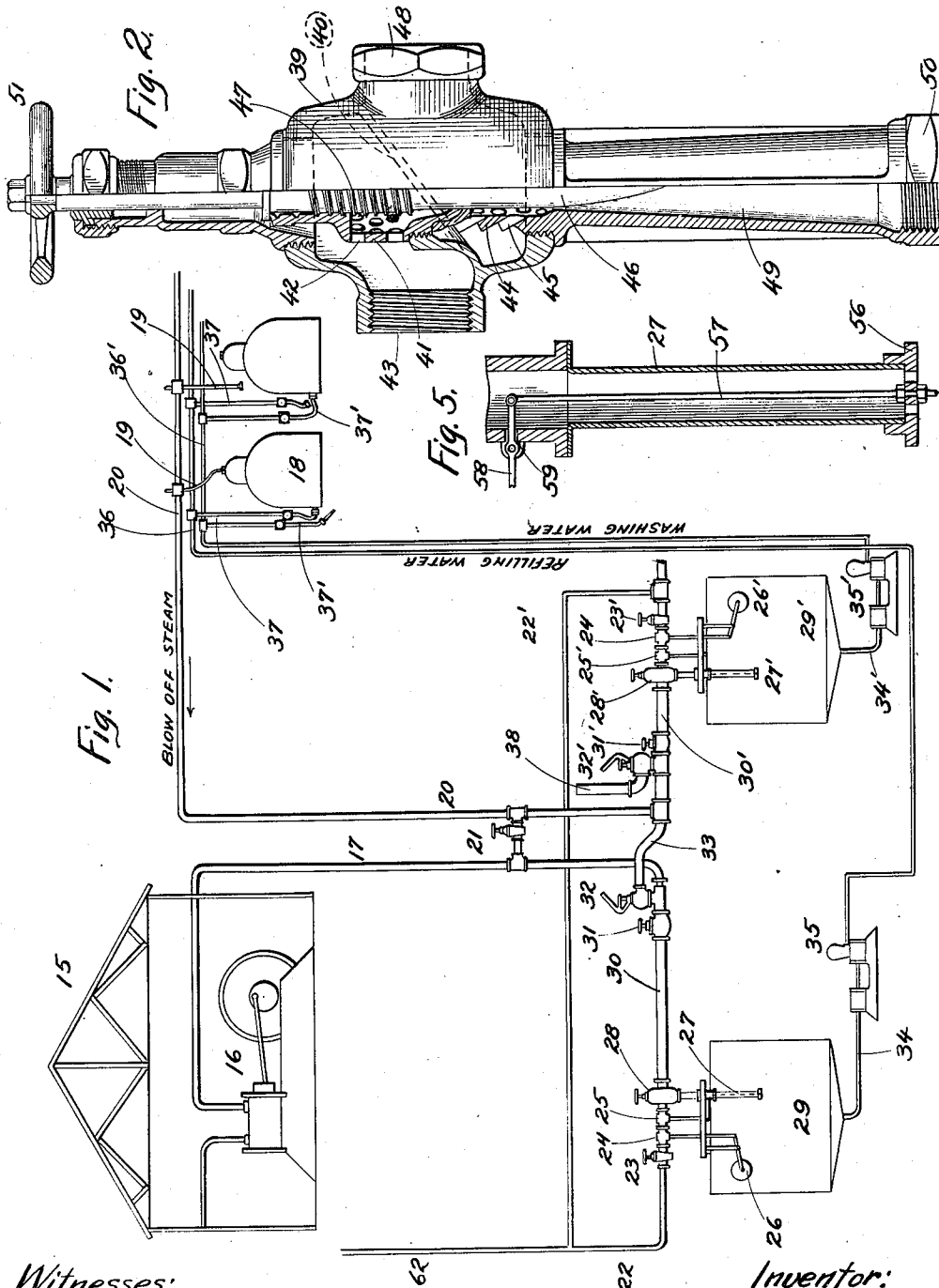


W. A. POWERS.
HOT WATER WASHING AND REFILLING SYSTEM FOR LOCOMOTIVE BOILERS.
APPLICATION FILED NOV. 27, 1909.

1,023,441.

Patented Apr. 16, 1912.

3 SHEETS—SHEET 1.



Witnesses:

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By *Henry A. Parks*

Inventor:

William A. Powers

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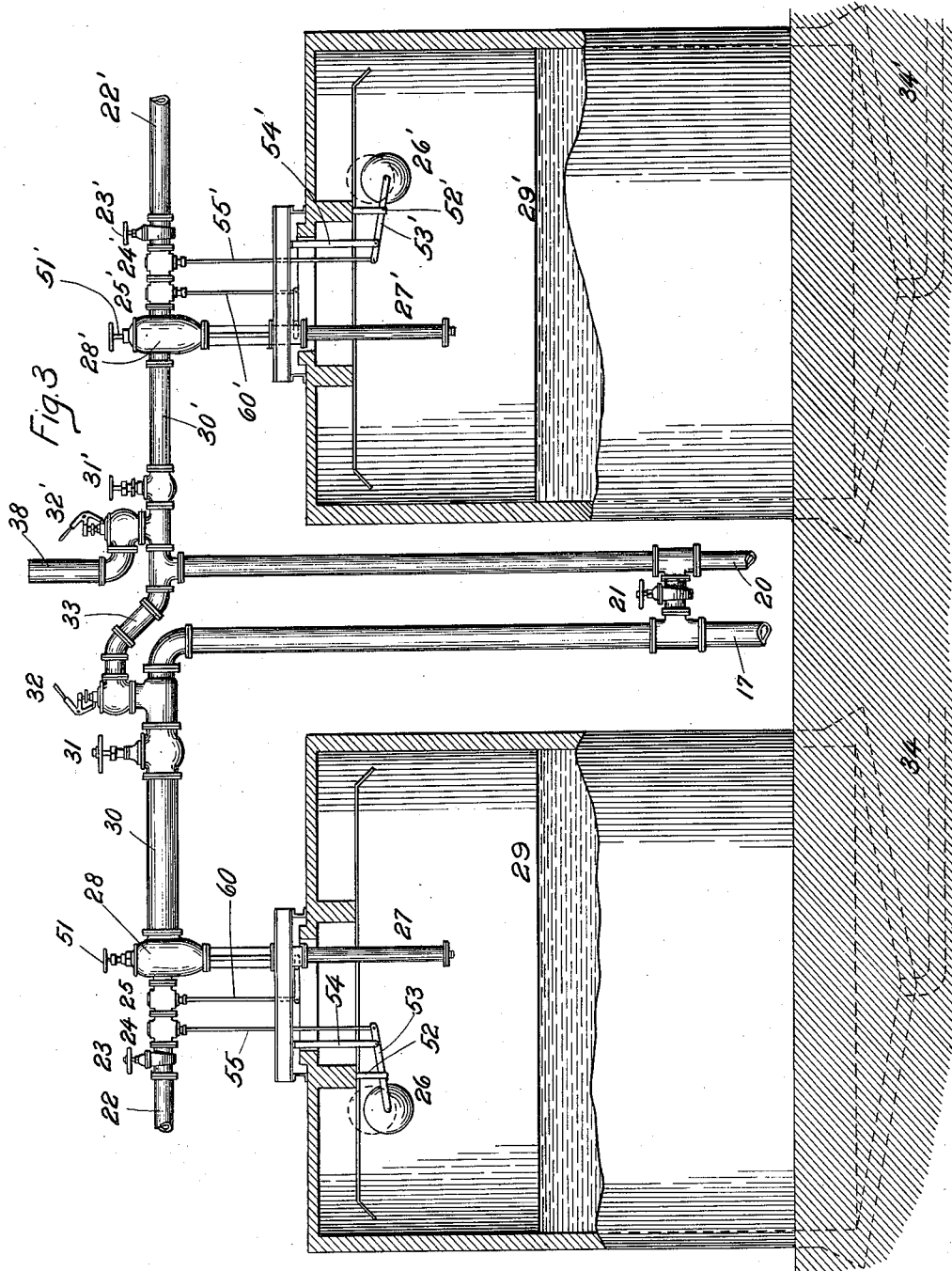
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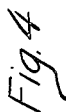
William A. Powers

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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

WILLIAM A. POWERS, OF TOPEKA, KANSAS.

HOT-WATER WASHING AND REFILLING SYSTEM FOR LOCOMOTIVE-BOILERS.

1,023,441.

Specification of Letters Patent.

Patented Apr. 16, 1912.

Application filed November 27, 1909. Serial No. 530,131.

To all whom it may concern:

Be it known that I, WILLIAM A. POWERS, a citizen of the United States, residing at Topeka, in the county of Shawnee and State of Kansas, have invented certain new and useful Improvements in Hot-Water Washing and Refilling Systems for Locomotive-Boilers, of which the following is a specification.

The principal object of my invention is to provide an improved system for washing and refilling locomotive boilers with water heated to a proper degree of temperature for the desired purposes.

Another object of my invention is to utilize exhaust steam for the purpose of heating the washing and refilling water for locomotive boilers.

Another object of my invention is to utilize in this way the exhaust steam from a local steam power plant in the neighborhood of the roundhouse where the washing and refilling is to be performed.

Another object of my invention is to reduce the back pressure in the exhaust steam conduits when the exhaust steam is used for heating the washing and refilling water.

Another object of my invention is to provide duplex apparatus for heating wash water and refilling water separately each to the proper temperature.

All these objects and others will be made apparent in the following specification and claims, when taken in connection with the accompanying drawings.

My invention is defined in the appended claims, but, for the purpose of illustrating it, I have shown two specific embodiments thereof in the accompanying drawings, and I now proceed to describe and explain these particular embodiments in the following specification.

Figure 1 is a diagrammatic outline showing a complete system. Fig. 2 is an elevation partly in section of a jet condenser which forms an element of the system. Fig. 3 is a view on an enlarged scale of the two tanks shown in Fig. 1, these being partly in section to show the apparatus within. Fig. 4 is a view illustrating a modification in which one and the same tank holds water both for washing and refilling purposes; and Fig. 5 is a detail sectional view showing a thermostat regulator.

The exhaust steam from the steam engine 16 in the power plant 15 is conducted through the pipe 17 past the free exhaust valve 32 and check valve 31 to the injector condenser 28, which is shown in detail in Fig. 2. Exhaust steam from the locomotives 18, standing in their respective stalls in the roundhouse, is conducted through the flexible couplings 19 to the main pipe 20, which connects to the pipe 17 by a gate valve 21, and also to the outlet 33 from the free exhaust valve 32. A head of water is supplied through the pipe 62 which has the branches 22 and 22'. In the branch 22 are successively interposed the control gate valve 23, the valve 24 controlled by the float 26, and the valve 25 controlled by the thermostat 27. Finally after passing through all these valves, the water supplied through the pipes 62 and 22 empties into the injector condenser 28 meeting exhaust steam received through the pipe 30 and the mixture of steam and water are delivered into the tank 29. An outlet pipe 34 from the tank 29 leads to the pump 35 and the delivery pipe 36 from this pump goes as a refilling water main through the engine stalls in the roundhouse, branches 37 being taken off adjacent to each locomotive for the purpose of refilling the same. The tank 29' and its related apparatus are exactly similar to the tank 29 and its related apparatus; therefore the tank 29' and its associated parts have been designated by numerals corresponding to those employed in connection with the tank 29, but distinguished by means of primes. The exhaust steam passing from the power plant 15 and that coming from the locomotives 18 may be mingled by opening the gate valve 21 or may be kept separate by closing the same. Part of this exhaust steam goes along the pipe 30 and part along the pipe 30'. These respective parts meet with cold water in the injector condensers 28 and 28' and thus a vacuum is maintained in the exhaust pipes 17 and 20. The supply of cold water through the pipes 22 and 22' is regulated by the float 26 and also by the thermostat 27, so that the water in each tank 29 and 29' is kept at a desired temperature. In case there should be an excessive supply of exhaust steam relative to the quantity of water admitted by the valves

24, 25, 24', and 25', then the excess of exhaust steam turned back from the conduit 30 will escape from the valve 32 into the branch 33 and the excess from the conduit 30' will escape from the valve 32' to the open outlet 38.

The injector condenser is shown in detail in Fig. 2. It has a shell 39 with an inclined partition 40 through which passes a central perforated shell 41—44. This shell has perforations 42 above the partition 40, through which cold water enters from the branch connection 43. Below the partition 40 steam enters from the branch connection 48 through the downwardly inclined holes 45. Regulation is effected by means of the plunger 46, which has screw threaded engagement at 47 with the upper part of the shell 41—44 and is adapted to be controlled by the hand wheel 51. The water from the branch connection 43 passes down around the plunger 46 and meets the steam coming through the inclined holes 45. The mixture goes down through the flaring conduit 49 and through the connection 50 into the tank 29 or 29'.

It will be seen that the apparatus acts to take the back pressure off from the exhaust pipe 17, and, if desired, from the exhaust pipe 20. The check valve 31 or 31' serves to hold whatever vacuum may be attained in the pipe 17. The tank 29 or 29' is open to the atmosphere, some space being left at the top around the thermostat.

The tanks shown in Fig. 3 are made of reinforced concrete. The control floats 26 and 26' are pivoted on the hangers 54 and 54' that depend from the top of these tanks. 52 is a guide, and the float arm 53 connects to the valve 24 by means of the rod 55.

The thermostat is shown in detail in Fig. 5. An openwork cap 56 is fixed on the lower end of the tube 27, and attached thereto is the lower end of a highly expandible inner rod or tube 57, the upper end of which is pivotally connected to one end of the lever 58, which is fulcrumed on the lugs 59. The other end of this lever 58 is connected to the rod 60, which operates the valve 25. When the water descending through the pipe 27 is too hot, the resultant elongation of the rod or tube 57 will open the valve 25, thus admitting a larger proportion of cold water to the mixture in the tank 29.

The modification shown in Fig. 4 is employed when only one supply of water is to be maintained both for washing and refilling purposes. In this case, the attachments 37 for refilling and 37' for washing are connected to the same hot water main 36 and can be used alternatively. A cold water supply comes in at 22. The exhaust steam from the locomotive boiler comes

along the main 20 and the exhaust steam from the local power plant comes along the pipe 17.

As is well known, a suitable temperature for refilling water may be somewhat higher than for wash water, and therefore, when two tanks are used, I maintain slightly different temperatures in them. When only one tank is used, it is necessary to use refilling water of a temperature reduced to the point that is proper for wash water.

It will be seen that by the use of a system employing my invention both the exhaust steam from the local power plant and from the locomotive boilers in the roundhouse can be utilized simultaneously; or, if desired, the apparatus is susceptible of operation with steam from either source alone.

The use of a jet condenser simplifies the mode of operation and also gives certain other advantages. It is a compact and a convenient piece of apparatus, easily regulated and controlled, and it reduces the back pressure on the exhaust conduits.

I desire to call attention to the duplex character of my device by which two tanks are provided, so that the water can be heated to two different temperatures and the exhaust steam will divide itself between these two tanks automatically in a proper proportion. The advantage of having a vacuum on the blow-off line 20 is that it decidedly shortens the time to blow off the locomotive boilers and also makes it possible to blow off at a lower pressure than would otherwise be the case, thereby utilizing a decidedly greater proportion of heat from the waste contents of the boilers.

I claim:

1. In a device of the class described, two tanks, cold water conduits leading to each tank, a steam power plant, an exhaust steam supply pipe leading from said plant to one tank, a free exhaust valve connected thereto, a pipe connected to said free exhaust valve and leading therefrom to the other tank, another free exhaust valve opening to the outside atmosphere from said last mentioned pipe, jet condensers at the respective tanks to mingle the cold water and exhaust steam and thermostatic means associated with each tank to regulate the supply of water and temperature thereof as it is delivered into each tank, respectively, said temperatures being different.

2. In a device of the class described, a steam power plant, a boiler refilling tank, a boiler washing tank, cold water conduits to both tanks, an exhaust steam pipe from the power plant to the refilling tank, a branch pipe therefrom to the washing tank provided with a free exhaust valve, another free exhaust valve opening from said branch pipe to the outer atmosphere, jet con-

5 densers at the respective tanks to mingle the cold water and exhaust steam and thermostatic means associated with each tank to regulate the supply of water and temperature thereof as it is delivered into each tank, respectively, said temperatures being different.

In testimony whereof, I have subscribed my name.

W. A. POWERS.

Witnesses:

ORTON T. REES,
JAS. R. PARRISH.