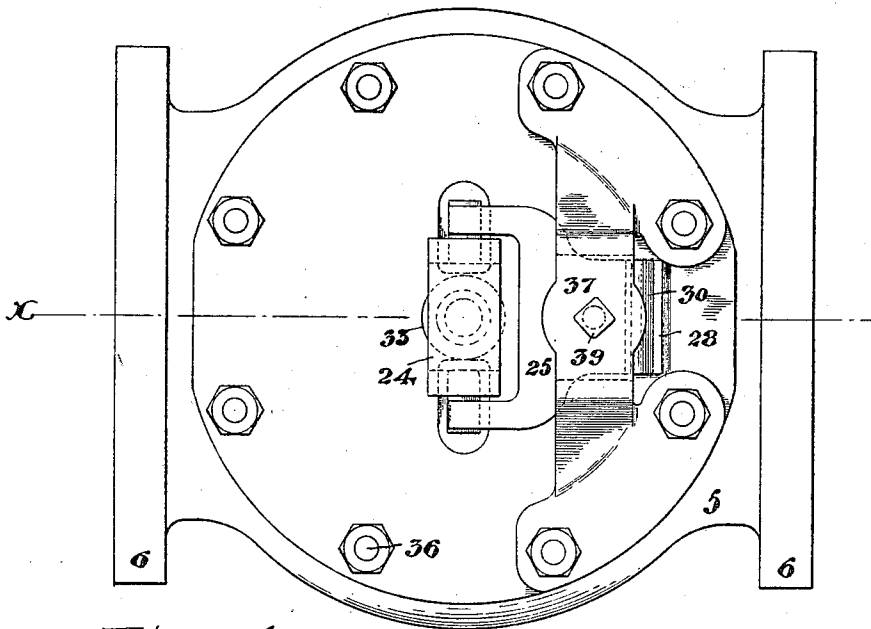


Fig. 1.

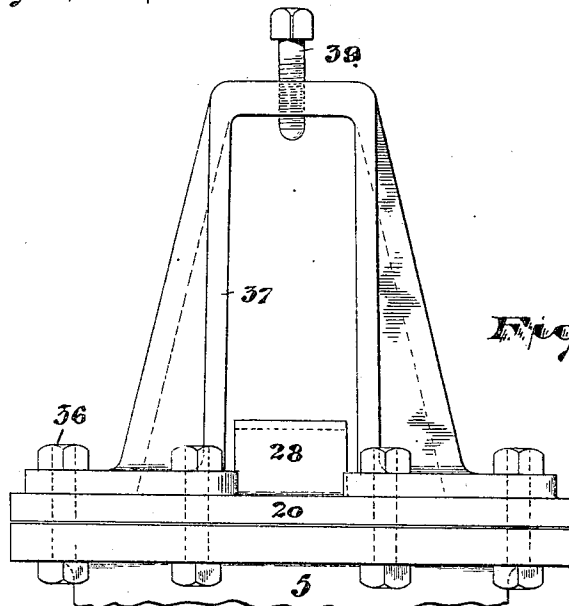


Fig. 2.

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BACK-PRESSURE VALVE.

No. 816,216.

Specification of Letters Patent.

Patented March 27, 1906.

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To all whom it may concern:

Be it known that I, ARTHUR W. CASH, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Back-Pressure Valves; 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, reference being had to the accompanying drawings, and to numerals of reference marked thereon, which form a part of this specification.

This invention relates to certain improvements in that class of back-pressure valves or relief-valves the functions of which are to prevent excessive or undue pressure within a system of pipes or reservoirs employed in heating buildings or drying-rooms, bleaching or other tanks, paper-drying machines, and other kindred structures.

It is common practice to utilize the exhaust-steam from engines, pumps, &c., about buildings or factories, the discharge-pressure from the engines and pumps usually being at a normally low pressure—say at any given point from atmospheric pressure up to as high as fifteen pounds above. The discharge from such engines not being constant, but variable and pulsating in effect, the ordinary devices in common use adapted to allow the escape of any accumulated excess pressure are caused to vibrate or “hammer” in the act of opening and closing unless provided with a “dash-pot” filled with water, oil, or other liquid substance. Such liquid-containing dash-pots are expensive and troublesome to maintain and generally uncertain in operation unless frequently renewed or given close attention. Again the ordinary valves are provided with weighted levers which by their action augment the hammering effect of the opening and closing of the valve, and such levers necessitate various alterations and modifications in forms and adjustment to adapt the said valves for use in pipes lying variously in horizontal, vertical, or intermediate positions.

The objects of my invention are to provide a valve having a self-maintaining dash-pot with a minimum weight to its quick-moving parts and to avoid the accelerated hammer effect of the extended lever and its heavy

weight; to provide a valve simple and inexpensive in construction and sensitive and certain in operation; to accomplish these objects without providing a cumbersome and complicated structure involving an expenditure of skilful work and considerable expensive metal; to secure the desired results without exposing the compensating spring and the parts immediately in connection therewith to the moisture within the body of the device, whereby more or less rapid deterioration, due to rust, &c., is effected; to enable the pressure to be more conveniently regulated and controlled and the parts adjusted from the outside of said pressure-valve, and to secure other advantages and results, some of which may be referred to hereinafter in connection with the description of the working parts.

The invention consists in the improved back-pressure valve and in the arrangements and combinations of parts of the same, all substantially as will be hereinafter set forth, and finally embraced in the clauses of the claim.

Referring to the accompanying drawings, in which like letters of reference indicate corresponding parts in each of the several figures, Figure 1 is a plan of my improved device. Fig. 2 is an end view of a portion of the bed or body of the same. Fig. 3 is a section taken at line *x* of Fig. 1; and Fig. 4 is a detail view of a certain stem-yoke, which will be more fully described hereinafter.

In said drawings the body portion 5 is made in the form of an ordinary “globe” valve-body and of any suitable material, usually cast-iron, and having the ordinary end flanges 6 6, which may be angular, to enable the valve-body to be held securely when joining the same to the pipes. Within the said body 5, which is suitably chambered, is an ordinary partition 7, separating the low-pressure chamber 8 from the atmospheric-pressure chamber 9 within said body, said partition providing a perforation or passage around which is a seat 10 for a disk-plate 11. At the points of contact between the last-mentioned parts, where there is more or less corrosion and wear, said parts are preferably provided with non-corrosive metal contact-surfaces, such as of bronze or copper, and these are preferably of wire let into recesses in said seats and held therein in any suitable manner.

The disk or plate 11 for closing the passage through the partition 7 is centrally perforated, as at 12, and at said perforation is provided with a hub 13, in which is rigidly secured, by means of a tight forced fit, a tubular stem 14, which extends upward into a dash-pot 15, seated at the top of the valve-body, where said stem is in connection with a piston-head 16. The passage 17 within the stem is in open communication with the perforation 12, and at its opposite terminal opens through a lateral branch 18 into the dash-pot chamber beneath the piston-head 17. Thus the low-pressure steam within the chamber 8 is free to flow into said dash-pot beneath the piston-head and above said piston-head, because of a loose fit of the latter in its cylinder 15'.

Above the dash-pot the valve-body is open to permit the insertion of the piston, and at the edges of the opening is a seat 19 for the flanged upper end of said dash-pot, and over the top opening is secured a cover 20, having at its center a stuffing-box 21 and its gland or follower 22 for making a steam-tight joint around a supplemental stem 23, extending from the top of the piston-head to the outside of the valve above the cover 20, where it engages a yoke 24, by which it is pressed down against the pressure of the steam beneath the disk 11. Said yoke is in turn engaged at opposite sides of the supplemental stem 23 by a forked lever 25, the prongs of which rest upon the bearings 26 of the yoke, and the said yoke at its under side is recessed, as at 27, to receive the top of the supplemental stem, whereby disengagement is prevented.

The cover 20 at its upper side is provided with a fulcrum 28, on which the lever 25 rests, the fulcrum being recessed at the top, as at 29, to receive the downwardly-turned end 30 of the lever 25, and intermediate of its ends on its upper faces said lever is again recessed, as at 31, to receive the bottom bearing-plate 32 of the spring 33. Steam or other fluid under pressure entering the valve-body in the direction of the arrows is prevented from passing through the closed partition until such time as the pressure reaches a point greater than the resistance of the spring 33, acting through the lever 25, stem-yoke 24, supplemental stem 23, piston-head 16, and disk 11. When the pressure of the steam overcomes such resistance of the spring, the disk or plate 11 and dash-pot and piston-head rise, and the accumulated steam passes out to the atmosphere or any suitable receptacle therefor through the chamber or passage 9. When said dash-pot piston is raised, the fluid under pressure, flowing through passages 12 17 18, enters the space 34 and forms a cushion, by means of which the disk 11 is prevented from pounding violently upon its seat 10 under the power of the spring 33, and yet the steam

may be slowly pushed back by the spring into the low-pressure chamber 8 to allow the piston-head 16 and disk 11 to assume their seats or normal positions.

The cover 20 may be packed on the body 5 by means of any ordinary packing-ring 35 and be held by bolts 36 or the like.

To regulate the back pressure of the spring 33 to suit conditions, I prefer to secure a frame 37 to the cover 20, which extends above the upper end of the spring and thereat is provided with an adjusting or regulating screw 39, which bears upon an upper end bearing-plate 40, as shown in Fig. 3. It may be noted that if the spring 33 acted directly on the supplemental stem 23 or through an ordinary lever its resistance would very materially increase as the disk 11 rose to release any largely-increased volume of fluid, thereby increasing the pressure of the retained or retarded fluid under pressure at 8. To overcome this undesirable feature, I provide the peculiar construction of compensating lever 26, which is arranged so that its load-receiving bearing 31 is considerably above a direct line between the fulcrum-bearing 29 and the opposite bearings 26 on the yoke. Thus when the bearing 25 is forced upward and the resistance of the spring is increased the distance between the axial line of the spring 33 and the fulcrum 29 is decreased, while the distance between said line and the bearings 25 is increased. Thus I obtain a greater leverage as the resistance of the spring increases with the opening of the valve to permit the escape of an increased volume of fluid.

While I have referred to the valve in connection with its use with steam, it is obvious that it may be used with water or other liquids.

It is obvious that while the particular materials I have described may be employed other materials may be substituted without departing from the invention.

Having thus described the invention, what I claim as new is—

1. In a back-pressure or relief valve, the combination with a suitable valve-body having an open partition and having an opening in the outside walls with a seat at its edges for a flanged dash-pot, and having a perforated cover for said outside opening with a stuffing-box at its center, of a disk or plate adapted to close the opening in said partition, a flanged dash-pot arranged in said valve-body, said flanged dash-pot resting on said seat at its edges and being held in place by said cover, a piston-head in said dash-pot and connected to said disk, the connections having passages permitting a flow of fluid from the said body into said dash-pot beneath said piston-head, a stem extending from the piston-head through said stuffing-box and on the outside of said cover having a connection with a lever, said lever and a spring

bearing on said lever, intermediate of its connection with the stem and its fulcrum.

2. In a back-pressure or relief valve, the combination with a suitable valve-body having an open partition therein, of a disk or plate adapted to close the opening in said partition, a dash-pot and a piston-head in said dash-pot and connected to said disk, the connections having passages permitting a flow of fluid from the said body into said dash-pot beneath said piston-head, a spring and compensating means transmitting the compensated power of said spring to the piston-head to counteract the pressure of said fluid, said spring and compensating means being arranged outside of said valve-body, substantially as set forth.

3. In a back-pressure or relief valve, the combination with a suitable valve-body having an open partition therein, of a disk or plate adapted to close the opening in said partition, a dash-pot and a piston-head in said dash-pot and connected to said disk, the connections having passages permitting a flow of fluid from the said body into said dash-pot beneath said piston-head, a supplemental stem extending from the piston out from said body, a lever arranged on the outside of said body and means for transmitting power therefrom to the said stem, and a spring also arranged on the outside of said body to press on said lever and force it and the said stem against the power of said fluid, substantially as set forth.

4. In a back-pressure or relief valve, the combination with a suitable valve-body having an open partition therein, of a disk or plate adapted to close the opening in said partition, a dash-pot and a piston-head in said dash-pot and connected to said disk, the connections having passages permitting a flow of fluid from the said body into said dash-pot beneath said piston-head, a supplemental stem extending out from said body, a yoke arranged on the outside of the said body and bearing on said stem, a lever bearing at one end on said yoke, and a spring bearing on said lever intermediate of its bearing on the yoke and its fulcrum, substantially as set forth.

5. In a valve, the combination with the open partitioned valve-body and a disk or plate closing the passage therethrough, of a dash-pot seated within said body above said disk or plate, a tubular piston-stem connecting said disk or plate with a piston-head arranged within said dash-pot, the said stem providing open communication between the dash-pot and pressure-chamber of said valve-

body, and a supplemental stem at one end engaging the piston-head within the valve-body and extending out from said body and at its outer end being engaged by a yoke, said yoke being arranged outside of said valve-body, a lever and spring, the latter receiving power from said disk through the medium of said lever-yoke and supplemental stem, substantially as set forth.

6. The combination with the valve-body having an open partition and a dash-pot therein, a disk closing the open partition, a piston-head within said dash-pot, a tubular stem connecting said head and disk, a supplemental stem extending out through the valve-body, a yoke engaging said supplemental stem, a lever fulcrumed on said valve-body and engaging said yoke, a frame attached to said body and a spring arranged between said frame and lever and engaging the latter between the ends thereof, substantially as set forth.

7. The combination with the valve-body having an open partition and a dash-pot therein, a disk closing the open partition, a piston-head within said dash-pot, a tubular stem connecting said head and disk, a supplemental stem extending out through the valve-body, a yoke engaging said supplemental stem, a lever fulcrumed on said valve-body and engaging said yoke, a frame attached to said body and a spring arranged between said frame and lever and engaging the latter between the ends thereof at a point out of line of the fulcrum of said lever and the bearings of said lever on said yoke, substantially as set forth.

8. The combination with the valve-body having an open partition and a dash-pot, a disk for closing the open partition, a piston-head within said dash-pot, a tubular stem connecting said head and disk and opening fluid communication between the chambers in said dash-pot and valve-body, a yoke, a supplemental stem, a compensating lever fulcrumed on said valve-body and engaging said yoke, a frame on said valve-body and a spring arranged to bear oppositely between the frame and lever, and change its line of pressure with the change in the position of said lever, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 17th day of April, 1905.

ARTHUR W. CASH.

Witnesses:

CHARLES H. PELL,
JOSEPH A. WELLS.