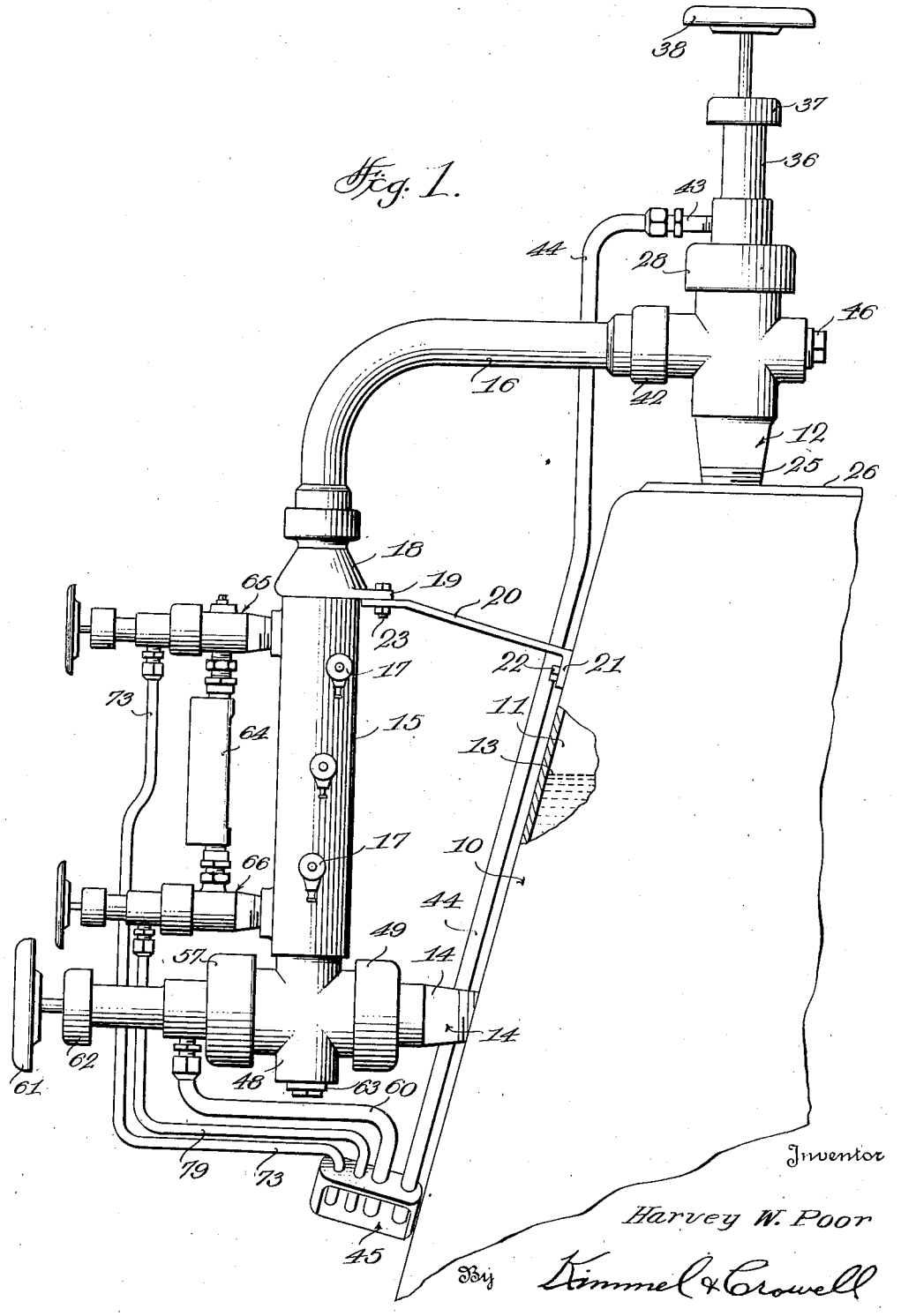
Feb. 6, 1940. H. W. POOR 2,189,473

STEAM AND WATER LEAKAGE REVEALING STRUCTURE FOR STEAM BOILERS

Filed April 20, 1938 2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

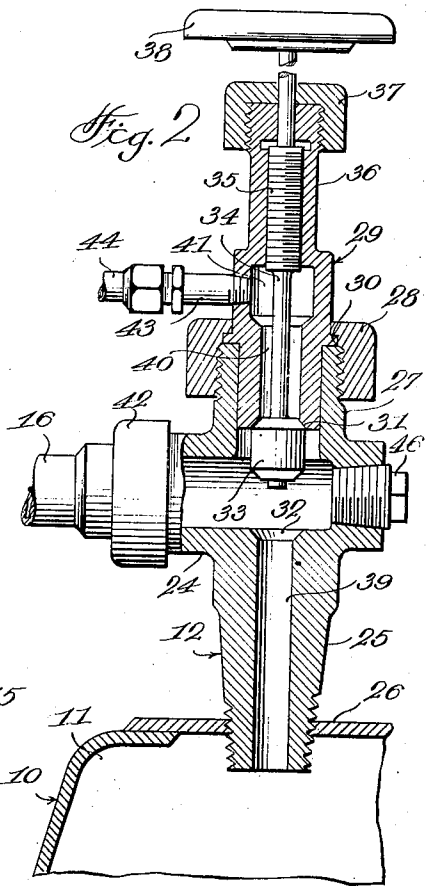


Fig. 3.

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STEAM AND WATER LEAKAGE REVEALING STRUCTURE FOR STEAM BOILERS

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Application April 20, 1938, Serial No. 203,191

1 Claim. (Cl. 73—332)

This invention relates to a steam and water leakage revealing structure for steam boilers. The structure in accordance with this invention is for correlation with the steam and water spaces of the boiler, both ends of the boiler sight glass, both ends of the water column of the steam boiler and said column adjacent its ends.

An object of this invention is to provide for use in a boiler structure a combination of valves which are connected to the boiler, to the boiler sight glass and to the water column of the boiler and so arranged that the attendant will be able to quickly determine which one of the valves is in either an open or closed position, so that it will not be necessary in the event a valve is in the wrong position for the attendant to open or close various valves to determine the valve which is in an incorrect position.

Another object of this invention is to provide in combination with a boiler and a water column having a glass gauge connected thereto, a plurality of double acting valves which are each provided with a drain or outlet connection which is at all times open to the atmosphere for revealing leakage so that the attendant will be able to determine which one of the valves is incorrectly positioned by means of either water or steam flowing out of the outlet pipe.

To the above objects and others which may hereinafter appear, the invention consists of the novel construction, combination and arrangement of parts as will be more specifically referred to and as illustrated in the accompanying drawings wherein embodiments of the invention are shown, but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawings:

Figure 1 is a fragmentary side elevation partly in section of a boiler showing the adaptation therewith, in side elevation a steam and water leakage revealing structure, in accordance with this invention,

Figure 2 is a vertical section partly in detail of the steam valve connected to the steam chamber of the boiler, and

Figure 3 is a fragmentary section partly in detail of the water column and water valve connected to the boiler.

Referring to the drawings, the numeral 10 designates generally a boiler of conventional construction wherein water is positioned to a level designated by the numeral 13. The upper portion 11 of the boiler comprises the steam chamber and a steam valve generally designated as 12 is connected to the top wall of the boiler 10 and communicates with the steam chamber 11. A water valve generally designated as 14 is connected to a side wall of the boiler 10 below the water level 13 and a water column or tubular member 15 is connected at one end to the valve 14 and at the other end is connected by means of a pipe 16 to a side of the steam valve 12. The water column 15 is provided with a plurality of testing valve members 17 which are longitudinally spaced apart along the length of the column 15 so that the operator or attendant may open selected ones of these valve members 17 so as to determine the height of the water level 13 in the boiler 10. The upper portion of the water column 15 is provided with a cap 18 having an outstanding arm or lug 19 which is secured as by a bracing member 20 to the boiler 10. The brace 20 is provided with a substantially right angular inner leg 21 secured as by a bolt 22 to the adjacent wall of the boiler 10 and the opposite end of the brace 20 is secured as by a bolt 23 to the lug 19.

The valve 12 comprises a housing 24 provided with a threaded nipple 25 which is adapted to be threaded into the top wall 26 of the boiler 10 and an oppositely disposed nipple 27 is carried by the housing 24 and is provided with exterior threads for engagement by a coupling member or collar 28. A valve bonnet 29 is adapted to engage in the nipple 27 and is provided with a peripheral flange 30 engaging the upper end of the nipple 27. The collar or coupling member 28 is adapted to engage this flange or rib 30 so as to tightly hold the lower portion of the bonnet 29 within the nipple 27. The lower end of the bonnet 29 is provided with a valve seat 31 and the upper end of the nipple 25 is provided with a valve seat 32 which confronts the valve seat 31. A valve plug or head 33 is secured to a stem 34 which is threaded as at 35 in the upper portion 36 of the bonnet 29. A cap or gland member 37 is threaded onto the upper end of the bonnet 29 and seals the stem 34 in the bonnet 29. A handle or wheel 38 is secured to the exterior end of the valve stem 34 so that the valve plug may be moved to engagement with either the seat 32 or the seat 31. The nipple 25 has a passage 39 therethrough and communicates with the interior of the housing 24. The bonnet 29 has a passage 40 communicating with the interior of the housing 24 and with a chamber 41 provided intermediate the ends of the bonnet 29. A coupling member 42 is threaded onto the housing 24 and

connects the housing 24 with the pipe 16 which communicates with the water column 15. A nipple or length of pipe 43 is connected to the outlet or vent chamber 41 in the bonnet 29 and a steam leakage revealing pipe 44 is connected to this nipple and is extended downwardly along the adjacent wall of the boiler 10 and is held in a bracket or holder generally designated as 45. A plug 46 is threaded into a side of the housing 24 and provides a means whereby communication may be had with the interior of the housing 24 for cleaning or like purposes.

The valve member 14 is constructed somewhat similar to the valve member 12 being provided with a nipple 47 which is secured to a housing 48 by means of a threaded connection or union 49. Preferably the nipple 47 is provided with a convex end portion 50 engaging a concave seat 51 carried by the housing 48. The housing 48 is provided with a valve seat 52 on which a double-ended valve head 53 is adapted to engage. The valve head or plug 53 is secured to a valve stem 54 which is threaded through a bonnet 55 similar in construction to the bonnet 29. The bonnet 55 has a valve seat 56 at the inner end thereof which is adapted to be engaged by the outer end of the double-ended valve plug 53.

The bonnet 55 is detachably held on the housing 48 by means of a nut 57 which engages a flange 58 carried by the bonnet 55. The bonnet 55 is provided with an outlet chamber 59 and a water leakage revealing pipe 60 is connected to this outlet chamber and is extended downwardly and is open at the opposite end thereof. The opposite end of the pipe 60 is secured to the bracket or holder 45 in side by side relation to the pipe 44. The valve stem 54 is provided with a hand wheel 61, and a gland or nut member 62 is threaded onto the outer end of the bonnet 55. A draining or cleaning plug 63 is threaded into the housing 48 in axial alignment with the axis of the water column 15.

A water gauge 64 is connected at one end to an upper water gauge valve 65 which is also connected to the water column 15 and is connected to the opposite end to a lower water gauge valve 66, likewise connected to the water column 15 adjacent the lower end thereof. The valves 65 and 66 are similar in construction to each other and to the valves 12 and 14. The valve member 65 has a double-ended valve plug 67 secured to a valve stem 68 and in one position the valve plug 67 is adapted to engage a seat 69 for closing communication between the water column 15 and the gauge 64. In the other or opposite position, the valve plug 67 is adapted to engage a seat 70 carried by the bonnet 71 of the valve 65. In this latter position the valve plug 67 cuts off communication between an outlet or drain chamber 72 provided in the bonnet 71. A steam leakage revealing pipe 73 is connected at one end to the outlet chamber 72 and is then extended downwardly and is connected to the holder or bracket 45.

The valve 66 comprises a double-ended valve plug 74 which in its innermost or cut off position is adapted to engage a seat 75 so as to cut off communication between the gauge 64 and the column 15. The valve 66 is also provided with an outer seat 76 which is engageable by the valve plug 74 so as to cut off communication between the water gauge 64 and a drain chamber 77 provided in the bonnet 78. A water leakage revealing pipe 79 is connected at one end to the outlet chamber 77 and is extended downwardly and connected to the holder or bracket 45. The pipes 44, 60, 73 and 79 may be suitably marked at the point of engagement with the holder or bracket 45 so that the attendant looking at the drain pipes can quickly determine which valve is associated with a particular drain pipe. In this manner in the event either water or steam is being discharged from a drain pipe, the attendant or operator will know at a glance what valve is in an incorrect or open position.

In the use and operation of this valve structure during normal operation of the boiler, the water valve plug 53 will be engaged with the seat 56 so that free communication may be had between the boiler 10 and the water column 15 below the water level 13. The valve plug 33 of the valve member 12 will also be engaged with the seat 31 so that the steam in the steam chamber 11 may pass through the valve 12 into the pipe 16. The upper water gauge valve 67 will be engaged with the bonnet seat 70 and the plug 74 of the valve member 66 will be engaged with the bonnet seat 76. In these positions of the valve plugs communication is cut off between the leakage revealing pipes associated with the various valve members so that no water or steam will be discharged from the leakage revealing pipes which as hereinbefore stated are at all times open to the atmosphere at their free or lower ends.

Assuming that the positions of the valves have been changed and that the water valve 14 has the plug 53 thereof engaged with the seat 52. In this position the water in the boiler cannot pass through the nipple 47 into the valve housing 48 and then into the column 15. However, the valve member 12 being in the position shown in Figure 2 will permit steam to pass through this valve 12 into the pipe 16 and then down through the water column 15. The water in the column 15 will be blown out through the valve housing 48, the bonnet 55 and the leakage revealing pipe 60. After all of the water from the column 15 has been discharged through the pipe 60, steam will be discharged through this pipe 60 and the attendant will thereby know at a glance that the valve plug 53 is in an incorrect position for normal boiler operation.

In the event the valve members 12 and 14 have the plugs 33 and 53 thereof engaging the seats 31, 52 respectively and in the event the valve members 65 and 66 have the plugs 67 and 74 in the positions shown in Figure 3, the steam from the steam chamber 11 will pass through the water column 15, the valve 66 then up through the water gauge 64 through the bonnet 71 and the outlet or drain pipe 73. The attendant will thereby know at a glance that with steam discharging from pipe 73 the valve 65 associated with the drain pipe 73 is not in its correct position for normal boiler operation.

It will be apparent from the foregoing that an improved system of valve connection with a boiler, water column and water gauge has been provided so that the operator or attendant will be able to tell at a glance which one of the various valves is in an incorrect position with respect to normal boiler operation. This improved system will thereby permit the attendant or operator to quickly close the correct valve and eliminate the necessity of opening and closing a number of these valves before being able to properly adjust the correct valve.

What I claim is:

A steam and water leakage revealing structure for revealing the conditions of valve seals for use

with the steam and water spaces of a steam boiler having a boiler sight glass and a water column, said structure including in combination an upper and a lower valve unit arranged relative to the boiler, said upper unit including a steam intake chamber opening into said steam space and the upper end of said column, a steam outlet chamber communicating with the intake chamber, a pair of spaced aligned valve seats and a manually adjustable valve for selective cooperation with said seats for simultaneously closing the steam space to said column and intake chamber and to establish communication between said chambers, for simultaneously closing said outlet chamber to said intake chamber and to establish communication between said column and steam space and for simultaneously establishing communication between said chambers, column and steam space, said lower unit including a water intake chamber opening into said water space and into the lower end of said column, a water outlet chamber communicating with the said water intake chamber, pair of spaced aligned valve seats and a manually adjustable valve for selective cooperation with such seats for simultaneously closing the water space to said column and intake water chamber and to establish communication betwen said intake and outlet water chambers, for simultaneously closing said outlet water chamber to said intake water chamber and to establish communication between said water intake chamber, water space and column and for simultaneously establishing communication between said intake and outlet water chambers, column and water space, a pair of spaced superposed upper and lower sight glass valve units, one formed with a steam intake and a steam outlet chamber communicating with the latter steam intake chamber and the other sight glass valve unit formed with a water intake chamber and water outlet chamber communicating with the latter water intake chamber, the steam intake chamber of one of the sight glass valve units opening into the upper portion of said column and the upper end of said glass and the water intake chamber of the other sight glass valve unit opening into the lower portion of said column and the lower end of said glass, each of the sight glass valve units including a manually adjustable valve for controlling communication between the chambers thereof the said column and glass, a depending leakage revealing pipe opening into and leading from each of said outlet chambers, the lower end terminal portions of said pipes being disposed in closely related spaced parallel position, and means for maintaining the lower end terminal portions of said pipes in closely related spaced parallel position.

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