

(No Model.)

F. HENNEBÖHLE.

PRESSURE REGULATING VALVE AND GOVERNOR.

No. 419,440.

Patented Jan. 14, 1890.

Fig. 1.

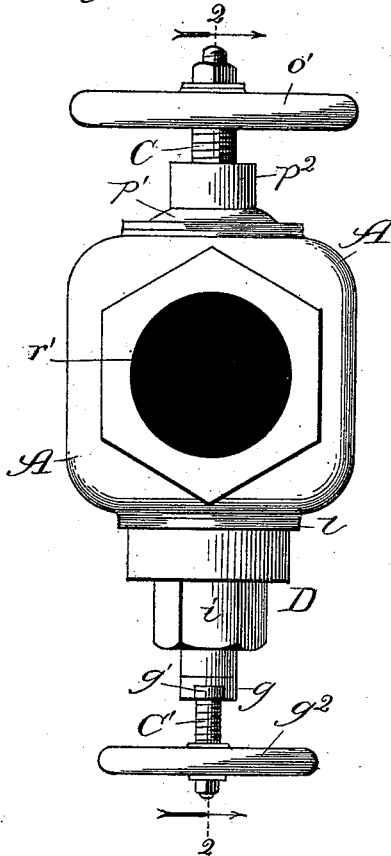


Fig. 2.

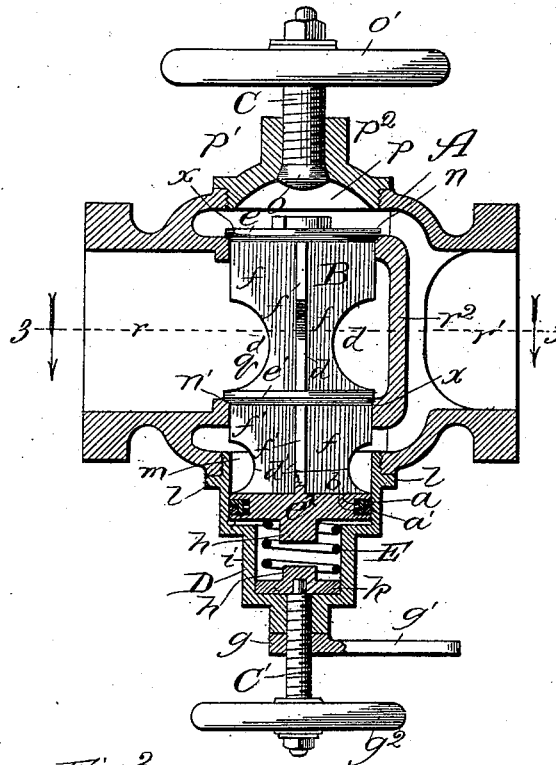
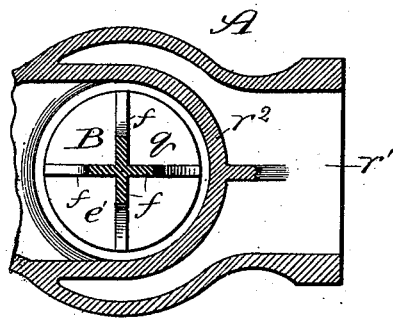
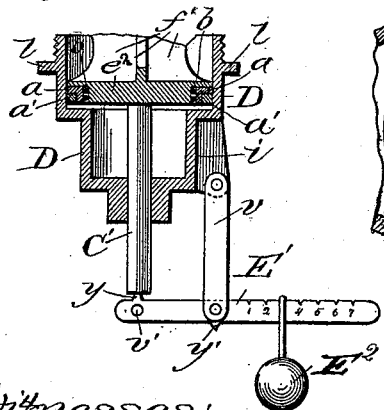


Fig. 3.

Fig. 4.



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PRESSURE-REGULATING VALVE AND GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 419,440, dated January 14, 1890.

Application filed May 25, 1889. Serial No. 312,057. (No model.)

To all whom it may concern:

Be it known that I, FRANK HENNEBÖHLE, a citizen of the United States, residing at South Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Pressure-Regulating Valves and Governors, of which the following is a specification.

My invention relates to improvements in the class of valves designed for regulating and governing the delivery-pressure from an initial pressure, whereby when the valve is once set for a certain degree of delivery-pressure such degree shall be maintained as long as required.

The objects of my improvements are so to perfect valves of the above-named class that the delivery-pressure shall not be affected by variation in the initial pressure; to provide a pressure-regulating valve which shall be reliably operative equally with the lowest and the highest initial pressure up to several thousand pounds, if need be, and one which shall automatically adjust itself to variations in the quantity of the delivery-pressure consumed; to avoid the use of a stuffing-box or packing for the valve closing and releasing stem and of the usual diaphragm, and to afford a regulating-valve of generally improved construction and operation.

In the accompanying drawings, Figure 1 is a view in elevation of my improved device; Fig. 2, a section taken on the line 2 2 of Fig. 1 and viewed in the direction of the arrows; Fig. 3, a section taken on the line 3 3 of Fig. 2 and viewed in the direction of the arrows; and Fig. 4, a broken sectional view of the lower part of the device, showing a preferred construction of the yielding support for the valve in any position to which it may be adjusted.

A is the valve-shell, having the inlet-passage r , at which to afford communication between the source of initial fluid-pressure (steam, gas, water, or the like) and the valve-chamber q at one side of the valve B, and the outlet-passage r' , at which to afford communication between the chamber q on the delivery side of the valve and the object or objects through the medium of which the delivery-pressure is used, and the chamber

q contains a web r^2 , affording a partition, over the extremities of which the passages r and r' intercommunicate. In the upper side of the shell A, between the passages r and r' , is an internally-threaded opening p , to receive a screw-plug p' , having a hollow internally-threaded extension p^2 , containing a screw C, which should be provided with a head o at its lower or inner end and on the part which projects beyond the shell with means for turning it, such as the hand-wheel o' . A valve-seat n is provided in the upper part of the chamber q and a valve-seat n' in the lower part thereof, directly below the seat n , and below the valve-seat n' , between the passages r and r' , the shell A is provided with an internally-threaded opening m to receive the threaded extremity of a cap D, having a flange l and reduced toward its outer extremity, at which it is provided centrally with an internally-threaded opening through which to admit a threaded stem C', entering at its inner extremity a washer k , fitting inside the reduced part i of the cap, which part i is formed externally in the shape of a nut, as shown, to afford convenient means at which to manipulate the cap. The washer k is movable perpendicularly in the cap, but is not revoluble therein, and it is provided centrally with a stud h , affording a seat around it in the part i of the cap for a spring E, hereinafter described. On the stem C' is a nut g for locking the stem against rotation and releasing it when it is desired to turn it, the nut being provided with a handle g' , affording convenient means for its manipulation, and a hand-wheel g^2 may be provided for turning the stem C'.

I form the valve B with guide-wings f , preferably four in number, hollowed out at their outer edges, as shown at d , and extending laterally from a common center to fit snugly the wall of the chamber q and between heads e and e' , each beveled, as shown at x , around the edge of its under side—the former to fit in a downward or inward direction against the seat n and the latter in the same direction against the seat n' ; and beyond the valve proper B, I provide an extension formed of guide-wings f' , like the wings f , and hollowed out at their edges, as shown at d' , the wings f' affording a piston projecting beyond the

valve-seat n' into the cap D against the head e^2 , having a stud h' in its outer surface in line with the stud h , around which the upper end of the coiled spring E fits, the spring being thus held between the head e^2 and washer k , and tending to force the valve and hold it yielding from its seat. The head e^2 is packed and to the end should be recessed around its periphery and provided in the recess with a spring b , against which in the recess are packing-rings a and a' , the former being of the angle-iron shape illustrated and the latter adapted to fit into it, and the spring tends to hold the packing-rings outward against the wall of the part i of the cap D.

The operation is as follows: To adjust the valve B to remove it from its seats n and n' , for the purpose of permitting the passage between the seats and adjacent beveled edges x of the valve-heads into the delivery-passage r' of the fluid from the initial-pressure side r , the stem C' is turned to raise the valve the required distance to produce the desired pressure on the delivery side, which pressure may be determined by any suitable or well-known means (gage) for the purpose. Thus, if the initial pressure be one hundred pounds and the pressure desired for the delivery be ten pounds, the valve will be raised from its seat accordingly. The valve itself, when adjusted in the manner described, is necessarily balanced under the influence of the initial pressure, the same as if the latter were not present, since the fluid surrounds the valve by filling the chamber g and obviously exerts equal pressure in all directions. With the valve raised to permit the access of a given pressure into the passage r' , and with the access of that pressure, the valve is obviously closed or forced to its seat against the tension of the spring E by the back-pressure against the piston in its chamber of the delivery-pressure, and there held until reduction of the last-named pressure by consumption of the fluid permits the spring again to act. When it is desired to fasten the valve upon its seat, the screw C is turned against it. It will thus be seen that the valve is balanced, notwithstanding the initial pressure against it, in any position to which it is adjusted; that, owing to that fact, variation in such pressure—as a reduction therein, which is a common occurrence in steam-boilers, necessitating, with other constructions of pressure-regulating valves known to me, frequent adjustment of the valve—has no effect upon the adjustment; that the device therefore maintains the same delivery-pressure in a manner thoroughly automatic, and whatever the initial pressure may be within the capacity of the device; that no diaphragm is required nor packing for the valve closing and releasing stem, and that a reliably operating and generally improved construction of the device is afforded.

Any air or steam which finds its way into the cap D below the piston escapes through

a suitable vent-opening (not shown) in the cap to avoid its interference with the operation of the valve.

Instead of employing the spring E, necessitating the washer k and screw-stem C' , I prefer to employ a lever E' , (shown in Fig. 4,) fulcrumed to the cap D, (or elsewhere on the device,) to extend its short arm underneath the stem C' of the valve B, (extending like the screw-stem C' , through the cap D,) and the long arm of the lever is notched at intervals, indicating the pounds pressure which should be marked, as indicated, and a suitable weight E^2 , adjusted in a notch, indicating the delivery-pressure desired, the device thus also serving the purpose of a gage. The lever should also be provided with the points y and y' , located as shown and on its opposite edges, so that it may, when it is desired to employ the device upside down with reference to the position in which it is illustrated, the lever may be pivoted to the link v at its pivot-hole v' , and caused to extend in the direction opposite that shown, thus rendering it a lever of the second class, to cause the weight then to act yieldingly on the valve.

The construction last described renders adjustment of the valve to variation in the number of separate objects supplied with the delivery-pressure thoroughly automatic. Thus, to illustrate, if there be connected with the delivery to be driven thereby two or more motors, each requiring a given pressure—say ten pounds—when one or more of such motors is shut off from or opened to the delivery-pressure, (in the first instance requiring the valve to move toward its seat and in the other to open wider,) readjustment of the weight E^2 is not necessary, since, being always required to exert the same resistance for a given delivery-pressure, when the quantity from the initial supply to produce that pressure diminishes or increases by variation in the number of motors actuated by it, the weight effects lowering or raising of the valve with the decrease or increase in the consumption of the delivery to the extent required to maintain the same delivery-pressure. The number of the graduated scale on the lever E' at which the weight is adjusted (the feature of adjustment rendering the same regulator readily applicable to uses requiring different delivery-pressures) thus always indicates the degree of delivery-pressure in each particular application of the regulator, whereby the lever device affords an accurately reliable gage and avoids effectually any necessity for adjusting the valve by hand.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a pressure-regulating valve, the combination, with the shell A, containing the chamber g , inlet r , and outlet r' , of the partition r^2 within the chamber, valve-seats n and n' , a valve B, having heads e e' fitting in the seats, a piston-head e^2 on the end of the valve-stem, located within the chamber so as to be

acted upon by the back-pressure in the outlet-passage, and an adjusting mechanism for holding open the valves against a predetermined back-pressure, comprising a piston-rod secured centrally to the piston-head and extending through the shell, and a pivoted bar bearing upon the piston-rod and carrying a weight and provided with a graduated scale for the adjustment of the weight to a predetermined resistance to counteract a predetermined pressure upon the piston-head, whereby the opening of the valve and the provision of a yielding resistance therein to a predetermined back-pressure in the valve is accomplished entirely by adjusting the resistance of the lever, substantially as described.

2. In a pressure-regulating valve, the combination, with the shell A, containing the chamber *g*, inlet *r*, and outlet *r'*, of the partition *r²* within the chamber, valve-seats *n* and *n'*, a valve B, having heads *e* and *e'* fitting in the seats, a piston-head *e²* on the end of the valve-stem, located within the chamber so as to be acted upon by the back-pressure in the outlet-passage, and an adjusting mechanism for holding open the valves against a predetermined back-pressure, comprising a stem *C'* for the piston, extending through the shell, a lever *E'*, fulcrumed upon the shell to engage the stem, and provided with a graduated scale and having bearing-points *y* and *y'* on opposite edges toward one end, whereby the lever may be changed to a first or second class lever and can be used whether the piston-stem projects upward or downward from the valves, and a weight upon the lever, said

combination producing a pressure-valve in which the maintenance of the valve against a predetermined back-pressure is accomplished entirely by the direct action of a lever having an adjustable resistance, substantially as described.

3. In a pressure-regulating valve, the combination, with the shell A, of a chamber *g*, having an inlet *r* and an outlet *r'*, and containing a partition *r²* and valve-seats *n* and *n'*, a valve B, having heads *e* and *e'*, adapted, respectively, to fit the seats *n* and *n'*, and recessed guide-wings *f*, extending between the heads and affording communication around the valve between the said heads, and the chamber with the inlet *r*, recessed guide-wings *f'*, extending from the head *e'* through the shell, a peripherally-recessed piston-head *e²* for the outer ends of the wings *f*, a spring *b*, and packing-rings *a* and *a'* in the recess, a permanent cap D, into which the head *e²* extends, a stem *C'*, extending from the valve through the cap, a lever *E'*, fulcrumed to a link on the shell and having bearing-points *y* *y'* on its opposite edges at and near the inner end, respectively, and engaging the stem *C'* through the medium of one of said points, and provided on the opposite side of its fulcrum with graduated indications of pressure, and a weight *E²*, adjustably supported on the lever, substantially as described.

FRANK HENNEBÖHLE.

In presence of—

J. W. DYRENFORTH,
M. J. BOWERS.