J. W. CURRIE.

RAIL FLUSHING MECHANISM FOR LOCOMOTIVES.

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984,510. Patented Feb. 14, 1911.

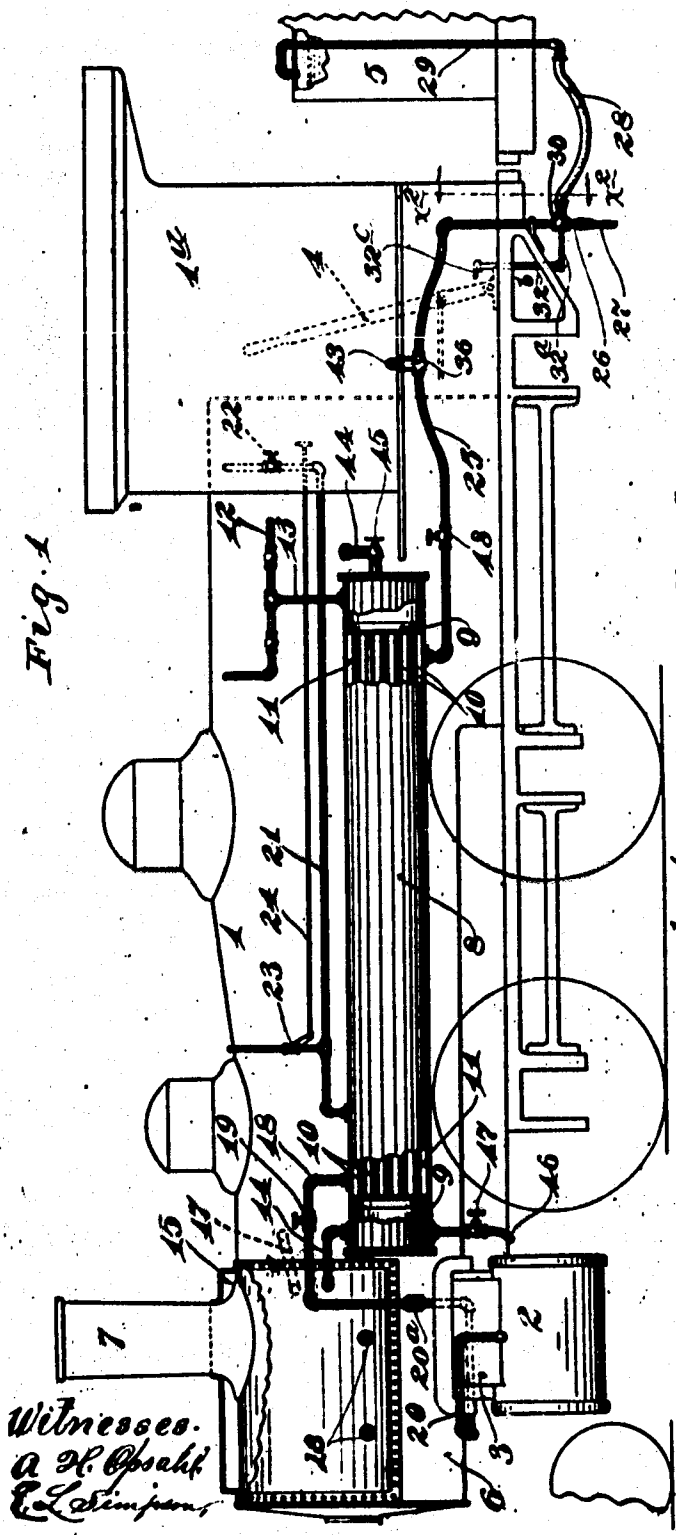

Fig. 1

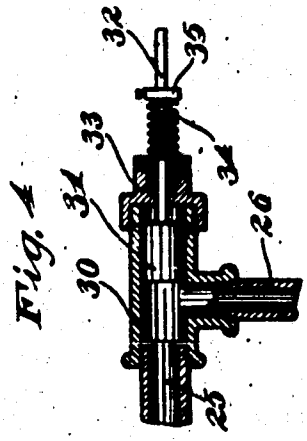

Fig. 4

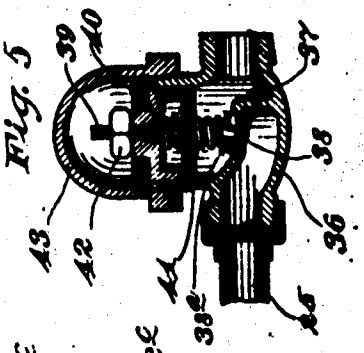

Fig. 5

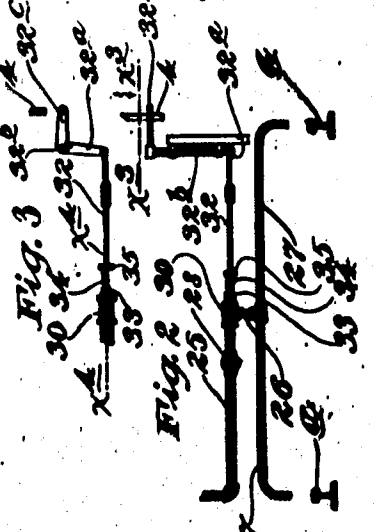

Fig. 3

Fig. 2

Witnesses.
A. H. Ashall
E. L. Simpson

Inventor.
John W. Currie
By his Attorneys.
Williamson & Merchant

UNITED STATES PATENT OFFICE.

JOHN WILLIAM CURRIE, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO CONSOLIDATED LAND AND MACHINERY COMPANY, OF MINNEAPOLIS, MINNESOTA, A CORPORATION OF MINNESOTA.

RAIL-FLUSHING MECHANISM FOR LOCOMOTIVES.

984,310. Specification of Letters Patent. Patented Feb. 14, 1911.

Application filed August 5, 1909. Serial No. 511,371.

To all whom it may concern:

Be it known that I, JOHN WILLIAM CURRIE, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Rail-Flushing Mechanism for Locomotives; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention has for its object to provide an improved rail flushing mechanism for locomotives: and to this end, it consists of the novel devices and combination of devices hereinafter described and defined in the claims.

The improved mechanism is particularly designed for use in connection with a feed water heater of a locomotive, and it will be so described, although the invention obviously has other applications. It may be said, however, that a steam heated feed water heater constitutes an especially reliable and yet economical source of water for my rail flushing mechanism, such water being formed by the condensation of the steam used in heating the feed water.

In the accompanying drawings, which illustrate the invention, applied to a locomotive, like characters indicate like parts throughout the several views.

Referring to the drawings, Figure 1 is a view in side elevation, with some parts broken away and some parts shown in diagram only, illustrating my invention as applied to an ordinary locomotive; Fig. 2 is a fragmentary vertical section taken approximately on the line x^2 x^2 of Fig. 1; Fig. 3 is a horizontal section taken on the line x^3 x^3 of Fig. 2, some parts being broken away; Fig. 4 is an enlarged vertical section taken on the line x^4 x^4 of Fig. 3; and Fig. 5 is an enlarged vertical section showing the automatic regulating valve.

For the purposes of this case, it is only desirable to particularly note the engine boiler 1, the cylinders 2, the steam chests 3, the reversing lever 4 and the water tank 5, which latter is, of course, carried on the engine tender. The cylinder exhaust ports, of course, extend to the exhaust nozzle (not shown) located in the smoke box 6 below the smoke stack 7.

The heating drum 8 of the feed-water heater is suitably secured at one side of the boiler 1 and extends longitudinally of the same. At its ends, it is provided with water chambers 9 that are connected by a multiplicity of small flues 10. The steam chamber 11 of the heating drum is located between the chambers 9 and surrounds the flues 10. The water fed to the heater and from thence to the boiler is delivered by pipes 12, from the injectors or from the pumps, to a common pipe 13 which connects with one of the drum chambers 9. The other chamber 9 is connected to the boiler. In some cases, it will be directly connected to the boiler, but for a special purpose presently to be noted, it is connected by a pipe 14 to a semi-cylindrical water jacket 15 that surrounds the upper portion of the smoke box 6 and is, of course, secured thereto and to the stack 7 by water-tight joints. In the lower portion of this jacket 15 are clean-out plugs 16. The said jacket 15 is directly connected to the boiler 1, preferably on the side opposite to the pipe 14, by a pipe 17 having the ordinary boiler check, not shown. This jacket 15 acts as an auxiliary water heater and affords a chamber through which the water moves very slowly, thus giving chance for impurities in the water to settle or to be precipitated, and hence, will be found especially desirable where water containing alkali and other impurities in considerable quantities, must be used in the engine.

The upper portion, preferably, of the steam chamber 11 of the heating drum is connected to a steam supply pipe 18 having a valve 19 and provided with branches 20 that lead one from each of the cylinder exhaust ports. The said steam chamber 11 is also preferably tapped by a steam supply pipe 21 which leads from the upper portions of the boiler 1 and is provided with a valve 22 preferably located within the engine cab 1^a. The steam exhaust port of the air pump (not shown) is preferably connected to the

steam chamber 11, through a portion of the pipe 21, and is provided with a valve 23 adapted to be opened and closed by an operating rod 24 extended into the engine cab.

The steam exhaust pipe 25 from the steam chamber 11 is, as shown, connected by a short pipe 26, to the intermediate portion of a transversely extended drip pipe 27 which has downturned ends arranged to deliver condensed steam in the form of water, onto the rails *a*, for purposes already indicated. The pipe 25 is also connected, as shown, by a detachable hose section 28, to a pipe 29 carried by the engine tender with its upper end arranged to deliver exhaust steam into the upper portion of the water tank 5.

At the junction of the pipes 25 and 26 is a cut-off valve, the casing 30 of which affords a coupling between the said pipes, and the passage therein is adapted to be opened and closed by a plunger valve 31, the stem 32 of which works through a stuffing box 33 applied to one end of said casing. A light coiled spring 34, which reacts against the stuffing box 33 and against a collar 35, on the stem 32, normally holds the valve 31 in its open position, shown in Fig. 4. The extended end of the stem 32 is connected to the lower arm 32^a of a small upright rock shaft 32^b mounted in suitable bearings on the engine frame and provided at its upper end with an arm 32^c adapted to be engaged by the engine reversing lever 4. The relation between the arm 32^c and lever 4 is such that when the said lever is in its neutral position, as when the engine is standing still, or when the said lever is forced forward, as when required to cause the engine to travel forward, the spring 34 holds the valve 31 in its open position; but when the said lever is moved rearward to cause the engine to back up it engages the arm 32^c and through the connections just described moves the valve 31 into a closed position, against the tension of said spring. This latter action, as is evident, closes the drip pipe 27, so that the rails will not be washed and made slippery when the engine is backing up. The exhaust steam from the heating drum 8, which is not condensed before reaching the pipe 29, is by the latter delivered into the tender tank 5, for the purpose of warming, to some extent, the water contained therein.

The automatic regulating valve, already referred to, is interposed in the exhaust pipe 25 and its casing 36 is provided with a divided partition 37 having a port that is normally closed by a check valve 38. A stem 39 of this check valve works through a plug 40 which is threaded into the upwardly extended portion of said casing 36. A coiled spring 41, which surrounds the stem 39, and is compressed between the valve 38 and plug 40, yieldingly holds the said check valve normally seated. By adjustments of the plug 40, the tension of the spring 41 may be varied. The threaded upper end of the valve stem 39 is provided with a nut 42 which serves to hold the valve 38 connected to said plug 40 when the two are removed from working position. The numeral 43 indicates a protecting cap which incloses the plug 40 and upper end of the valve stem 39 and, as shown, is threaded onto the upwardly extended portion of the valve casing 36.

In the pressure-opened valve 38 are one or more ports 38^a, through which water may constantly flow to the drip pipe 27 whenever the valve 31 is open. In this connection, it may be stated that the condensation of the steam delivered into the heater will keep up a considerable flow of water which should be permitted to escape, except when the engine is backing up, even though the valve 38 be closed. These ports 38^a, however, are of such size that they will be constantly flooded with water, so that the steam pressure will be available to open the valve 38.

In the steam pipe 20, which connects the exhaust ports of the cylinders to the steam chamber 11 of the heating drum, is a check valve 20^a which permits flow of steam in the direction stated but checks a back-flow and thereby prevents condensed steam from flooding the cylinder exhaust ports.

The automatic check-valve 38 is set under light tension so that, while it will normally close the exhaust from the heating drum steam chamber 11, it will, nevertheless, be opened up whenever the pressure of the exhaust steam exceeds a certain predetermined point. Obviously, the higher the pressure of the exhaust steam, the greater the extent to which the valve 38 will be opened. This normally closed regulating valve prevents too ready escape of the exhaust steam and causes the same, even when under low pressure, to completely fill the steam chamber 11, thereby very greatly increasing the efficiency of the heater and, furthermore, affording an automatic variable relief port to the exhaust nozzle of the locomotive.

One of the water chambers 9 of the heater is shown as directly connected to the boiler 1 at a point below the water line thereof by a pipe 44, provided with a normally closed valve 45. The other water chamber 9 is shown as provided with a blow-out pipe 46 having a normally closed valve 47. When it is desired to wash out the heater, two valves 45 and 47 may be opened up and hot water from the boiler will then be forced through the heater, to-wit, through the water chambers 9 and flues 11, under high pressure. The steam exhaust pipe 25 is shown as provided with a normally open cut-off valve 48 which is adapted to be closed for the purpose of repairs or when,

for other reasons, it may be desirable to entirely cut off the exhaust of steam from the heater.

What I claim is:

1. The combination, with a locomotive, of a water pipe leading to a point above the rails, a valve in said pipe, and means for automatically opening said valve when the locomotive runs forward, and for automatically closing the same when the locomotive runs backward.

2. The combination, with a locomotive, of a water pipe leading to a point above the rails, a valve in said pipe, a spring for moving said valve in one direction, and connections for moving said valve in the other direction, actuated by the reversing lever of the locomotive.

3. The combination, with a locomotive, having a reversing lever, of a pipe leading to a point above the rails, a valve in said pipe, a spring normally holding said valve open, and lever connections operated by the reversing lever and connected to said valve to close the same when the locomotive runs backward.

4. The combination with a locomotive, of a steam exhaust conduit connected with the exhaust of said locomotive, a pipe connected with said conduit and terminating at points above the rails, at the rear of the locomotive, a normally open valve in said exhaust conduit, and means for automatically closing said valve when the locomotive runs backward.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN WILLIAM CURRIE

Witnesses:
H. D. KILBORE,
F. D. MERCHANT.