

D. W. CUNNINGHAM.
LOCOMOTIVE BOILER WASHING AND REFILLING APPARATUS.
APPLICATION FILED JAN. 14, 1907.

976,438.

Patented Nov. 22, 1910.

2 SHEETS—SHEET 1.

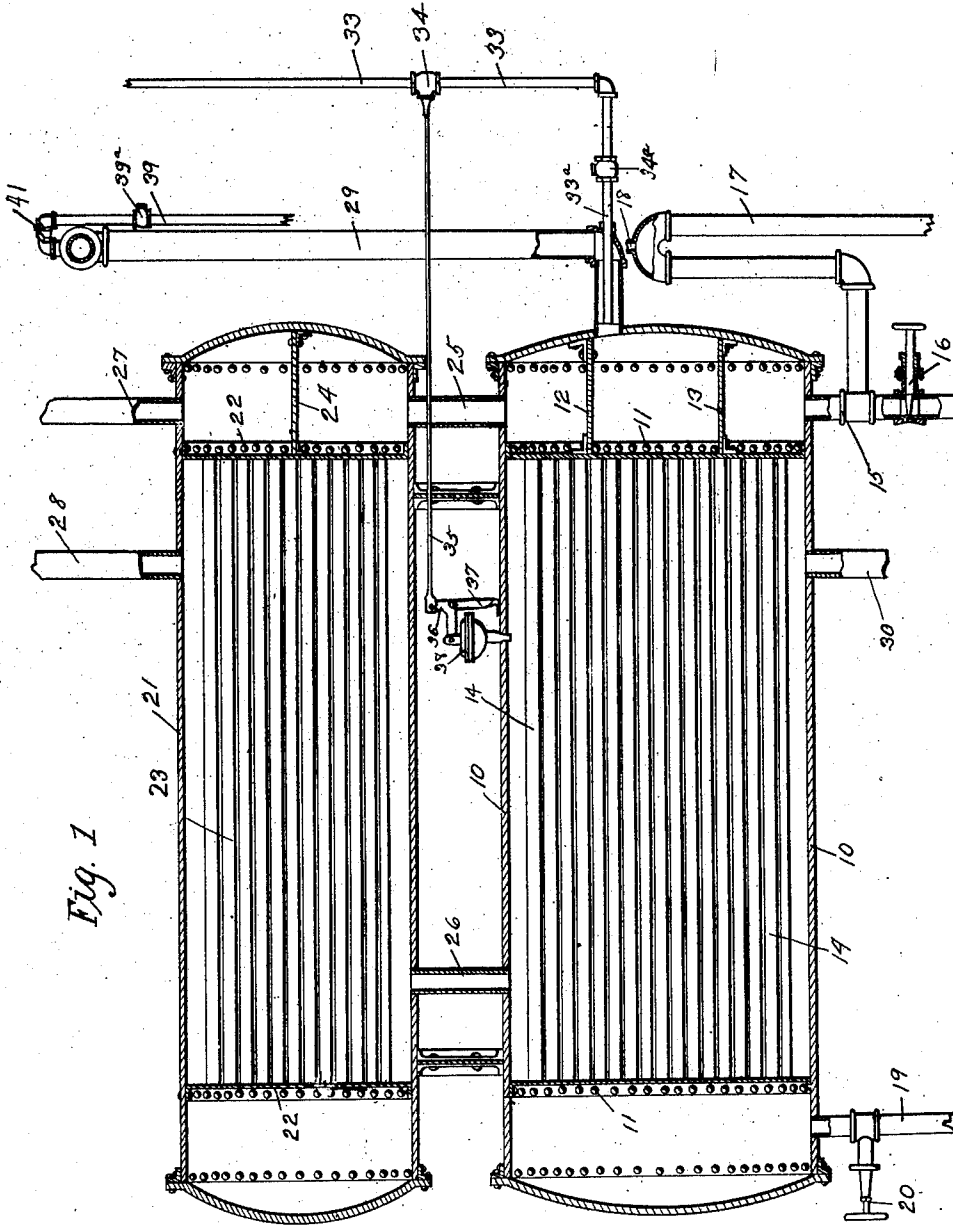


Fig. 1

Witnesses.
A. C. Dahlberg.
S. F. Christy.

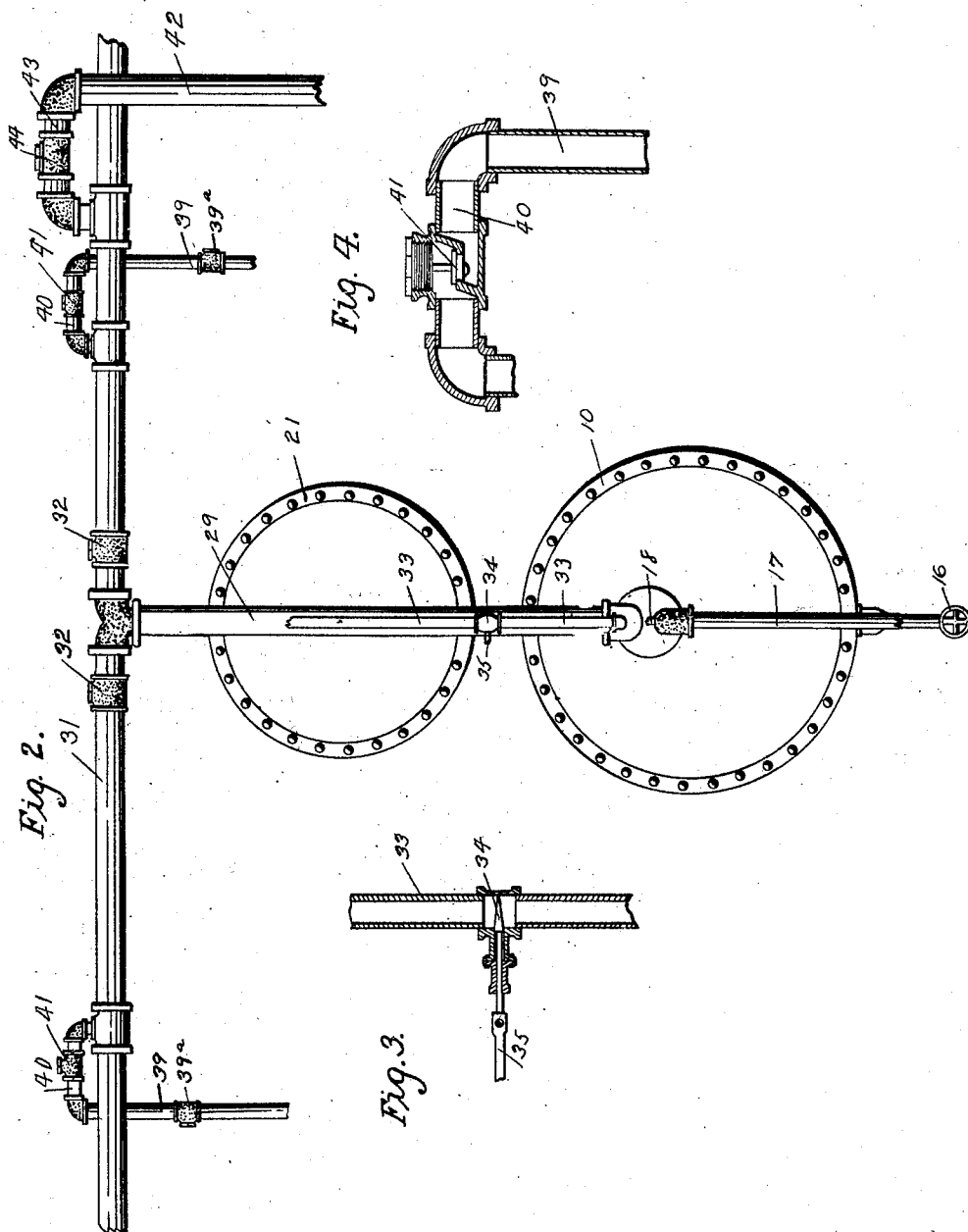
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UNITED STATES PATENT OFFICE.

DAVID W. CUNNINGHAM, OF DES MOINES, IOWA.

LOCOMOTIVE-BOILER WASHING AND REFILLING APPARATUS.

976,438.

Specification of Letters Patent.

Patented Nov. 22, 1910.

Original application filed July 6, 1906, Serial No. 325,394. Divided and this application filed January 14, 1907. Serial No. 352,197.

To all whom it may concern:

Be it known that I, DAVID W. CUNNINGHAM, a citizen of the United States, residing at Des Moines, in the county of Polk and State of Iowa, have invented a certain new and useful Locomotive-Boiler Washing and Refilling Apparatus, of which the following is a specification.

The subject matter of this application has been divided out of my application for United States Letters Patent, Serial Number 325,394, filed July 6, 1906, on a water heater for locomotive boilers.

The object of my invention is to provide an apparatus of this kind of simple, durable and inexpensive construction to which one or more locomotive boilers may be connected and the steam and water therefrom be discharged into a heater to be utilized in warming the water in said heater, which water thus warmed may be used for washing out and refilling the locomotive boiler or boilers from which the steam and water was blown off.

More specifically it is my object to provide an apparatus of this kind to which two or more locomotive boilers may be connected, having different degrees of steam pressure, and both be permitted to blow off into the heater without any backward flow of steam or water or deposit into the boiler having the less degree of pressure, the valves for accomplishing this result being automatically actuated.

A further object is to provide means for utilizing the steam exhaust from a stationary engine for the purpose of aiding in supplying steam to the heater and without being affected by the back pressure caused by connecting one or more locomotive boilers with the heater under different degrees of pressure.

A further object is to provide means for supplying live steam to the heater direct from a stationary boiler, said steam to be supplied through a valve automatically opened when the temperature within the heater falls below a certain predetermined degree to the end that the water in the heater may be maintained at the proper temperature at such times when the supply of steam and water from locomotive boilers is not available.

My invention consists in the combination with a heater of the apparatus for blowing

off, washing out and refilling locomotive boilers, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings, in which—

Figure 1 shows a central, longitudinal, sectional view of an apparatus embodying my invention. Fig. 2 shows an end elevation of an apparatus embodying my invention. Fig. 3 shows an enlarged, detail, sectional view illustrating the valve for controlling the admission of steam from the supply pipe to be connected to a stationary boiler, and Fig. 4 shows an enlarged, detail, sectional view through one of the pipes for admitting steam and water from a locomotive boiler to the main supply pipe of the heater.

Referring to the accompanying drawings, I shall first describe in a general way the form of heater to which my present invention is especially adapted. The reference numeral 10 indicates a main cylinder having spaced apart from each end a vertical partition 11. In one end, partitions 12 and 13 are provided, to extend from the partition 11 to the cylinder head, thus forming an upper, a middle and a lower compartment in said end. Connected with the partitions 11 are the boiler tubes 14 communicating with the chambers at the ends of the cylinder. Communicating with the said lower compartment is a drain pipe 15 having a gate valve 16 therein and also having connected therewith, above the valve, an overflow pipe 17, which pipe extends upwardly to a point above the center of the cylinder and then downwardly to a point of discharge and which is provided, at its top, with an air vent tube 18. Communicating with the compartment at the other end of the main cylinder is a cleaning out pipe 19 provided with a gate valve 20. Mounted on top of the main cylinder is the upper cylinder 21 having near its ends the partitions 22 and the boiler tubes 23 connected with the partitions and communicating with the chambers in the ends. This upper cylinder is provided in the chamber at one end with a transverse partition 24 dividing said end into upper and lower compartments. Communicating between the lower compartment of the upper cylinder and the upper compartment of the lower cylinder is a pipe 25

and communicating between the cylinders 21 and 10 is a pipe 26. A steam discharge pipe 27 leads from the upper compartment of the upper cylinder and a hot water discharge pipe 28 leads from the body portion of the upper cylinder. The pipe 29 which admits steam and water into the heater communicates with the middle compartment of the main cylinder and fresh water to be used in cleaning and refilling locomotive boilers is admitted into the lower cylinder through the pipe 30. The practical operation of the heater proper is fully described in my application before referred to.

The means for introducing steam and water from locomotive boilers or from the exhaust pipe of a stationary engine or from a stationary boiler and which forms the subject matter of this application, comprises a horizontally arranged main pipe 31 having the pipe 29, before referred to, connected with it and extended downwardly into the middle compartment of the lower cylinder. In the main 31 adjacent to the upright pipe 29, I have provided two check valves, each arranged to permit the flow of steam or water from the main 31 to the pipe 29 and also arranged to prevent steam and water from moving through the main 31 in the opposite direction. These check valves are indicated by the numeral 32 and are placed in the main 31 adjacent to the pipe 29.

The reference numeral 33 indicates a live steam supply pipe arranged to receive its steam from any suitable source of supply. It extends to a point adjacent to the lower end of the pipe 29 and there is provided with a right-angled extension 33^a that projects through the pipe 29 and terminates near the end of the pipe 29 so that when live steam is being forced through the pipe 33, it will tend to cause a suction upon the pipe 29 and draw from said pipe 29 all of the steam or hot water therein contained and it also serves to prevent the live steam from applying a back pressure upon the pipe 29. In the said pipe 33^a is a cut-off valve 34 and beyond the cut-off valve is a check valve 34^a designed to prevent back pressure from the heater into the pipe 33.

I have provided for automatically operating the valve 34 for the purpose of maintaining the temperature of the water within the lower cylinder at a certain predetermined degree as follows: Connected with the valve stem of the valve 34 is a link 35 connected to a bell-crank lever 36 which is fulcrumed to a support 37 on the lower boiler. The other end of the bell-crank lever connects with a thermostatic regulator of ordinary form communicating with the interior of the lower cylinder. The advantage of having the thermostatic regulator connected with the lower cylinder is

that the cold water supply pipe enters said lower cylinder and it is desirable to admit live steam for the purpose of raising the temperature as soon as the water in the lower boiler is cooled. In this way the water in the upper boiler is always maintained hot enough for the purposes desired and the operation of washing or refilling a locomotive boiler may be started at any time because the water first drawn from the heater comes from the cylinder and if when water is drawn from the upper heater, the cold water comes into the lower heater in such quantities as to reduce its temperature, then the live steam is automatically turned into it and its temperature raised before all of the hot water is withdrawn from the upper cylinder. The operation of this part of the device is as follows: When the temperature of the lower cylinder falls below a certain predetermined degree, the thermostatic regulator is affected thereby and operates the bell-crank lever 36 and opens the valve 34, thus introducing live steam into the heater until the temperature is raised to the point where the thermostatic regulator will close the valve 34.

I have provided for blowing off steam and water from locomotive boilers as follows: One or more pipes 39 are provided and designed to be connected with the blow-off pipes of locomotives. Each of these pipes 39 is provided with a check valve 39^a and extends to a point above the main 31 and then horizontally at 40 where it is provided with a second check valve 41. Beyond the check valve it extends downwardly and enters the main 31. In the present instance, two of these pipes are shown in Fig. 2. The arrangement of said blow-off pipes and the valves therein accomplish the following desirable results: First, by having said pipes extending to points above the main 31, the water within said main is prevented from flowing by gravity from the main 31 into the pipes 39. Furthermore by having said pipes each provided with two check valves it is obvious that if two locomotive boilers should be connected with the apparatus at the same time and one of them should have a steam pressure of considerable amount, say for instance one hundred and fifty pounds to the square inch and the other should have a steam pressure of only fifty pounds to the square inch, then the high pressure from one would be prevented from forming a back pressure upon the locomotive boiler connected with the other and each could discharge its steam and water into the main at the same time. There is often considerable solid matter in the water blown off from a boiler and by having two check valves, I avoid the danger of having them made inoperative by the deposit which may accumulate in the

pipe 39. I have also provided means for introducing steam from the exhaust pipe of a stationary engine to the main as follows: The numeral 42 indicates a pipe to be
 5 connected with the steam exhaust port of a stationary engine. This port extends to a point above the main 31, and is provided with a horizontal portion 43 containing a check valve 44 and beyond the check valve it
 10 extends downwardly into the main 31. By this arrangement water within the main is prevented from flowing into the pipe 42 and the valve 44 prevents steam under pressure within the main 31 from flowing back
 15 into the pipe 42.

By the arrangement, just described, one or more locomotives may have their boilers connected with the pipes 31 and the hot water and steam therefrom may be blown
 20 off into the heater where the steam and water are both utilized to their maximum efficiency in heating the water within the heater and the water from the locomotive boilers is not in any way commingled with
 25 the water in the heater. As soon as a locomotive boiler has blown off, water is taken by the operator from the pipe 28 of the heater and used for the purpose of washing out the locomotive boiler. On account of
 30 the high temperature of the water, the washing out process may be commenced immediately after the boiler has been blown off and there will be no danger of injuring the boiler by contraction and expansion caused by a
 35 great variation in temperature. When the washing out process has been completed, the boiler may then be refilled with hot water from the pipe 28 and this water being at high temperature may be quickly and easily
 40 brought to the boiling point, so that the engine may be ready for use in a very short time after having blown off. If at any time the supply of steam and hot water from the locomotive boilers is not sufficient to main-
 45 tain the desired temperature within the

heater, then the supply pipe for live steam is automatically opened, as before described.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States, therefore is—

1. In a device of the class described, the combination of a locomotive blow-off pipe designed to receive steam and hot water from a locomotive, a receptacle designed to contain water to be heated and having said
 55 locomotive blow-off pipe admitted into it, a pipe for live steam inserted into said locomotive blow-off pipe and arranged to discharge its contents adjacent to the inlet of the locomotive blow-off pipe into said
 60 receptacle so that when live steam is admitted into the blow-off pipe it will create a suction in the blow-off pipe tending to force water and steam therein into said receptacle, and a valve for controlling the flow of live steam.
 65 2. In a device of the class described, the combination of a locomotive blow-off pipe designed to receive steam and hot water from a locomotive, a receptacle designed to contain water to be heated and having said
 70 locomotive blow-off pipe admitted into it, a pipe for live steam inserted into said locomotive blow-off pipe and arranged to discharge its contents at a point adjacent to the inlet of the locomotive blow-off pipe into
 75 said receptacle so that when live steam is admitted into the blow-off pipe it will create a suction in the blow-off pipe tending to force water and steam therein into said receptacle, a valve for controlling the flow of live
 80 steam, and a thermostatic regulator connected with said receptacle and also with said valve on the steam pipe for automatically regulating the admission of steam by the temperature of the receptacle.

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Witnesses:

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