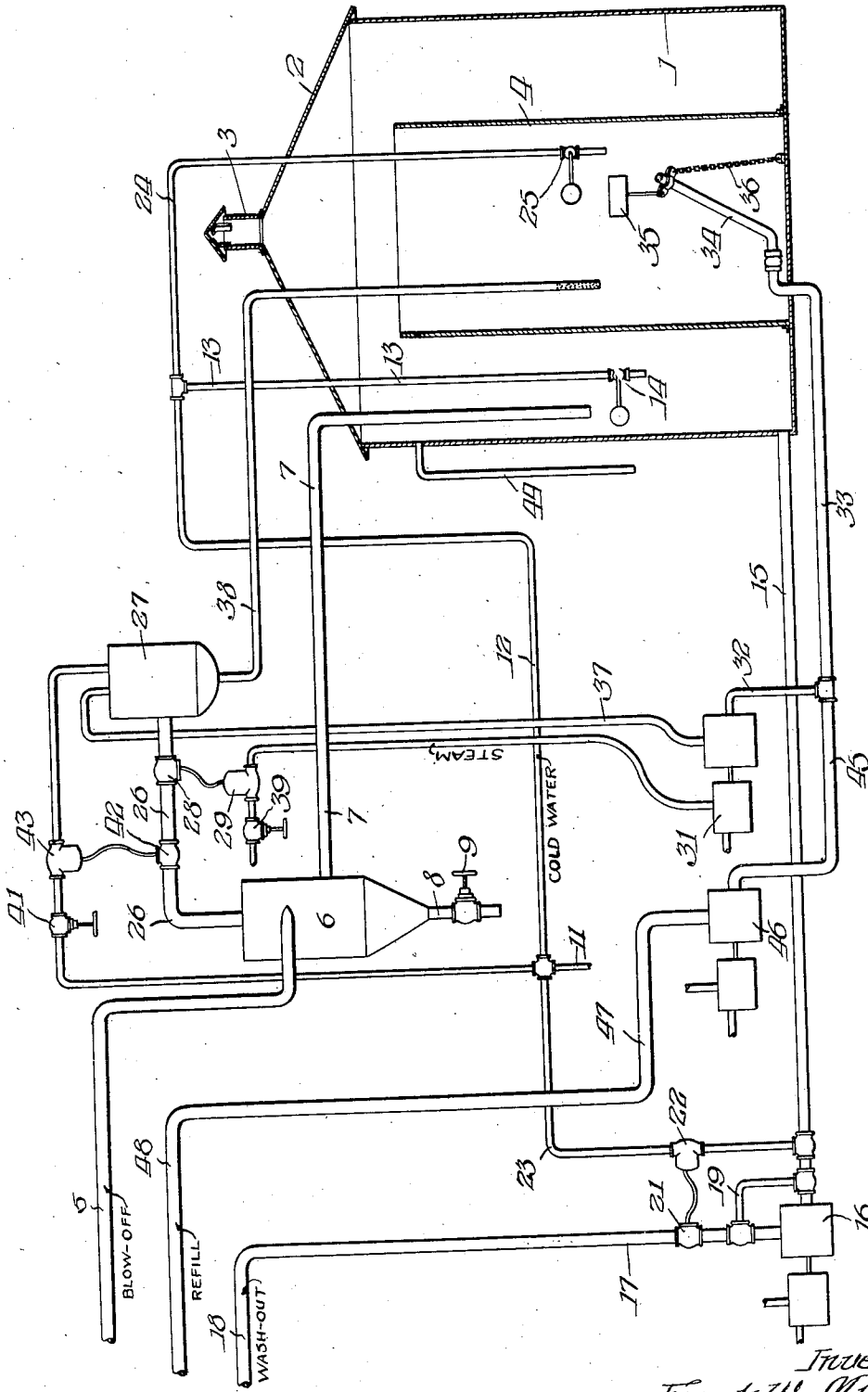
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BOILER WASHING AND FILLING SYSTEM

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BOILER WASHING AND FILLING SYSTEM

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This invention relates to boiler washing and refilling systems in general and more particularly to systems of the type in which the blow-off steam is utilized for pre-heating the refill water, and the blow-off water is utilized as wash-out water.

This invention provides improvements in apparatus designed to effect economy in the heat units which may be obtained from the blow-off products. The manner in which these economies are effected and the various advantages and purposes of the system will be readily appreciated upon a perusal of this specification and the drawing which shows somewhat diagrammatically the essential parts of the system.

Referring now to the drawing there is provided a cylindrical wash-out tank 1 provided with a cover 2 and a vent 3. Disposed entirely within the wash-out tank is a refill tank 4.

Water is supplied to the wash-out tank in the following manner: A blow-off main 5 is provided for conducting the blow-off products from locomotive boilers, and the like, to a separator 6, preferably of the centrifugal type, which separates the steam from the water and delivers the water through the pipe 7 into that portion of the wash-out tank which surrounds the refill tank. Any sludge and foreign matter which may accumulate in the separator may be discharged through the pipe 8 and valve 9. Should the supply of water in the wash-out tank received from the above source become insufficient, cold water from the cold water supply line 11 may be admitted through the pipes 12 and 13 under the control of a suitable float valve 14 to replenish the water in the wash-out tank until a suitable desired level has been restored therein.

Water is delivered from the wash-out tank in the following manner: A pipe 15 connected with the bottom of the wash-out tank and with the pump 16 conducts the water from the wash-out tank through a pipe 17 into a wash-out main 18. A small pipe 19 connecting the inlet and outlet of the pump 16 will serve to permit water in the wash-out main to drain back into the wash-out tank whenever the pump 16 is not running.

A thermostatic element 21 located in the pipe 17 and connected with a thermostatically operated valve 32 will be arranged to admit cold water from the pipe 23 into the intake of the wash-out pump 16 whenever the wash-out water being withdrawn from the wash-out tank is hotter than a predetermined temperature. By means of this regulated admixture of cold water the wash-out water delivered to the wash-out nozzle at the locomotives may be tempered to make it safe for handling.

Water is delivered to the refill tank in the following manner: A pipe 24 connected with the cold water supply line will admit cold water into the refill tank 4 under the control of a float operated valve 25 whenever the water in the tank falls below a predetermined level. Whenever steam is being discharged from the blow-off line into the separator 6, the steam thus separated will be conducted through a pipe 26 into a condenser 27. As the separated steam flows through the pipe 26 it contacts with a thermostat 28 which controls a valve 29 by means of which steam may then be admitted into the pump 31 to drive the same. It should be understood that instead of using the thermostatically controlled steam valve 29 and a steam driven pump 31 an equivalent thereof could be employed in the form of an electrical motor and a thermostatically controlled electric switch. The pump 31 which may be called a condensing pump is connected on its inlet side with a pipe 32 and a pipe 33, the latter being swivelly connected with a pipe 34 within the refill tank. The latter pipe will be caused to be lifted upwardly from the bottom of the tank by means of a float 35 while the open end of the pipe 34 will remain somewhat below the surface of the water. A chain 36 establishes a limit for the upward swinging of this pipe. Water withdrawn from the refill pipe 34, 33 and 32 will be delivered by the pump 31 through a pipe 37 into the condenser 27 at such times as separated steam is likewise being admitted into the condenser. Normally this refill water so delivered into the condenser will be quite warm but will condense the separated steam and the mixture of the two will be delivered

through the pipe 38 into the refill tank.

In case the refill water thus obtained from the refill tank is too hot for adequate condensing of the refill steam, as may occur in the summertime in southern climates, the operator of the system may shut down the pump 31 by closing the valve 39 and by opening the valve 41 admit cold water into the condenser. Under these conditions a thermostat 42 and a thermostatically controlled valve 43 may be used to regulate the admission of cold water into the condenser only at such times as separated steam is passing through the pipe 26.

Should the refill tank become full it may overflow without harm into the wash-out tank. Overflow from the wash-out tank may be discharged from the pipe 44 to a sewer or any suitable outlet.

For delivering refill water from the refill tank a pipe 45 is connected to the pipe 33 and to a pump 46, the latter being steam driven or otherwise driven and adapted to deliver water into the pipe 47, thence into the refill main 48.

Although steam driven pumps are shown in the drawing it is obvious that electrically driven pumps would be the equivalent therefor and may be utilized.

It should be understood that this invention may be incorporated in various embodiments differing from the one herein disclosed, yet remaining within the scope of the appended claims.

Having shown and described my invention, I claim:

1. In combination, a wash-out tank and a refill tank entirely disposed therein, a condenser, a blow-off main and a separator connected therewith arranged for separating blow-off products and delivering the blow-off water into the wash-out tank and the separated steam into said condenser, a refill main, a refill pump connected with the refill tank and with said refill main, a condenser pump connected to said refill tank and to said condenser, a thermostat arranged to be operated by the delivery of steam to said condenser, and means operated by the expansion of the thermostat for starting the condenser pump said condenser being arranged and connected to mix the refill water from said condenser pump with said separated steam and to deliver them into said refill tank.

2. In a boiler washing and refilling system, the combination of a cylindrical wash-out tank, a refill tank disposed entirely within the wash-out tank, a refill main and a pump connected therewith and with said refill tank for delivering the refill water to the refill main, a wash-out main and a pump connected therewith and with the wash-out tank for delivering wash-out water to the wash-out main, a small pipe connected to the delivery side of the wash-out pump and to the intake side of the wash-out pump for draining water slowly from the wash-out main to the wash-out tank, a blow-off main and a separator connected therewith for separating the water and steam from the blow-off products of the locomotives, a condenser connected for receiving separated steam from the separator and discharging into the refill tank, a condenser pump connected with the refill tank and said condenser, and means controlled by the flow of steam into said condenser for starting and stopping said condenser pump.

3. In a boiler washing and refilling system including a wash-out tank, a wash-out main, a wash-out pump connected with said main and said tank, means normally free from valves or the like connected with said wash-out main beyond said pump arranged for draining by gravity water from the wash-out main back to said tank whenever said pump is idle.

4. In a boiler washing and refilling system including a wash-out tank, a wash-out main, a wash-out pump connected with said main and said tank, a pipe of relatively small capacity connected to said wash-out main beyond said pump and further connected to enable it to drain water from said wash-out main back into said tank whenever said pump is idle, said drain connection being continuously maintained during operation of the pump but being so small as not to greatly interfere with the delivery of water for wash-out purposes.

5. In a boiler washing and refilling system, the combination of a cylindrical wash-out tank, a refill tank disposed entirely within the wash-out tank, a refill main and a pump connected therewith and with said refill tank for delivering the refill water to the refill main, a wash-out main and a pump connected therewith and with the wash-out tank for delivering wash-out water to the wash-out main, a pipe connected to the delivery side of the wash-out pump and to the intake side of the wash-out pump for returning water from the wash-out main to the wash-out tank when no water is being delivered by said wash-out pump, said pipe being of much smaller capacity than the output of the wash-out pump, a separator and a blow-off main connected thereto arranged for separating steam from the blow-off products of a locomotive and connections therewith for delivering the separated water into the wash-out tank, means thermostatically controlled by the separated steam for mingling therewith water withdrawn from the refill tank, and means for returning the mixture thereof to said tank.

In witness of the foregoing I affix my signature.

FRANK W. MILLER.