April 26, 1932. W. L. B. WILSON 1,855,505

PRESSURE EQUALIZER AND DAMPER CONTROL FOR OIL BURNERS

Filed Dec. 17, 1928

Fig. 3.

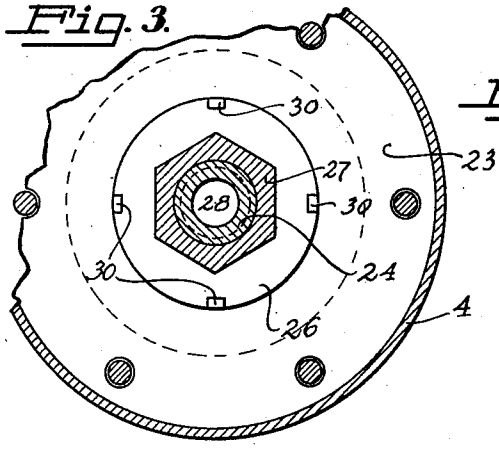


Fig. 1.

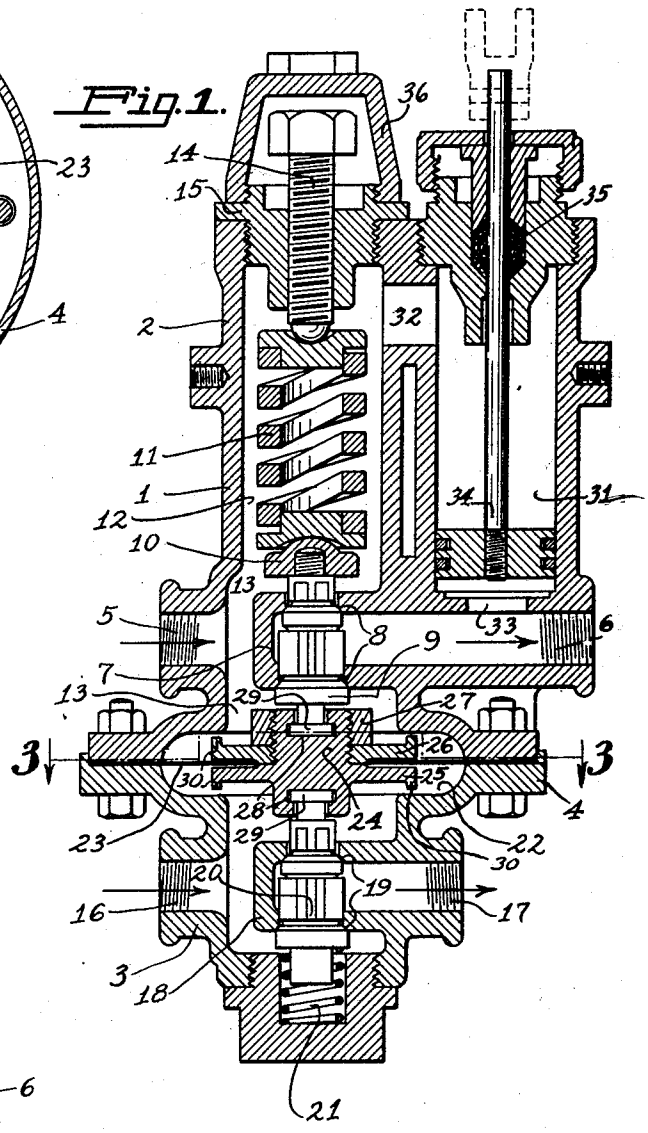
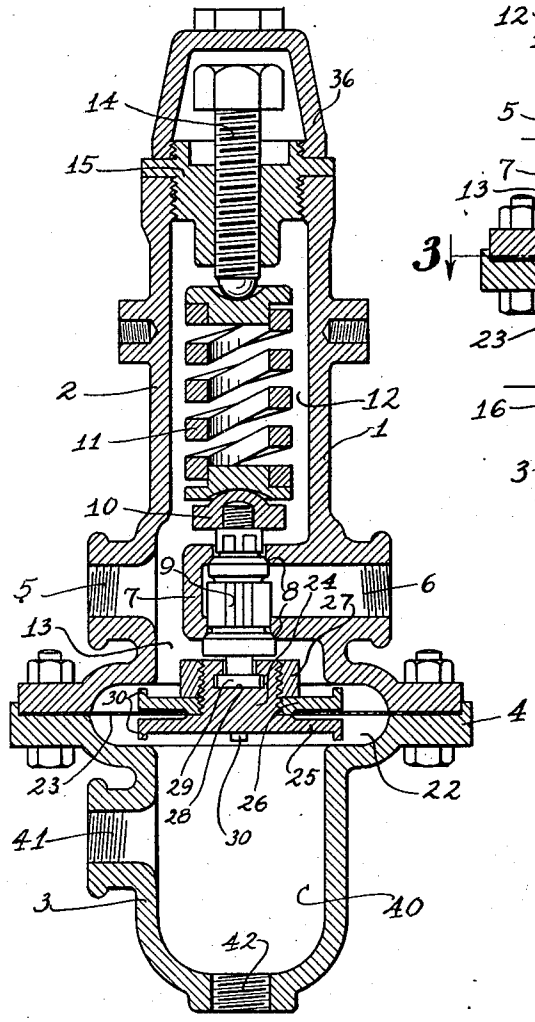


Fig. 2.



INVENTOR.
William L B Wilson
BY
Harry A Toulmin
ATTORNEYS.

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UNITED STATES PATENT OFFICE

WILLIAM L. B. WILSON, OF SAN FRANCISCO, CALIFORNIA

PRESSURE EQUALIZER AND DAMPER CONTROL FOR OIL BURNERS

Application filed December 17, 1928. Serial No. 326,486.

The present invention relates to an improved pressure control means for regulating the flow of steam and oil in predetermined volume ratio to any suitable type of hydrocarbon burner employing steam and oil to obtain the proper combustion.

The principal object of this invention is to improve the pressure control means and to simplify its construction, enabling the use or employment of but a single diaphragm exposed to the steam and oil pressure and directly connected with the steam and oil control valves, whereby the same will be simultaneously operated.

Another object is to provide a diaphragm, the mounting of which is so constructed as to limit the movement of flexing of the diaphragm in either direction, and when at the limit of its movement, to maintain exposed to the operating pressure the effective area of the diaphragm.

A further object is to provide a control means wherein the valves controlling the passing of oil and steam through the apparatus are of substantially duplicate structure, and wherein furnace damper regulating means is formed as an integral part of the structure and is actuated by a variation of the oil pressure admitted to the burner.

Other objects are in the simplification of the structure of the casing for the control means, enabling the same to be manufactured of two parts, readily assembled, and which are designed for simplicity and efficiency in the carrying out of the invention.

By my invention, the predetermined volume ratio of oil and steam is preserved by the action of the regulated steam pressure in directly automatically and correspondingly varying oil pressure.

With the above mentioned and other objects in view, the invention consists in the novel construction and combination of parts hereinafter described, illustrated in the accompanying drawings and pointed out in the claims hereto appended; it being understood that various changes in the form, proportion, size and minor details of construction within the scope of the claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

To more fully comprehend the invention, reference is directed to the accompanying drawings, wherein—

Fig. 1 illustrates one form of the device in vertical section, with a damper controlling piston associated therewith.

Fig. 2 is a similar view of a modified form of construction.

Fig. 3 is a view in plan of the valve mounting plate for the diaphragm, illustrating the stop lugs on the periphery thereof.

Referring to the drawings, wherein like characters of reference designate corresponding parts in the several views, 1 indicates a casing, consisting of upper and lower sections 2 and 3, detachably united together along the annular flanges 4. The upper section is provided with an inlet 5 for oil under pressure and an outlet 6 for oil under pressure, the same being separated by a valve seat 7, the valve openings 8 of which are disposed in alignment axially within the casing. The passage of oil through the openings 8 is controlled by a valve 9, the surfaces of which are adapted for contacting with the seat 7.

Threaded to the upper end of the valve is a nut 10 on which bears the lower end of a diaphragm controlling spring 11, of the coil type, disposed longitudinally of a chamber 12, communicating with the oil inlet 5 through channel 13. A spring tension adjusting screw 14 is carried by a nut 15, closing chamber 12, and the adjustment of said screw varies the pressure necessary for valve 9 to close against the pressure of spring 11.

The lower section 3 is provided with an inlet 16 for steam under pressure, and an outlet 17 for the steam, they being separated by a valve seat 18, passage through the openings 19 of which is controlled by valve 20 of a cross sectional structure substantially the same as valve 9. A light coiled spring 21 raises valve 20 to its seat.

Interiorly of the casing 1, at the point of meeting of the flanges 4, is provided a circular chamber 22, closed by a transversely extending diaphragm 23, the periphery of which is held between the flanges 4, as illus-

trated. The diaphragm, which is of flexible structure, is provided with a central opening through which extends the threaded portion 24 of a valve mounting plate 25, disposed beneath the underside of the diaphragm. Threaded to the portion 24 is a similar plate 26, lying on the upper side of the diaphragm 23, the same being held in locked position by a nut 27.

At its opposite ends, the portion 24 is provided with a key seat 28 for respectively receiving key heads 29 of the valves 9 and 20, the same being so mounted as to be normally seated when the diaphragm is in its normal position.

The peripheries of members 25 and 26 are formed with stop lugs 30 which limit the movement of the diaphragm in either direction, and at the same time admit of the exposure of the entire surface of the diaphragm to a pressure existing on either side thereof.

Disposed parallel with the chamber 12, in the upper section 2, is a damper piston mounting cylinder 31, communicating at one end through a port 32 with the upper end of chamber 12, and at its opposite end through port 33 with the oil outlet 6.

Reciprocally mounted within the cylinder 31 is a damper operating piston 34 connected in any suitable manner with the furnace or boiler damper or draft controlling means.

The stem of the piston 34 extends exteriorly of the cylinder 31 through a gland or stuffing box 35, and a protecting cap 36 is adapted for positioning over the exposed portion of the screw 14.

Valves 9 and 20 are in axial alignment, a single diaphragm controlling the operation thereof, assisted in one direction by the action of a spring, the latter being in axial alignment with the valves.

With the parts assembled as in Fig. 1; an inlet 5 connected to an oil supply under pressure; and outlet 6 to a burner; an inlet 16 to a source of steam under pressure, preferably to the boiler associated with the burner; an outlet 17 connected to the burner with which outlet 6 connects, the device operates in the following manner:—

With spring 11 adjusted to maintain the valves 9 and 20 open their proper distance for a proportionate volume of oil and steam for proper combustion, the oil pressure above piston 34 will be reduced and that below will be increased, causing the piston to proportionately move, affording a correct adjustment to the damper which it controls.

This operation takes place inversely when said valves 9 and 20 are seated, due to the connection of the cylinder 31 through the port 32 with the oil supply under pressure. Should the steam pressure at 16 rise for any reason, the increase in pressure will act on the underside of diaphragm 23, operating the same to close valves 9 and 20, and thus reduce the fire at the burner, at the same time reducing the pressure on the underside of the piston 34. Should the pressure at 16 reduce for any reason, the release in pressure against diaphragm 23 will enable spring 11 to proportionately operate valves 9 and 20 and admit a greater volume of steam and oil. At the same time, this pressure operates piston 34.

In the structure in Fig. 2, a two part casing is provided containing but a single valve for the control of the oil, and the lower section 3 of the casing is in the form of a chamber 40 connected with a steam inlet 41 and having a normally closed drain 42.

This type of apparatus is employed where a straight oil is desired to be controlled to the burner.

It will be observed that on either complete movement of the diaphragm 23 upwardly or downwardly, the stop lugs 30 engage the wall of the chamber 22 and limit the diaphragm in its movement, thus saving it from undue strain, and at the same time the spacing of the stop lugs enables the entire surface of the diaphragm, when its movement is arrested to be exposed to operating pressure on either side thereof.

I claim:—

1. A pressure equalizer for plural fluid streams under independent pressures, comprising a shell consisting of a pair of flanged sections arranged in unitary assemblage, a flexible diaphragm seated in and traversing the union between the sections, one of said sections having an inlet and an outlet for one of said fluid streams, a valve for controlling the discharge of fluid from the inlet to the outlet, a spring within one of said sections and acting on the valve to move it in one direction, a connection between the valve and diaphragm with the valve interposed between the diaphragm and spring, said other of said pair of sections having an inlet for a fluid stream under pressure acting on said diaphragm, stop means at one side of said diaphragm for limiting its movement in that direction, a chamber within one of said sections and connected on opposite sides of said valve with said first mentioned fluid stream, and a piston within said chamber and acted on by the fluid pressure of said fluid dependent on the position of said valve.

2. A pressure equalizer for plural fluid streams under independent pressures, comprising a shell, a single flexible diaphragm seated at its periphery in the shell and dividing same into two chambers, each of said chambers having an inlet and an outlet opening, said flexible diaphragm being adapted to flex responsive to pressure of fluid streams entering each of said chambers through said inlet openings, a plate mounted centrally on said diaphragm, a valve attached to each face of said mounted plate and adapted to open

and close responsive to flexing of the diaphragm, means to delimit the flexing of the diaphragm in each direction, a spring within each chamber cooperating with the valve therein to move the valve in one direction, and means to adjust the tension of said springs.

3. A pressure equalizer for plural fluid streams under independent pressures, comprising a shell, a single flexible diaphragm disposed in the shell and dividing same into two chambers, each of said chambers having an inlet and an outlet for separate fluid streams, a plate centrally mounted on the diaphram, a valve positively connected to each face of said plate and adapted to open and close responsive to flexing of the diaphragm, said valves being adapted to move in unison responsive to the flexing of the diaphragm, said centrally mounted plate being adapted to contact with the wall of the shell upon the flexing of the diaphragm and thereby delimit the movement of the valves.

In testimony whereof I have signed my name to this specification.

WILLIAM L. B. WILSON.