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BOILER FEED CONTROL

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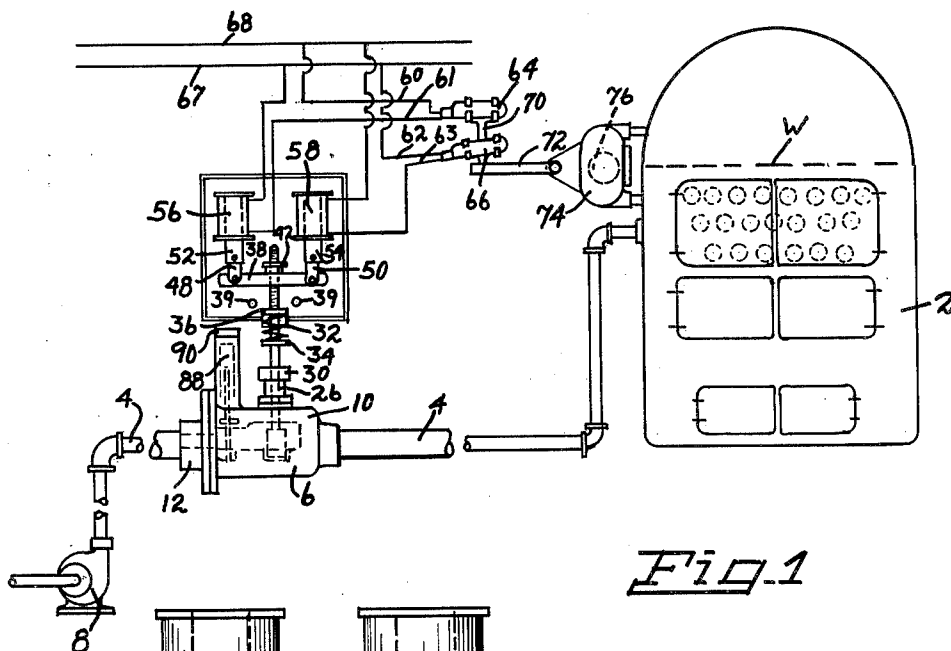


Fig. 1

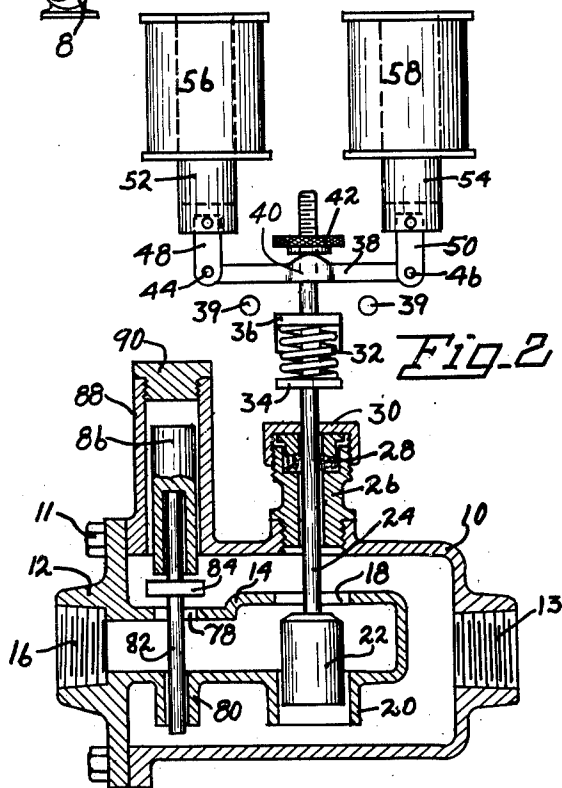


Fig. 2

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BOILER FEED CONTROL

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2 Claims. (Cl. 137-637)

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My present invention relates to an improved boiler feed control for the water level in a battery of steam boilers and more particularly to such control in boilers to which condensate is being returned by a continuous flow direct return system.

In boilers used for heating machines that are being drained by a direct and continuous flow return system the temperature of the machines is maintained through varying the rate of flow of steam and condensate to and through such machines. It will be evident that nothing must be permitted to check the flow of such condensate as the result would be to render inoperative the system of temperature control.

Uniform temperatures hence close regulation of flow are very important factors in certain food manufacturing processes, as for example the cooking of tomato pulp and juice to paste, catsup etc.

The conventional means for battery boiler level control depend upon throttling the boiler with the high water level to force the feed water into the boiler having for the moment the lower water level. Such controls are usually so installed as to eventually close fully the inlet valve to all the boilers, thus building up a pressure in the feed lines in excess of normal requirements, such pressure acting upon a diaphragm throttles or entirely closes off the flow of steam to the feed pump and so stopping the pump until the water level again falls. With condensate this system cannot be used as above described.

What is indicated in this case is an independent feed line to return the condensate to the boilers, distribute it uniformly and permit condensate to continue to flow in the event of the water level rising to high from some other cause, as for example excess use or carelessness in the operation of the make-up pump. The invention herein described provides a simple and dependable and efficient control for the purposes described.

The purpose of this invention is to provide a means for uniform distribution of returning condensate to a battery of steam boilers so that a uniformly high water level may be maintained in all boilers of the battery.

Another purpose of the invention is to provide such means for such purpose as shall permit continued flow of such condensate and distribute such condensate to the several boilers when and if the water level in such boilers rises above the operating water line.

Still another purpose of the invention is to provide such means for such purpose as shall be

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adapted to any form of boiler feeding and which will operate efficiently under the various methods of boiler feeding.

In the accompanying drawings I have illustrated one complete example of the physical embodiment of my invention according to the best mode I have thus far devised, but it will be understood that various changes and alterations may be made in the exemplified structure within the scope of the appended claims.

In the drawings:

Fig. 1 is a diagrammatic view of the assembled control means of my invention.

Fig. 2 is a vertical sectional view of the control.

Referring now to the drawings I have illustrated the present preferred embodiment of my invention as comprising the boiler 2 having a water feed pipe 4 in which is located a flow control mechanism 6 and a pump 8.

The control 6 consists in a housing 10 having a coupling for pipe 4 and secured by bolts 11 to the end flange 12 of inlet pipe 14, formed with a threaded recess 16 for the pipe 4 from the pump 8.

The inlet pipe 14 has an opening 18 consisting in a passage through which water may flow and aligned therebelow I provide an open well or collar 20. A cylindrical valve 22 is located in the well and is adapted to reciprocate vertically into the opening 18 to control the flow of water therethrough. A stem or rod 24 passes through a guide 26 and packing 28 is secured by cap 30.

A spring 32 mounted between collar 34 and bracket 36 on the rod 24 renders the rod flexibly movable and near the upper end of the rod is a cross arm 38 pivoted on a bearing lug 40, and adjustably secured by thumb screw 42. Wires 60-61 and 62-63 connect respectively with mercury switches 64 and 66 and the main current lines 67-68. The mercury switches are actuated by the link 70 of float arm 72 extending from the casing 74 operated by float 76.

A further control consists in the opening 78 and aligned well 80 in the tube 14 through which the rod 82 reciprocates and the valve 84 acts to close the opening 78. The upper end of this rod carries a weight 86 in tube 88 closed by cap 90 in the housing 10.

In operation as seen in Fig. 2, the valve 22 is in its lower position leaving opening 18 at the maximum desired capacity of flow. Water passing into case 14 through the opening 16, impelled by the feed pump 8, passes out at the opening 18 through the outlet 13 into feed pipe 4 and into the boiler 2, opening 78 being closed by the valve

member 84 held down by the weight 86. Under this condition, that is with the boiler level below normal and the valve 22 in its lower position the float 76 will be at a lower position and the solenoids 56 and 58 inactive, their cores being in the lower or extended position and the bar 38 resting against the stops 39 shown.

Assume now the boiler 2 is steaming more slowly than other boilers of the series and is receiving more than its share of the feed. As the water level W rises to normal the float 76 will be carried upward and cause the mercury switch 66 to close the circuit to solenoid 58. Solenoid 58 will then retract its armature 54 carrying upward the end of bar 38 the extent of the travel of armature 54. As nut 42 on rod 24 is in contact with the center of bar 38 it will be evident that nut 42 and rod 24 carrying valve 22 will move a distance equal to one half the movement of 54. This will carry valve 22 to its mid-position partially restricting the flow through 18 and forcing a portion of the water to the other boilers of the battery.

As the water level W in boiler 2 continues to rise mercury switch tube 64 will actuate solenoid 56 raising the other end of bar 38 a distance equal to the travel of armature 52 thus moving bar 38 and nut 42 a further distance equal to one half the travel of armature 52 and thus bringing valve 22 to its third or closed position.

In the event that all boilers of the series have received water sufficient to close the valve 22 on each boiler, then in that case the pressure in the feed line will rise sufficiently to lift the weighted valve 84 and permit water to flow in approximately equal proportions to each boiler until such time as one of the boilers will drop sufficiently to cause its valve 22 to reopen.

It will be clear that as the water level in one or more boilers falls the above process will be reversed and water fed to the separate boilers of the battery in proportion to their requirements to maintain a uniform water level in all boilers.

Where a makeup pump is required its controls will be set to stop such pump at a point below the closing point of valve 22 so that in practice valve 22 will never be fully closed. It will be evident then that valve 84 with its weight 86 constitutes a safety valve to prevent stoppage of the condensate flow when carelessness or accident result in an abnormally high water level.

The weight 86 may be installed to meet the local conditions and the nut 42 on rod 24 provides a means for adjusting the opening at 18 to meet local operating conditions.

From the above description it will be evident that I have provided an efficient means for distributing feed water to a battery of boilers that will automatically maintain a uniform water level regardless of requirements of individual boilers of the battery, and that will permit continuous flow of returning condensate in systems where such continuous flow is essential to the proper control of machine temperatures. It will be further evi-

dent that such control means may be adjusted to the varying needs of industrial plants.

While I have described the invention as applied to feeding a battery of boilers it is not to be restricted to that use but is applicable to many industrial uses. As an example assume that it is desired to maintain the temperature of a processing vat by the introduction of cooling water when and if the temperature reaches a certain maximum. It will be evident that a temperature control may be substituted for float control 76 and by the proper adjustment of port 18 and weight 86 a close regulation of the flow of cooling water may be secured.

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

1. In a boiler feed regulator a housing having inner and outer chambers, means for connecting said housing in the boiler feed line, ports in said housing establishing communication between said inner and outer chambers, valve means for opening and closing one of said ports, electromagnetic means adapted to actuate said valve means and including a valve stem, means for opening and closing another of such ports in response to pressure variations within said inner chamber, and means for adjusting the effective length of said valve stem.

2. In a boiler feed regulator having a housing with an inner chamber having an inlet and an outer chamber having an outlet and two communicating ports between said chambers, one of said ports being valved by a pressure operated valve; the means of controlling the other said port comprising a cylindrical valve located in position to open and close said port; a rod for the valve; a pivotally mounted cross arm on the rod; means for adjusting said cross arm longitudinally of said rod; and electromagnetic means for shifting said cross arm to actuate said valve.

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