

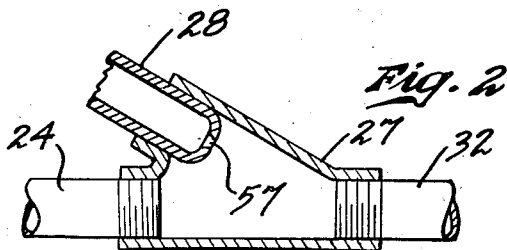
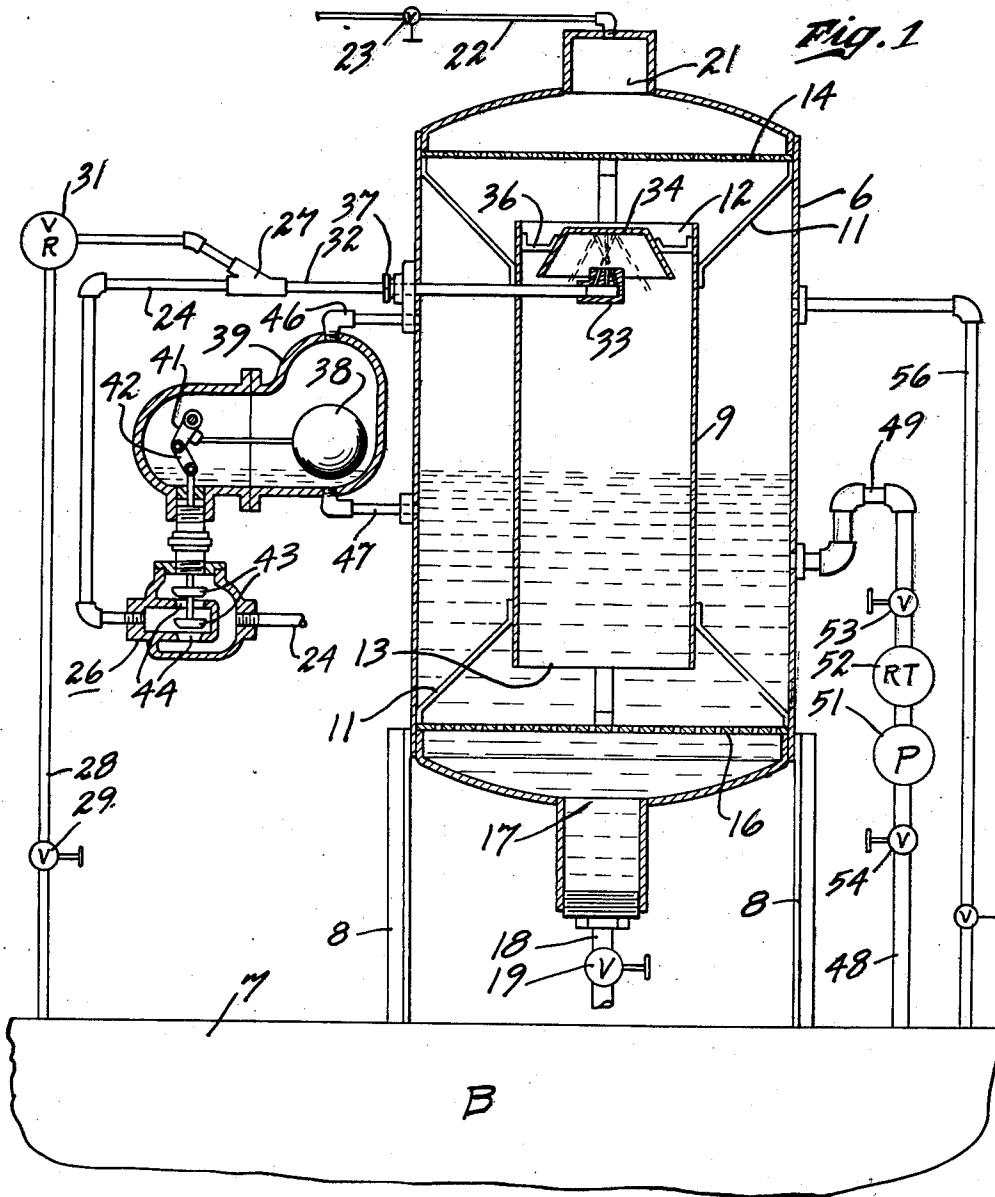
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O. R. MORTON

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APPARATUS FOR PURIFYING WATER

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INVENTOR  
O. R. Morton  
BY  
Charles H. Bassett  
ATTORNEY

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## APPARATUS FOR PURIFYING WATER

Osmond R. Morton, Birmingham, Ala.

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2 Claims. (Cl. 210—15)

My invention relates to apparatus for purifying water to render same non-scale forming and suitable for use in steam boilers and more particularly contemplates an apparatus employing a heat treatment of the water to render the scale-forming impurities therein insoluble and capable of being removed from the feed-water before it enters the boiler.

My invention further contemplates the provision of an apparatus for separating and removing carbon dioxide, free oxygen, and other harmful gases from the water prior to its entrance into the boiler in order to prevent the usual corrosion and pitting of the boiler caused by these gases.

My invention further contemplates the provision of apparatus for purifying feed-water without the use of the usual chemical compounds now being employed for the treatment of boiler water and thereby prevents the usual foaming and priming within the boiler.

My invention further contemplates the provision of means for removing the impurities from the feed-water before it enters the boiler and thereby saves time and expense incidental to washing out the boiler.

My invention further contemplates the provision of automatic control means for regulating the flow of feed-water to the boiler.

My invention embodies other novel features, details of construction and arrangement of parts which are hereinafter set forth in the specification and claims and illustrated in the accompanying drawing, forming part thereof.

In the drawing, Fig. 1 is a vertical sectional view showing my apparatus applied to a steam boiler for purifying the feed-water; and

Fig. 2 is a detail sectional view showing the Y-connection employed for heating the feed-water with steam from the boiler.

Referring now to the drawing for a better understanding of my invention, I show a purifying tank 6 mounted on the top of a boiler 7 by means of legs 8. A cylindrical member 9 is centrally positioned within the tank 6 by means of brackets 11 and is provided with a gas outlet 12 and a water outlet 13 at its upper and lower ends, respectively. A pair of baffle members 14 and 16 are disposed at opposite ends of the tank 6 and may be formed of wire mesh or apertured plates, as desired. A sediment chamber 17 is formed on the lower end of the tank and provided with an outlet pipe 18 controlled by a valve 19. A gas chamber 21 is formed at the

upper end of the tank and provided with an outlet pipe 22 controlled by a valve 23.

A feed-water pipe 24 leads from any suitable source to a float control valve 26 and thence to a Y-connection 27. A steam pipe line 28 leads from the boiler to the Y-connection and may be provided with a control valve 29 and a reducing valve 31, if desired. A conduit 32 leads from the Y-connection to the interior of the tank and has a spray head 33 mounted on its inner end and directed towards an inverted cup-shaped member 34 disposed overhead. The member 34 is secured within the upper end of the member 9 by means of arms 36 and in spaced relation to the wall thereof. A packing gland 37 is provided on the tank 6 for the conduit 32.

The float control valve 26 comprises a float 38 mounted within a housing 39 for engagement with toggle members 41 and 42 to raise and lower the valves 43 relative to their seats 44. A pair of conduits 46 and 47 leads from the tank 6 to the housing 39.

A feed-water outlet conduit 48 is provided between the tank 6 and the boiler 7 and embodies an upwardly extending goose neck portion 49 disposed above the inlet end of the conduit. A pump 51 and a pump receiver tank 52 are interposed in the conduit 48 to be employed when the pressure in the tank 6 is lower than the pressure in the boiler. A pair of valves 53 and 54 are also interposed in the conduit 48. A pressure supply line 56, extending from the boiler to the tank 6, is employed to balance the steam pressure in the tank and boiler to permit the feed-water to pass by gravity from the tank to the boiler.

Referring now to Fig. 2, I show a detail of the Y-connection 27 in which it will be observed that a restricted orifice 57 is provided at the end of the steam line 28. It has been learned that the type orifice shown is best adapted for transferring the heat from the steam to the water.

In the operation of the apparatus described, the feed-water passes through the conduit 24 to the Y-connection 27 where it is heated by the steam entering the Y-connection from the steam line 28. The heated feed-water then passes through the conduit 32 to the spray head 33 where it is sprayed upwardly against the member 34 to release the gases therein. As the released gases are lighter in weight than the water vapor, they pass upwardly into the upper end of the tank 6 and behind the baffle

member 14 which forms a gas chamber at the top of the tank and prevents a constant whirling mixing of the gases with the water vapor. The gases are released to the atmosphere through the pipe 22.

In order to obtain the best results in the purification of the feed-water, the water is heated to a temperature of two hundred and seventy degrees or higher as at this temperature the harmful gases such as free oxygen and carbon dioxide are released from the water and the scale-forming impurities such as calcium sulphate and calcium carbonate will become insoluble. The scale-forming impurities pass down through the cylindrical member 9 and thence through the lower baffle member 16 into the sediment chamber 17 for removal through the pipe 18.

The water level is maintained relatively constant within the tank 6 by means of the float control valve 26 and the pressure may be either equal to the boiler pressure or lowered by means of the pressure reducing valve 31. It will be observed that the cylindrical member 9 serves to separate the gases and scale-forming impurities from the water and to direct the gases and scale-forming impurities in opposite directions into their respective chambers for discharge from the tank 6.

While I have shown my invention in but one form it is obvious to those skilled in the art that it is not so limited but is susceptible of various changes and modifications without departing from the spirit thereof; and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art.

I claim:

1. In an apparatus for purifying feed-water for boilers, a tank, a vertically disposed cylindrical member mounted within the tank and having

open ends for the passage of water and gases, the lower end of the cylindrical member being disposed below the normal water level maintained within the tank, a cup-shaped member positioned within the cylindrical member, a water inlet conduit, a steam conduit leading into said water inlet conduit, a spray head for discharging heated water and steam against the cup-shaped member to release the impurities therefrom, a perforated baffle plate defining a gas chamber at the upper end of the tank, a gas outlet leading from the upper end of the tank, a perforated baffle plate defining a sediment chamber at the lower end of the tank, a sediment outlet leading from the lower end of the tank, and a feed-water outlet leading from the tank.

2. In an apparatus for purifying feed-water for boilers, a tank, a vertically disposed cylindrical member mounted within the tank and having open ends for the passage of water and gases, the lower end of the cylindrical member being disposed below the normal water level maintained within the tank, a cup-shaped member positioned within the cylindrical member, a feed-water inlet pipe leading to the tank, a steam pipe having a reduced discharge orifice for discharge into the feed-water inlet pipe, a spray head provided at the inner end of the feed-water inlet pipe for discharging heated water and steam against the cup-shaped member to release the impurities therefrom, a perforated baffle plate defining a gas chamber at the upper end of the tank, a gas outlet leading from the upper end of the tank, a perforated baffle plate defining a sediment chamber at the lower end of the tank, a sediment outlet leading from the lower end of the tank, and a feed-water outlet leading from the tank.

OSMOND R. MORTON.