(No Model.)

T. P. FORD.

AUTOMATIC PRESSURE REDUCING VALVE.

No. 558,794. Patented Apr. 21, 1896.

Fig. 1.

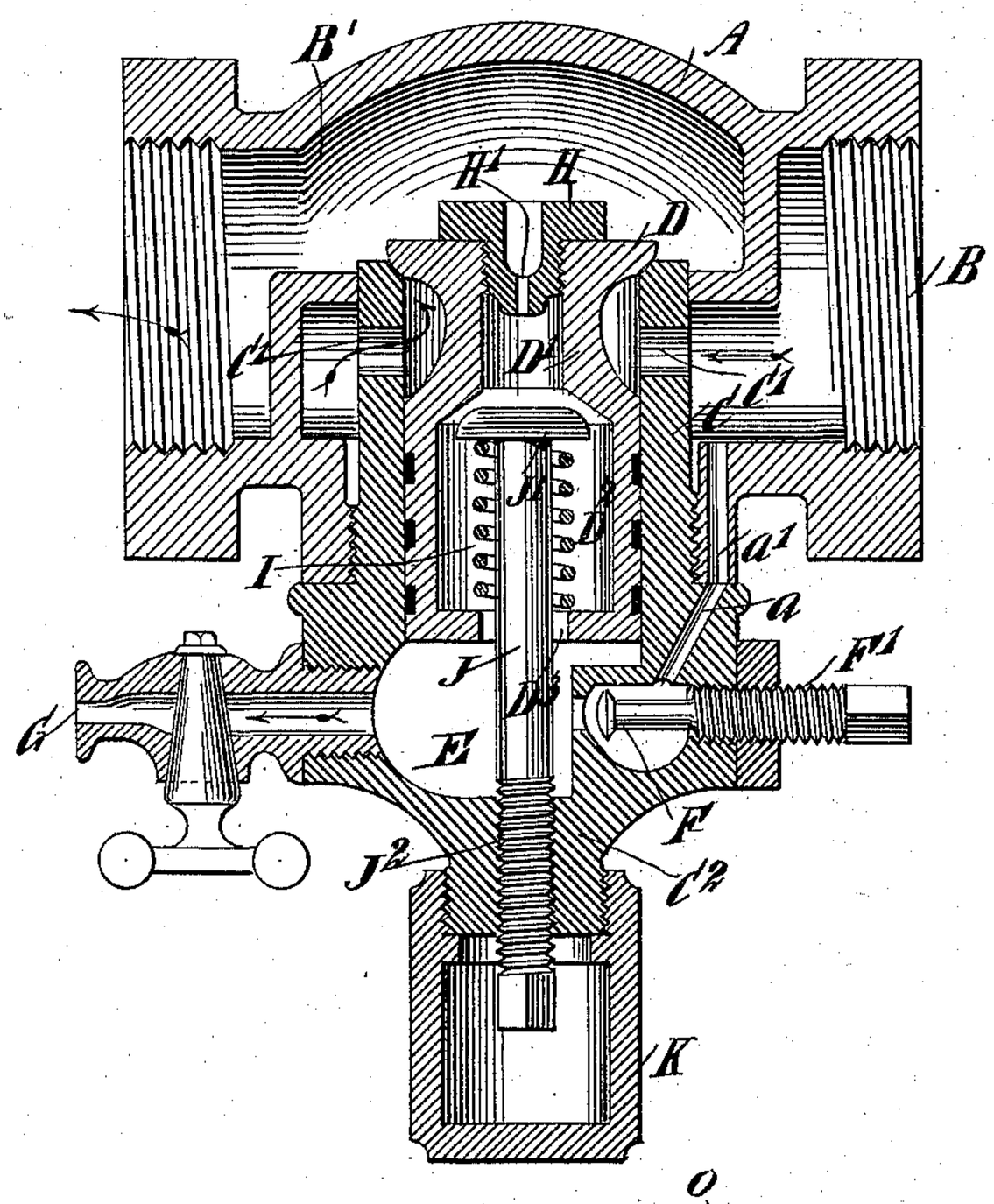
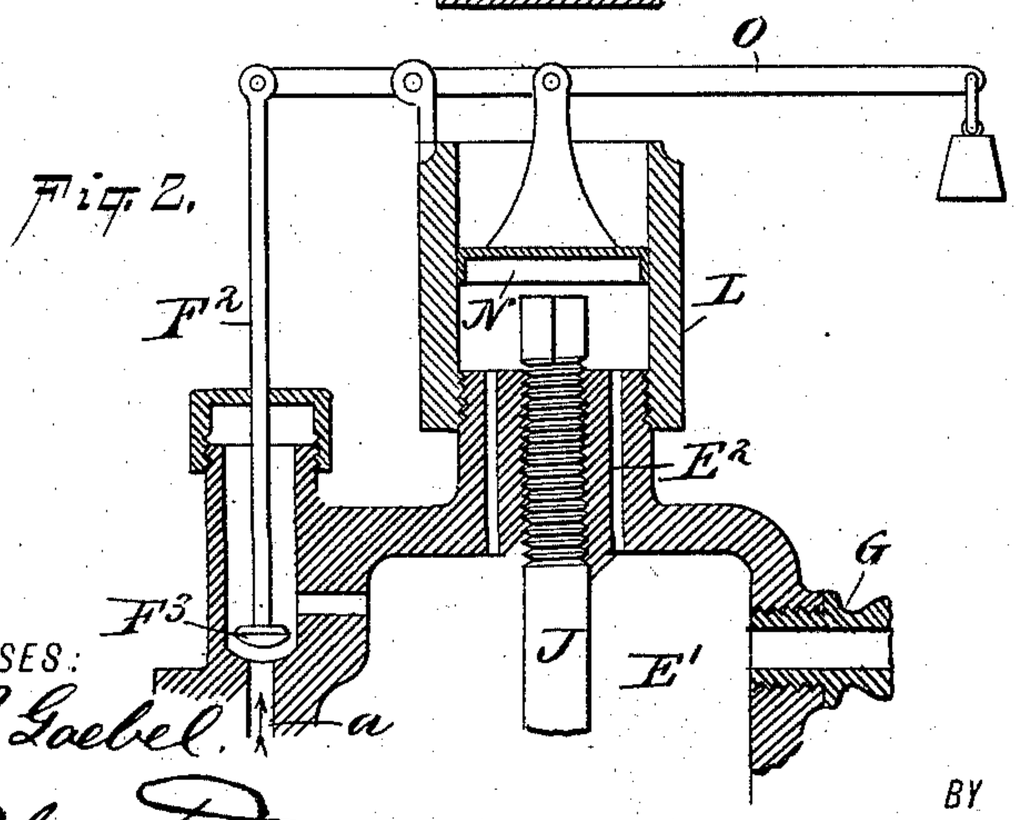


Fig. 2.



WITNESSES:

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AUTOMATIC PRESSURE-REDUCING VALVE.

SPECIFICATION forming part of Letters Patent No. 558,794, dated April 21, 1896.

Application filed December 16, 1895. Serial No. 572,333. (No model.)

To all whom it may concern:

Be it known that I, THOMAS P. FORD, of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Automatic Pressure-Reducing Valve, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved automatic pressure-reducing valve, arranged to permit of conveniently setting the valve to the desired reduction of the initial pressure passing to the valve.

The invention consists of a reducing valve-chamber adapted to be connected with the fluid-inlet, a main valve for controlling the fluid passing from the inlet to the outlet, and a permanent connection between the said reducing valve-chamber and the said outlet to permit fluid passing into the said reducing valve-chamber to pass into the outlet to press on the main valve.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both the figures.

Figure 1 is a sectional side elevation of the improvement, and Fig. 2 is a like view of the automatic regulating attachment for the equalizing-valve.

The reducing-valve, as shown in Fig. 1, is more especially designed for steam and other gaseous fluids, and the valve is provided with a valve-body A, having an inlet B connected with the fluid supply and leading to the apertures C′, formed in a bushing C, screwed into the valve-body, and said bushing having at its top the seat for the main valve D, the latter, when open, connecting the inlet B with the outlet B′, so that the steam or other fluid passes from the outlet under the reduced pressure.

The main valve D is formed on its hollow valve-stem D′ with a piston D^2, fitted to slide in the bushing C, and the bottom of this hollow piston D^2 is formed with an opening D^3, leading to a reducing valve-chamber E, having a reducing-valve F for connecting the said chamber E by reducing-ports *a a′* with the inlet B. In the top of the valve D screws a plug H, having a minute aperture H′ opening into the inlet-valve stem D′, so that when the valve F is open live steam at the initial pressure can pass through the ports *a′ a*, past the valve F and into the reducing valve-chamber E, and from the latter the steam can pass through the opening D^3, the hollow piston D^2, the hollow valve-stem D′, through the opening H′, and into the outlet B′, so as to act on the outer face of the main valve D. The reducing valve-chamber E is provided with a train-cock G.

The valve D is normally held to its seat on the upper end of the bushing C by its weight; but for small valves I prefer to employ a spring I, resting in the bottom of the hollow piston D^2 and pressing with its upper end on the head J′ of a rod J, on which the said spring is coiled. The lower threaded end J^2 of the rod J screws in the outer end C^2 of the bushing to permit the operator to move the said rod J up or down to decrease or increase the tension of the spring. A cap K incloses the outer end of the rod J, said cap screwing on the outer end of the bushing.

The valve F is preferably provided with a valve-stem having a threaded portion F′ screwing in one side of the bushing to permit the operator to open or close the valve F, as the case may require. By adjusting the valve F nearer to or farther from its valve-seat more or less steam can be admitted to the reducing valve-chamber E, so that the pressure within the latter can be regulated to any desired amount.

Now when the valve is in operation and the initial pressure in the inlet B is, say, ninety pounds, then the valve F can be adjusted to bring the initial pressure in the reducing valve-chamber E, say, to fifteen pounds and the initial pressure in the outlet B′ to five pounds. Now it will be seen that by the arrangement described adjusting the valve F permits of regulating the pressure in the out-

let B′ to a nicety, irrespective of the initial pressure in the inlet B. When the valve D is opened by the pressure of the steam passing through the opening C′ into the bushing C and acting on the under side of the said valve, and the steam-pressure in the outlet B′ should increase beyond the pressure to which the valve is set, then the latter will instantly move downward nearer to the valve-seat, so as to cause the reduction of the pressure in the outlet B′ until the desired pressure to which the valve is set is reached.

It is understood that by the arrangement described a permanent connection is made between the reducing valve-chamber E and the outlet B′ to permit the fluid to pass from the inlet B to the said reducing-chamber and into the outlet B′. It is further understood that the aperture H′ in the plug H is comparatively very small, and depends upon the size of the valve to obtain, in conjunction with the reducing-valves F, the desired reduction of pressure between the inlet B and the outlet B′.

It will be seen that this pressure-reducing valve can be used as a back-pressure valve to exhaust steam, as any desired amount of back pressure can be arranged for the outlet B by adjusting the tension of the spring I correspondingly. The valve can be readily examined or repaired by simply unscrewing the bushing C from the valve-body A to permit of getting at the seat and the main valve D.

In case the valve is used for water instead of steam then the equalizing-valve must be made to shift automatically, and for this purpose I prefer the construction shown in Fig. 2, in which the equalizing-chamber E′ is connected by channels E^2 with a cylinder L, screwing on the outer end C^2 of the bushing. In the cylinder L is arranged a cup-piston N, connected with a weighted lever O, carrying the stem F^2 of the equalizing-valve F^3. Now the water entering the equalizing-chamber from the inlet B by way of the open equalizing-valve F^3 can pass through the channels E^2 to press on the piston N to regulate the position of the valve F^3 according to the pressure of the water in the chamber E′. Thus if the pressure in the chamber E′ and the cylinder L increases, then the valve E^3 commences to close to reduce the pressure in the chamber E′ until a normal pressure is reached, when the lever O returns to its normal position.

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

1. An automatic pressure-reducing valve, comprising a reducing valve-chamber adapted to be connected with the fluid-inlet, a main valve for controlling the fluid passing from the inlet to the outlet, a permanent connection between the said reducing valve-chamber and the said outlet to permit the fluid to pass into the said reducing valve-chamber and into the outlet to act on the main valve, and a valve for the said reducing valve-chamber to regulate the amount of fluid passing from the inlet to the reducing valve-chamber, substantially as shown and described.

2. An automatic pressure-reducing valve, comprising a casing having inlet and outlet openings, a bushing having apertures in its wall for the fluid to pass from the inlet into the bushing, a main valve seated on the said bushing and formed with a piston fitted to slide in the said bushing, and a reducing valve-chamber adapted to be connected with the fluid-inlet and opening into the piston of the said main valve, substantially as shown and described.

3. An automatic pressure-reducing valve, comprising a bushing having apertures in its wall for the fluid to pass from the inlet into the bushing, a main valve seated on the said bushing and formed with a piston fitted to slide in the said bushing, and a reducing valve-chamber adapted to be connected with the fluid-inlet and opening into the piston of the said main valve, the said reducing valve-chamber having a permanent connection with the valve-outlet by way of the said main valve and its piston, substantially as shown and described.

4. An automatic pressure-reducing valve, comprising a bushing having apertures in its wall for the fluid to pass from the inlet into the bushing, a main valve seated on the said bushing, a piston connected to the main valve, a reducing valve-chamber adapted to be connected with the fluid-inlet and opening into the piston of the said main valve, the said reducing valve-chamber having a permanent connection with the valve-outlet by way of the said main valve and its piston, and an apertured plug held in the said main valve and opening into the hollow valve-stem and piston of the said valve, substantially as shown and described.

5. An automatic pressure-reducing valve, comprising a reducing valve-chamber having a reducing-valve, adapted to be connected with the fluid-inlet, a main valve for controlling the fluid passing from the inlet to the outlet, a permanent connection between the said reducing valve-chamber and the said outlet, to permit the fluid to pass into the said reducing valve-chamber and into the outlet to act on the main valve, and means for automatically regulating the position of the reducing-valve, substantially as shown and described.

6. In an automatic pressure-reducing valve, the combination with a shell, of a bushing removably fitting within said shell, a piston operating in the bushing, a valve carried by the piston and engaging one end of the bushing, a rod connected to the bushing and passed into the piston, and a spring engaging the rod and the piston, the bushing being capable of being removed from the shell so as to also remove the rod and piston, substantially as described.

7. In an automatic pressure-reducing valve, a shell, a bushing having a threaded portion screwed into the shell, the bushing having a flange engaging the shell and being formed with a reducing valve-chamber, a piston operating within the bushing, a valve connected to the piston and bearing against one end of the bushing, a rod carried by the bushing and passed into the piston, and a spring engaging the piston and rod, substantially as described.

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Witnesses:
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