No. 877,907. PATENTED FEB. 4, 1908.

G. W. COLLIN.

STEAM PRESSURE REDUCING VALVE.

APPLICATION FILED DEC. 20, 1906. 2 SHEETS—SHEET 1.

Fig. 1.

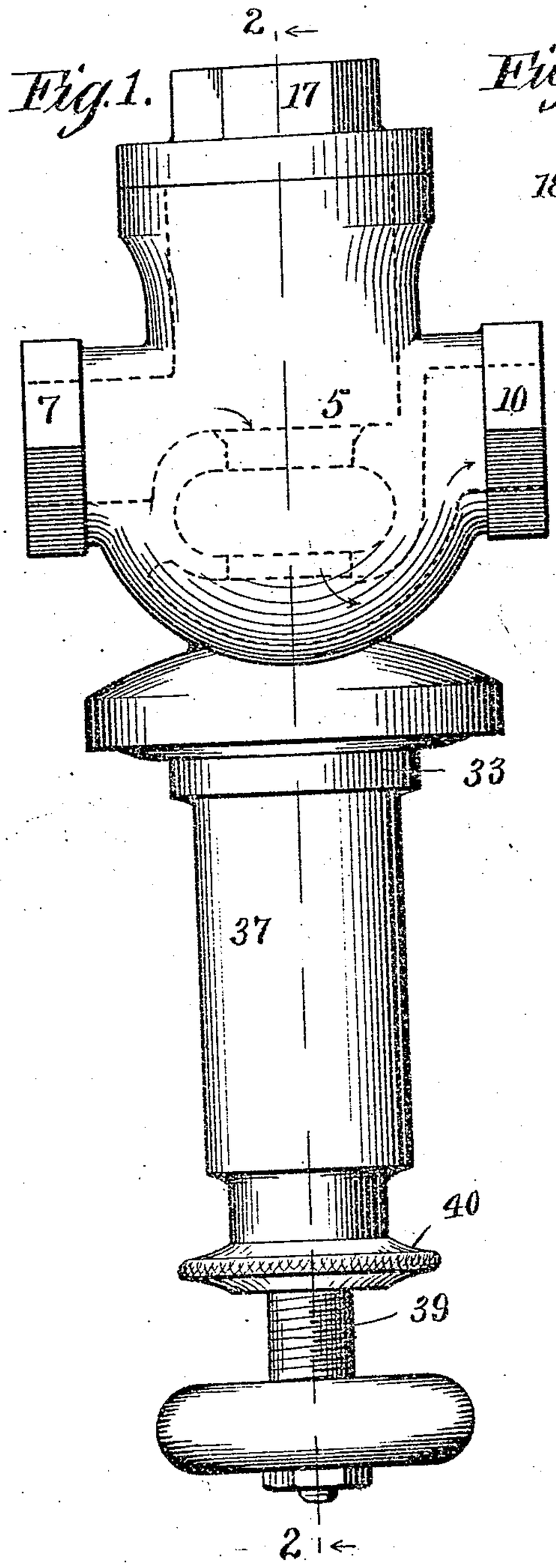
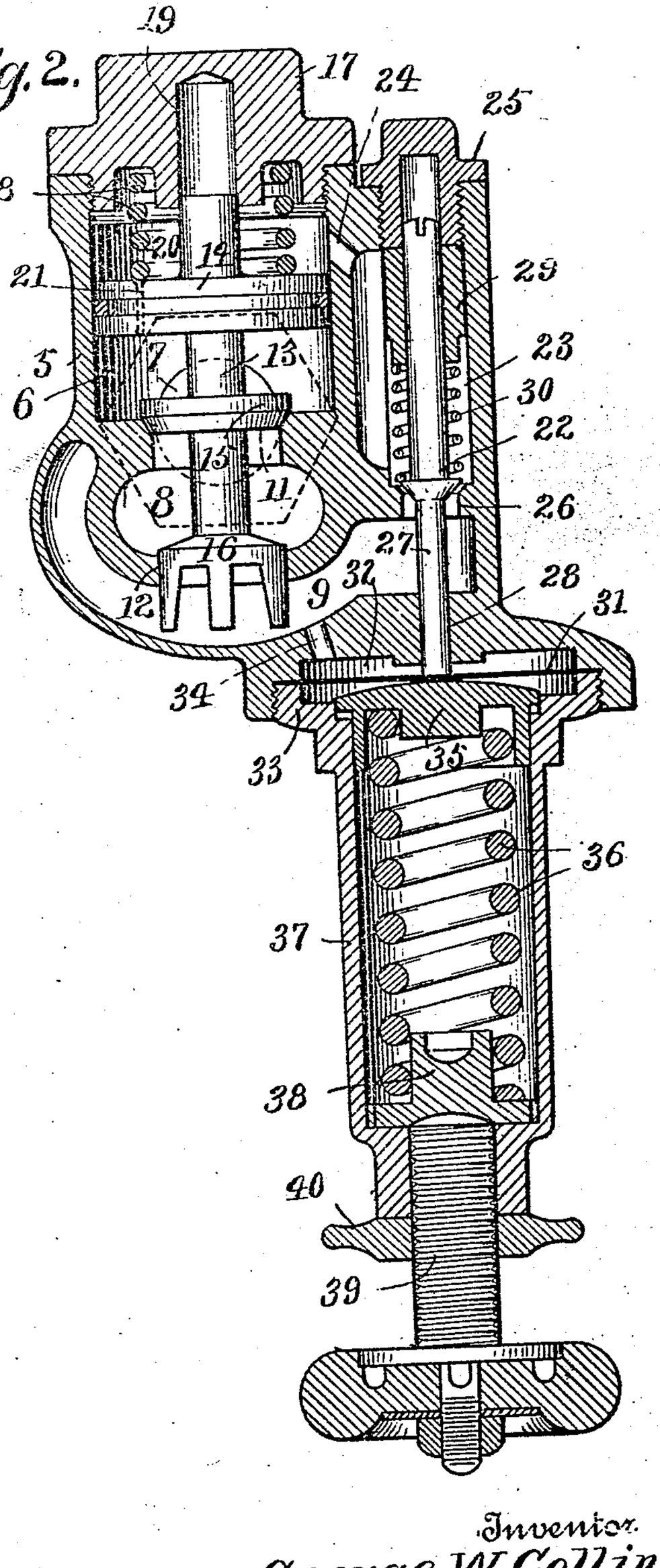


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

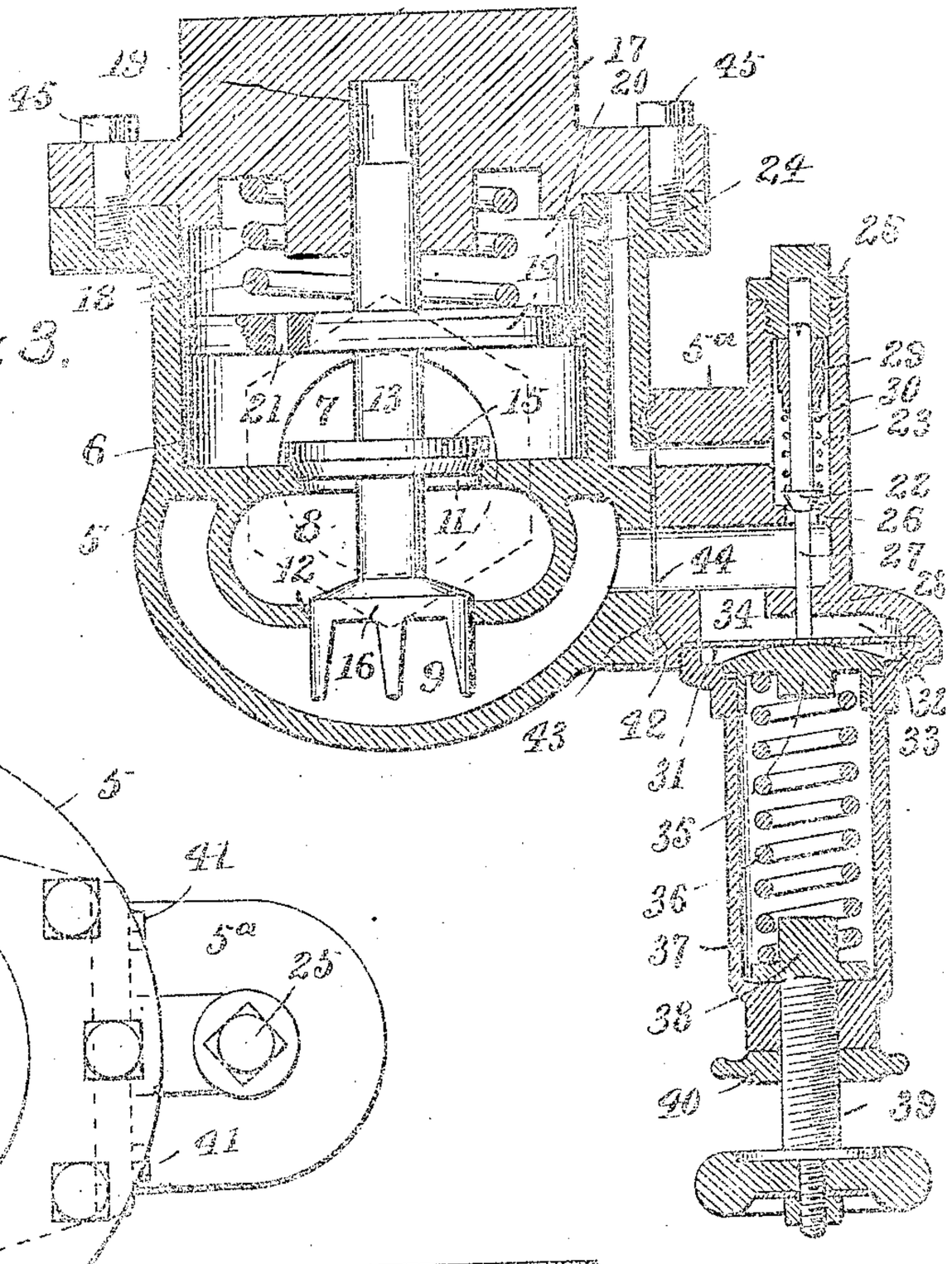


Fig. 4.

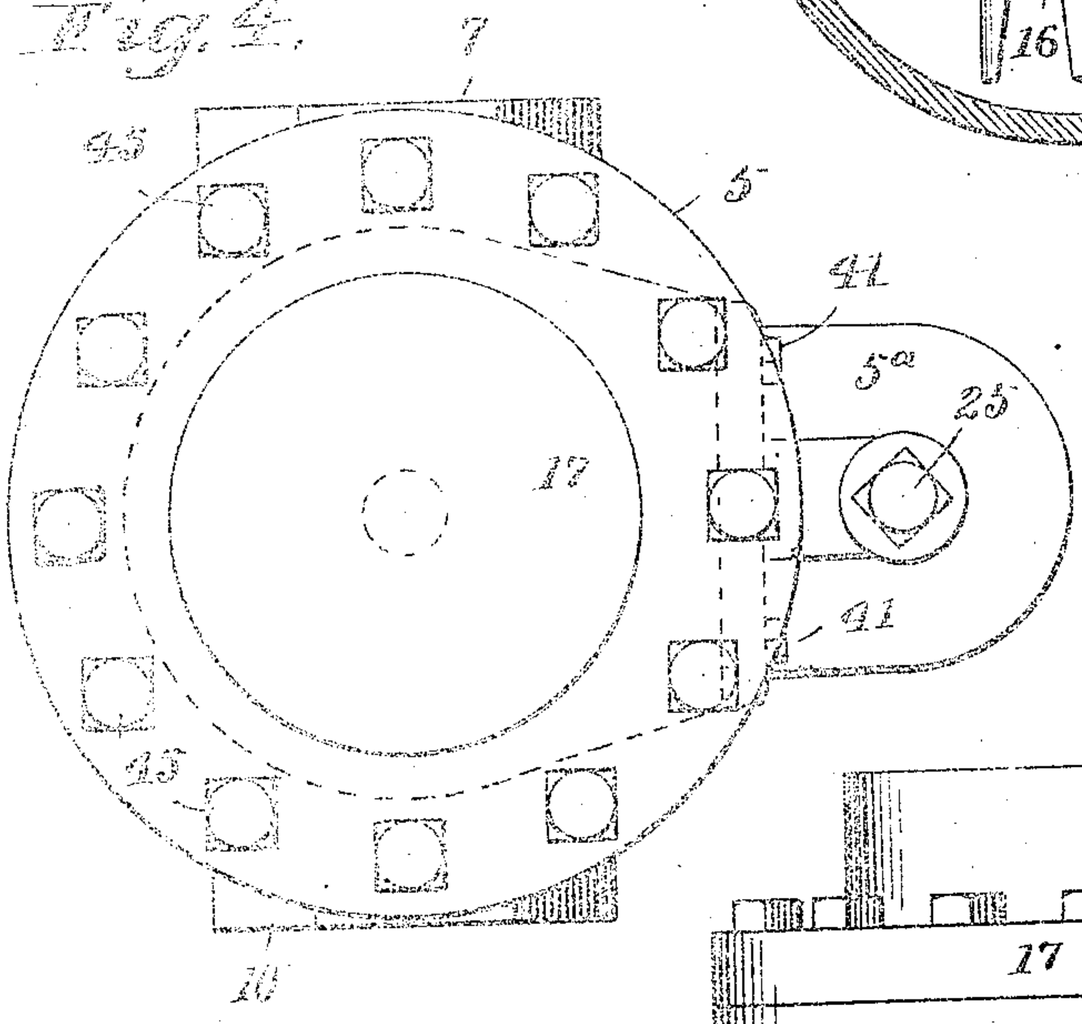
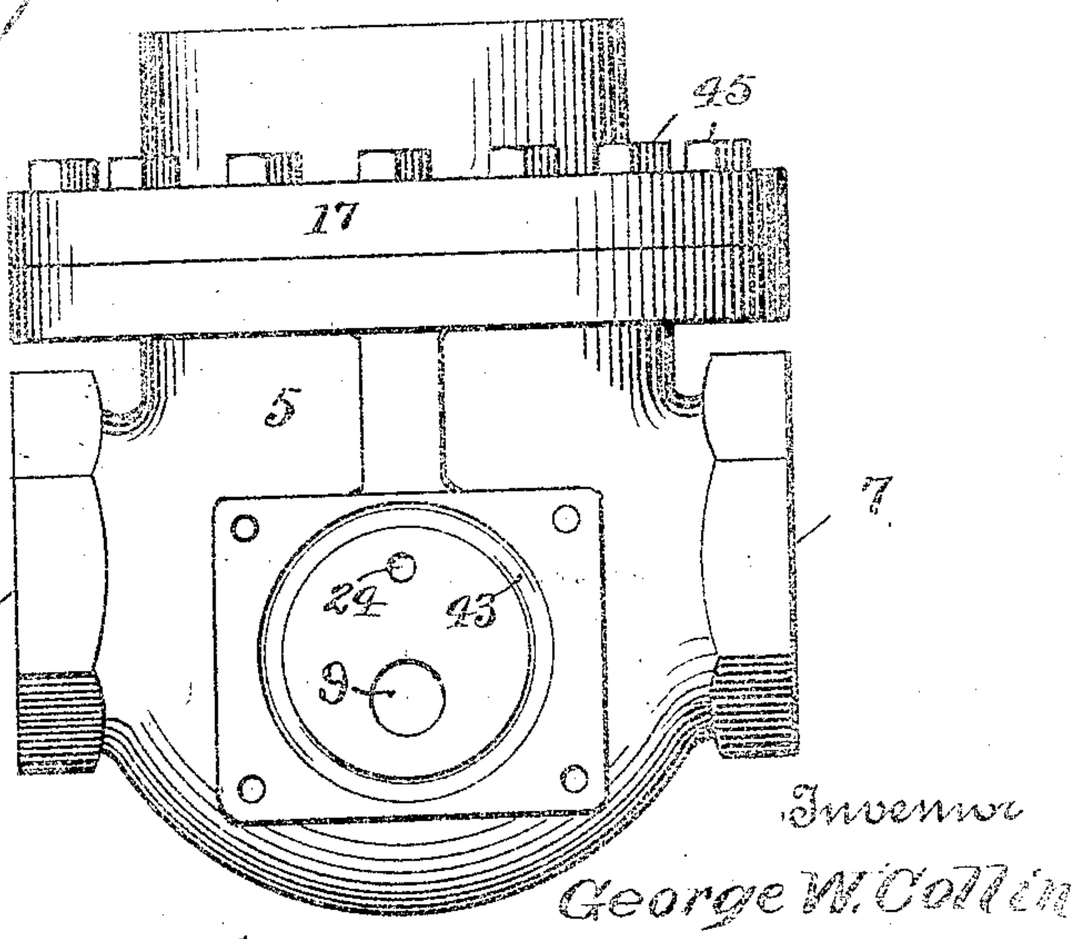


Fig. 5.



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UNITED STATES PATENT OFFICE.

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STEAM-PRESSURE-REDUCING VALVE.

No. 877,907. Specification of Letters Patent. Patented Feb. 4, 1908.

Application filed December 20, 1906. Serial No. 348,689.

To all whom it may concern:

Be it known that I, GEORGE W. COLLIN, a citizen of the United States, and resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Steam-Pressure-Reducing Valves, of which the following is a specification.

This invention relates to new and useful improvements in steam pressure reducing valves and has for its objects to generally improve the constructions of said types of valves.

In a prior patent granted to me October 24th, 1905, #802,496, I have shown a valve of the above general type, and my present invention is an improvement upon said valve, the important objects being to design the same in a more compact and cheaper manner, and so as to be better adapted to the more general uses to which the valve is put.

The advantages as contained in my present invention resides in the improved construction whereby the outlet may be located directly in line with the inlet, thus producing what I term a straightaway type of valve adapted for connections in a straight line of pipe; further to so construct the parts as to be able to shorten the length of valve and reduce its weight and finally to arrange the auxiliary or controlling valve alongside of and in close relation to the main valve though physically unconnected therewith and in a manner to permit of its removal from above, without interfering with the main valve, thus making my valve in its entirety more convenient and desirable in its practicable application and less expensive to manufacture.

Referring to the accompanying drawings, forming a part of this specification similar characters of reference denote like or corresponding parts throughout the several figures and of which,

Figure 1, shows a side elevation of my new type of valve complete. Fig. 2, shows a central vertical longitudinal section through the valve, taken on line 2—2 of Fig. 1. Fig. 3, is a further central vertical longitudinal section, of a slightly different form of construction of valve, said view illustrating the auxiliary valve chamber as formed in a separate but attached part of casing. Fig. 4, is a plan view of construction shown in Fig. 3, and Fig. 5, is a detached side elevation of main valve casing shown in Figs. 3 and 4.

The main casing 5 of the valve as shown in Figs. 1 and 2, is cast in a single piece, being cored, bored, tapped and finished to receive the several attached and operative parts. The main or live steam cylinder 6 is provided with a side inlet 7 which in practice is connected with the high pressure steam, or supply from boiler. Beneath this cylinder is a cushion chamber 8 and adjoining said cushion chamber is the low pressure chamber 9 having an outlet 10 directly opposite from inlet 7 and in line therewith, and obviously for connection to distributing or low pressure service pipe (not shown).

The cylinder 6, cushion chamber 8, and low pressure chamber 9 are connected by suitable ports 11 and 12 respectively. A valve body 13 is operatively mounted in said chambers and has a piston 14 to fit the cylinder, a valve 15 to engage the seat of the port 11 and a plunger 16 to fit the outer port 12. The upper end of the cylinder 6 is adapted to receive a detachable closing cap 17 against which may be seated a cushion spring 18 for the piston and further contains a central bearing 19 in which the upper end of stem of valve body operates. When the valve is closed this piston 14 is located about midway of length of cylinder and above the inlet 7 before mentioned, thus dividing the cylinder into an upper and lower compartment, the latter being in direct communication with the inlet while the upper side 20 is only connected to the lower side by a small port 21 leading through the said piston. The relative distance of plunger 16 from valve 15 is slightly less than that between their respective ports; consequently an upward or opening movement of the valve body, opens the valve port 11 slightly in advance of the plunger port 12, causing the cushion chamber to hold the steam in check pending the further opening of the main valve thus serving to prevent wearing or wire drawing of said main valve.

An auxiliary valve 22 and its chamber 23 are located beside the main cylinder being arranged vertically and the valve adapted to operate parallel therewith. The said chamber is further connected to the upper portion of said cylinder by a port 24 through the side walls intermediate the said compartments.

The top end of the said auxiliary chamber is provided with a removable threaded plug 25 through which access may be had to the interior from above and independent of main valve. The lower end of chamber contains a valve seat and port 26 in which is seated the auxiliary valve 22 having an upper stem bearing in the cap 25 before mentioned and a lower stem 27 which operates in a bore 28 of the lower wall of chamber 9. A sleeve 29 is located upon the upper stem and spring 30 is arranged upon said stem intermediate of sleeve and valve to bear upon and hold the latter against its eat.

A diaphragm 31 is located in a suitable chamber 32 of the casing and is secured and supported in position by a hub 33 screwed into said lower portion of auxiliary valve casing. The said diaphragm chamber is connected with the low pressure chamber 9 of valve by a port 34 as shown. The end of lower stem 27 of auxiliary valve is seated against the face of the diaphragm and said stem and its valve are obviously operated by the movement of said diaphragm. A collar 35 is movably mounted in the hub 33 and is held against the back of diaphragm by a spring 36 seated in a tubular extension 37 of hub 33 and intermediate of said collar and a second collar 38 in outer end of tube. Said spring and collar being adjustable to regulate pressure against diaphragm by a screw 39 secured in position by lock nut 40.

Referring to Figs. 3, 4 and 5, I have shown a construction of valve that is especially adapted for large types of valves and less expensive to produce than the other form. In said design the auxiliary valve chamber is formed in a separable part 5^a of the casing, being secured to the main casing 5 by screw 41. This attached valve chamber casing is provided with an annular convex rib 42, while the adjoining side face of main valve body is provided with a corresponding annular concave recess 43 that in practice registers with said rib. A suitable soft gasket 44 of metal or other material is located intermediate the two connecting casings to form a steam tight connection. In this form the closing cap 17 of top end of cylinder is preferably attached by screw 45 as shown, instead of being threaded and screwed into main casing.

The operation of my valve when connected in a steam system is as follows: The high pressure steam enters lower valve chamber beneath the piston, causing the same to raise against the cushioning spring, and first raising the valve from seat 11, admitting steam to cushioning chamber and then opening the lower port 12 leading from cushion chamber to low pressure side of chamber, or heating system. The steam is then free to flow into the heating system and act on top of diaphragm, and raises to the desired pressure determined by the adjustment of screw 37, and resistance spring 36 that acts against the lower side of diaphragm. The steam is obviously also free to pass through the port 21, upper chamber 20, port 24 to auxiliary chamber and out through port 26 to low pressure side 9 of valve or service system. As the steam in system reaches desired pressure the diaphragm 31 will be forced out against the spring, away from end of auxiliary valve stem 27 allowing the auxiliary valve to be forced into its seat by spring 30 thus closing all passage leading from upper chamber 20 thereby causing pressure, to rise therein through port 21 to that of main supply and by reason of the greater area of surface expose on top of piston and valve combined the said steam pressure will cause the valve body to descend, first closing the port from cushion chamber and then from main valve, which obviously closes the valve. When the steam in system becomes low and pressure on diaphragm is relieved, the same again contacts with and operates auxiliary valve, stem to open said valve relieving pressure from above piston and allowing main steam pressure to again open main valve.

Having thus described my invention what I claim and desire to secure by Letters Patent is:—

1. In a steam pressure reducing valve, the combination with a casing containing a main valve chamber and having a side inlet and outlet, a cushion chamber adjoining the main valve chamber, a low pressure chamber, ports connecting said chambers, an auxiliary valve chamber beside and independent of main valve and having a separate detachable closing cap on upper end, an auxiliary valve in said chamber arranged to operate longitudinally of casing and to be removed through said top side, and a diaphragm connected with low pressure chamber to operate auxiliary valve.

2. In a steam pressure reducing valve, the combination with a casing containing a main valve chamber having a side inlet, a cushion chamber adjoining the main valve chamber, a low pressure chamber, ports connecting said chambers, an outlet from the low pressure chamber directly opposite the inlet to main valve chamber, a valve body to engage the seats of ports, a connected auxiliary valve chamber beside and parallel with the main valve chamber and having a detachable cap on top end, an auxiliary valve in said auxiliary chamber adapted to operate vertically and parallel with the main valve and to be removed through said top end, and a diaphragm connected with low pressure chamber to operate auxiliary valve.

3. In a steam pressure reducing valve, the combination with a casing containing a main valve chamber having a side inlet, a

cushion chamber adjoining the main valve chamber, a low pressure chamber, ports connecting said chambers, a valve to engage said ports, an auxiliary valve casing attached to the side of main casing and having a chamber therein connected with main valve chamber and a side outlet from low pressure chamber directly opposite the inlet, an auxiliary valve in said auxiliary chamber adapted to operate vertically and parallel with the main valve and to be removed through said top end, and a diaphragm connected with low pressure chamber and operate auxiliary valve.

Signed at Mansfield, in the county of Richland and State of Ohio, this 13 day of December, A. D., 1906.

GEORGE W. COLLIN.

Witnesses:
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