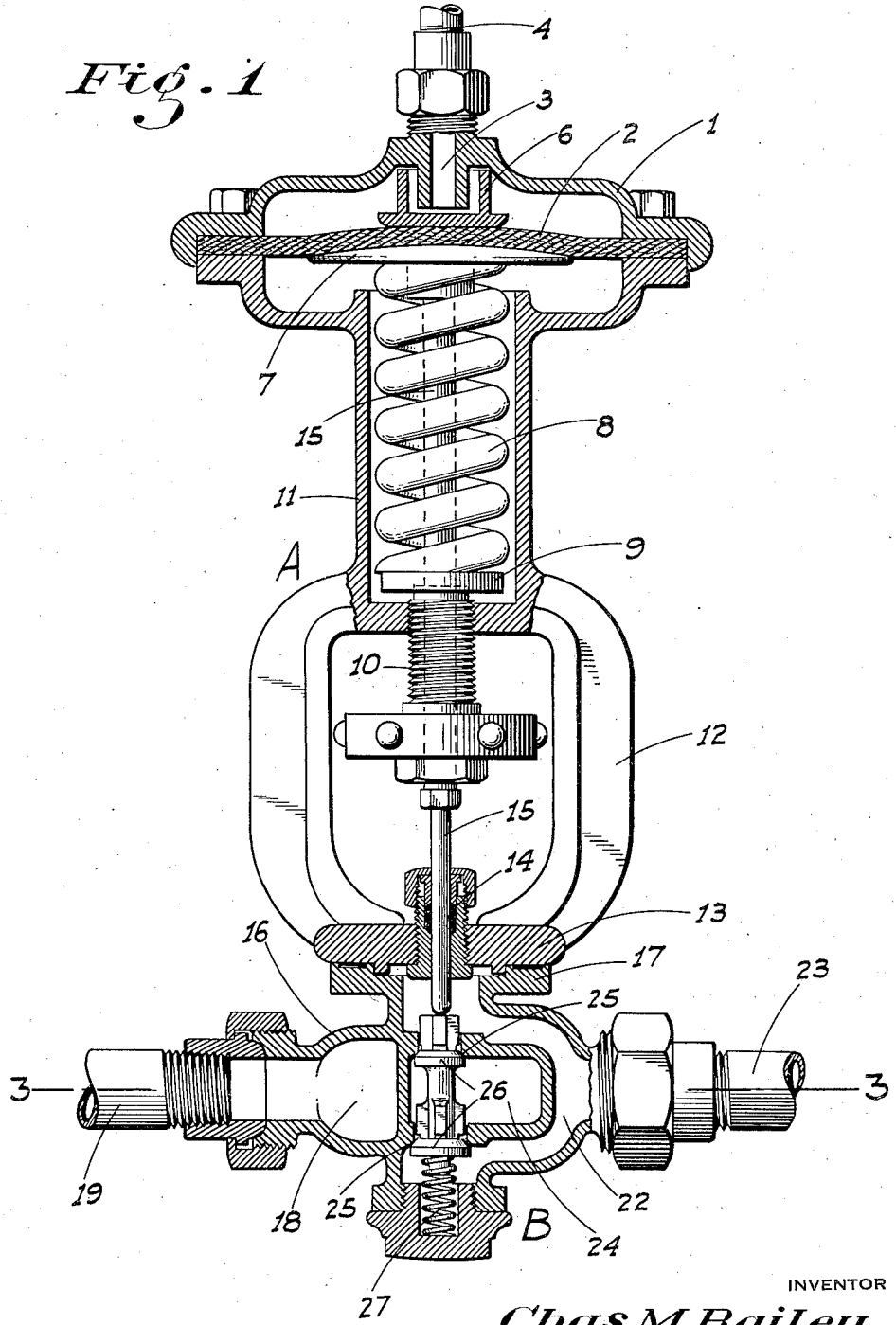
July 16, 1935. C. M. BAILEY 2,008,125

BOILER PRESSURE REGULATOR

Filed March 27, 1933 2 Sheets-Sheet 1

Fig. 1



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Fig. 2

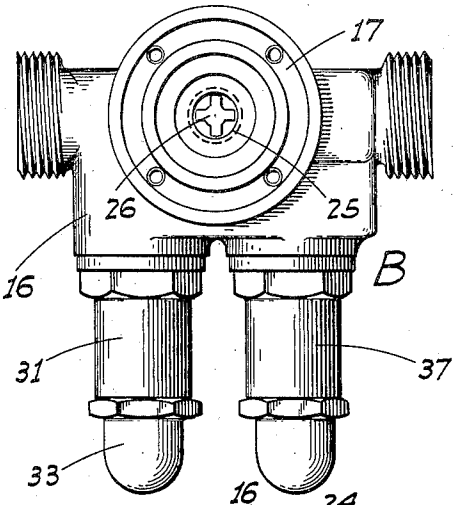


Fig. 3

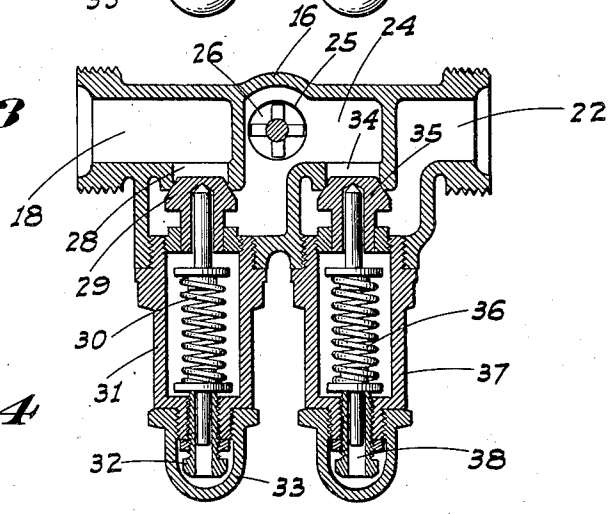
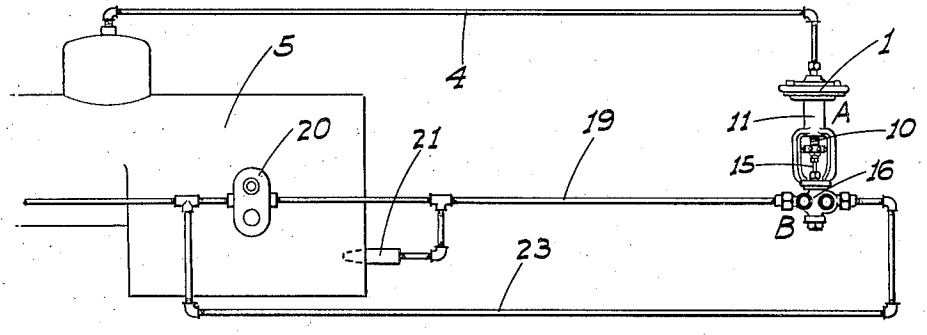


Fig. 4



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BOILER PRESSURE REGULATOR

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Application March 27, 1933, Serial No. 662,921

2 Claims. (Cl. 277—46)

This invention relates to steam boilers and particularly to a device for automatically controlling the fire by means of the boiler pressure.

The principal object of my invention is to provide a regulator and governor structure adapted to be connected to the steam line and to the oil line of an oil burner, and so arranged that when the boiler pressure exceeds a predetermined amount it will affect the oil flow so that the intensity of the fire is reduced, so as to ultimately cause a reduction of the boiler pressure to be had. This in turn will cause the fire to be again increased in intensity raising the boiler pressure and subsequently causing another fire decreasing action to be had and so on indefinitely.

The various control features of the device being individually and readily adjusted, the structure may be set to operate at any steam pressure, and the oil line pressure which determines the intensity or volume of the fire may also be separately regulated and according to the conditions met with in any particular installation.

A further object is to provide as a part of the regulator a means for preventing the building up of an oil pressure and the consequent operation of the burner with an excessive intensity, in the event that the steam control mechanism for reducing the oil pressure does not function.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a sectional elevation of my improved regulating structure.

Fig. 2 is a top plan view of the oil pressure control unit of the device.

Fig. 3 is a sectional plan of the same taken on the line 3—3 of Fig. 1.

Fig. 4 is a diagrammatic view showing the complete oil and steam line system in connection with the regulator.

Referring now more particularly to the characters of reference on the drawings, the regulator comprises a steam actuated unit A and an oil pressure controlling unit B connected thereto. The unit A comprises a preferably horizontal chamber 1 having a flexible diaphragm 2 extending across the same and dividing the chamber into two separate compartments. A steam inlet 3 is formed on the chamber centrally above the diaphragm being connected with a pipe 4 leading from the steam dome of the boiler 5. A cup 6 resting on the diaphragm surrounds the steam intake and receives the direct pressure of the steam to depress the diaphragm. The under side of the diaphragm is engaged by a disc 7 against which one end of a compression spring 8 bears. The lower end of the spring bears against a washer 9 supported for vertical adjustment by a hand screw 10 threaded in the bottom of the casing 11 provided with arms 12 so as to support the latter while exposing the hand screw for manipulation, said arms being connected at their lower ends to a base pad 13. A packing gland 14 is mounted in the pad and slidably engages a rod 15 which extends upwardly through the hand screw and spring to engage the disc 7. Upon the diaphragm and disc being depressed by a steam pressure in excess of the resistance of the spring the rod 15 will be lowered as will be evident.

The above structure in itself is of standard or conventional form but I use it in connection with the oil pressure regulating unit B in a certain manner to attain the desired result.

The rod 15 projects below the pad and packing gland into the unit B. Said unit comprises a body 16 having a top flange 17 intermediate its ends engaging and connected to the pad 13 in a pressure tight manner. At one end the body is formed with an oil intake chamber 18 to which a pipe 19 is connected. This pipe leads from the discharge or pressure side of a suitable pump 20; the oil burner 21 for the boiler 5 being connected to said pipe between the pump and the regulating unit. The opposite end of the body is formed with another chamber 22 connected to an oil pipe 23 which leads back to the suction side of the pump as shown in Fig. 4.

The chamber 22 communicates with an intermediate chamber 24 through openings 25 forming valve seats normally engaged by a double headed valve 26 mounted for vertical movement and opening in the direction of the chamber 22. This valve is normally held against its seats by a compression spring 27 and its upper end supports the lower end of the rod 15. When the rod is lowered by the steam pressure acting against the diaphragm as previously explained the valve is opened against the resistance of the relatively weak spring 27 and communication is established between the chamber 22 and 24.

The chamber 18 has communication with the chamber 24 only through a port 28 forming a seat

for a valve 29 normally engaging the same and opening away from the chamber 18. This valve is yieldably and adjustably held against its seat by a compression spring 30 enclosed within a housing 31 connected to the body and adjusted as to its pressing action by a hand screw 32 mounted in the outer end of the housing and normally enclosed by a cap 33. In this manner no oil can possibly leak out of the unit when the valve is open and the necessity for the use of a packing gland about the valve shank and which would interfere with its freedom of action is eliminated.

The chamber 22 also has additional communication with the chamber 24 by a port 34 normally closed by a valve 35 opening away from the chamber 24. This valve is also engaged and normally held against its seat by an adjustable spring 36 enclosed in a housing 37 preferably mounted and controlled in the same manner as the spring 30 by an adjustable hand screw 38. For convenience of manufacture and operation the housings 31 and 37 project laterally from the body 16 in parallel relation to each other. From the above description and upon a consideration of Fig. 3 particularly it will be seen that the port 34 is in effect a by-pass between the chambers 18 and 22 which under certain conditions allows of a flow of oil between said chambers without passing the valve 26.

In operation it will be seen that the oil pump tends to circulate oil through the pipe 19 ahead of the burner to the latter and back to the suction side of the pump through the portion of the pipe 19 beyond the burner, the regulating unit and the pipe 23. If all the valves of the regulating unit are held closed all the pressure generated by the pump passes to the burner and the latter burns with an intensity known as a high fire. The valve 29 is set to open with a relatively low pressure or about 5 lbs. so as to maintain a low fire, but the opening of this valve does not affect the intensity of the fire unless either the valve 26 or the valve 35 is open also. When the steam pressure raises by reason of the high fire beyond the predetermined limit which the spring 8 is set to resist, the valve 26 opens. Communication is then freely established from the intake chamber 18 to the chamber 24 by reason of the weak valve 29, and from said chamber 24 to the chamber 22 through the ports 25. The oil therefore circulates from the pump through the regulating unit and returns to the suction side of the pump through the pipe 23. Only sufficient oil pressure is then fed to the burner such as will maintain a low fire, such pressure being that for which the valve 29 is set and which may be adjusted to suit any given condition.

When the valve 26 again closes with the lowering of the steam pressure due to the use of steam or to the effect of the low fire, the relatively unrestricted flow of the oil back to the pump through the pipe 23 is again cut off and all the oil pressure will again pass to the burner, restoring the high fire condition. The intensity of the fire is thus automatically controlled as the steam pressure fluctuates so that said pressure may be kept at any desired amount within close limits, without any manual attention of the burner being necessary.

The by-pass valve 35 prevents the building up of an excessive pressure at the burner irrespective of the opening of the steam control valve 26, the spring 36 being preferably stronger than the spring 30 and being set to open at 50 lbs. or whatever pressure is desired. In any event however the resistance of said spring 36 will be greater than the corresponding steam pressure necessary to open the valve 26. Communication will be thus established between the chambers 18 and 24 past the valve 29 and from the latter chamber to the outlet chamber 22 past the valve 35. This will permit a certain amount of oil to pass back to the pump and will relieve the pressure at the burner sufficiently to prevent the excessively high fire which would otherwise result.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

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

1. A three-valve pressure regulating structure comprising a unitary body having inlet and outlet openings at its opposite ends axially alined with each other, walls in said body dividing the same into an inlet chamber, an outlet chamber and an intermediate chamber; the intermediate chamber at the front extending in front of the inlet chamber and the outlet chamber extending in front of the adjacent portion of the intermediate chamber and also above the latter, valve-seat ports in the front walls of the inlet and intermediate chambers in communication with the corresponding portions of the intermediate and outlet chambers respectively, forwardly opening valves in said chambers cooperating with the corresponding ports, adjustable tensioning means for the valves, parallel housings in which the valves and tensioning means are mounted secured to and projecting outwardly from the front wall of the body, a valve-seat port in the top wall of the intermediate chamber in communication with the corresponding portion of the outlet chamber, a normally closed valve cooperating with said port and opening inwardly of said intermediate chamber, and control means for opening said valve mounted on and upstanding from the body.

2. A three-valve pressure regulating structure comprising a unitary body having inlet and outlet openings at its opposite ends axially alined with each other, walls in said body dividing the same into an inlet chamber, an outlet chamber and an intermediate chamber, normally closed valves controlling communication between the inlet and intermediate chambers and between the intermediate and outlet chambers, manually adjustable valve tensioning means projecting outwardly from one face of the body, another normally closed valve controlling communication between the intermediate and outlet chambers, and pressure actuated means for opening said valve mounted on and extending outwardly from the body in a plane at right angles to the manually adjustable means.

CHARLES M. BAILEY.