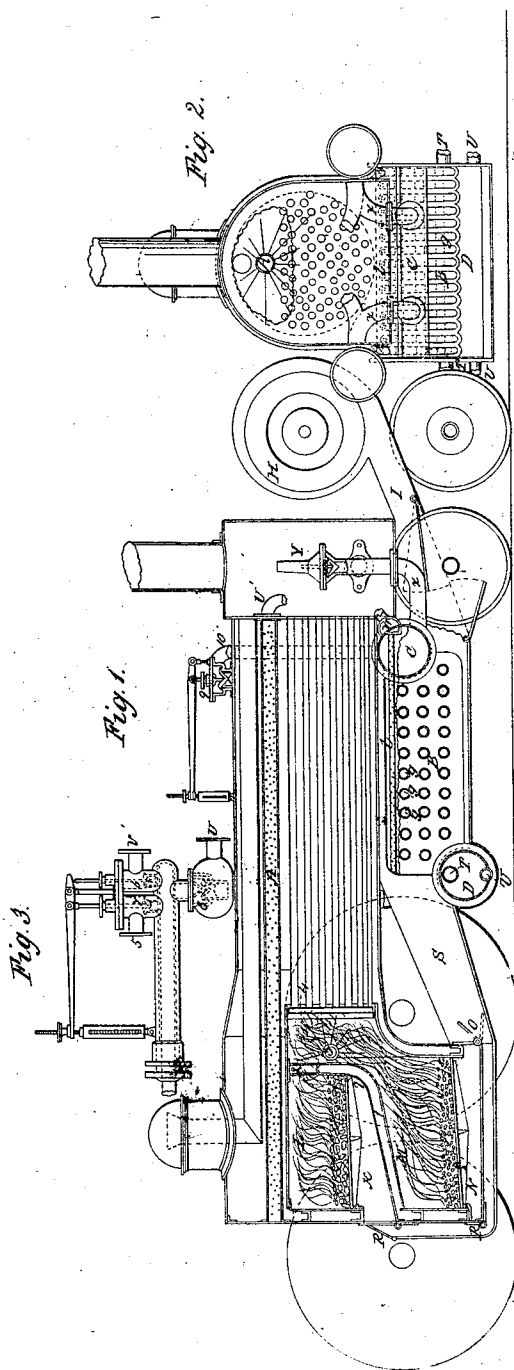


W. W. HUBBELL & D. MATTHEW.
 LOCOMOTIVE, MARINE, AND STATIONARY STEAM ENGINE.
 No. 12,947. Patented May 29, 1855.



Witnesses.
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IMPROVEMENT IN VAPOR-ENGINES.

Specification forming part of Letters Patent No. 12,947, dated May 29, 1855.

To all whom it may concern:

Be it known that we, WILLIAM W. HUBBELL and DAVID MATTHEW, of the city of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Locomotive, Marine, and Stationary Steam-Engines, whereby they are, in an improved manner, adapted to use sulphur bicarbon or alcohol of sulphur, sometimes called "bisulphuret of carbon," or to use other fluid as easily evaporated and condensed and highly expansive when heated, and more dense or heavy than water when condensed or in its fluid state, in conjunction with a bath of water in the boiler.

The invention consists in a combination of means, to be presently described, by which the fluid is uniformly supplied to the boiler according to the pressure on the valves uniformly distributed in the bath of hot water for evaporation and condensed for return to the distributor, using the same fluid repeatedly with economy, safety, and convenience. That this bisulphuret of carbon evaporates in hot water at a very low temperature, is very expansive, and quickly condenses when brought into contact with cold metals or cold water, and that its specific gravity is much greater than water, are facts which we believe are well known. Its cost and offensive smell, however, require that it should not be exhausted from the cylinders of the engine into the open air; but that it should be condensed, collected, and used repeatedly, to effect which in an economical, safe, and convenient manner is the object of our invention.

The nature of our improvement or combination consists in evaporating this heavy fluid by separating it into numerous small streams or particles near the surface of the water in the boiler, and allowing it to descend from near the surface in small particles by its greater weight in contact with the flues or the different particles of hot water, and thereby become suddenly heated and evaporate and rise in expansive vapor as power to be used in the cylinders of the engine, and from them to pass into a close condenser, where it is restored to its fluid state and received into a reservoir containing both water and this fluid, and from this reservoir supplying the fluid to the boiler in quantities proportionate to and governed

by the pressure in the boiler by means of a safety-feed pump supplying the distributor in such manner, as hereinafter described, that the supply, evaporation, and condensation of the fluid are made uniform and dependent on each other to accomplish the objects intended.

The construction of our improvement is as follows, reference being had to the accompanying drawings, in which like letters refer to like parts.

Figure 1 is a side view in section; Fig. 2, an end view, with part of the flue-sheet removed; and Fig. 3 is a side view of the feed-pump, supposed to be connected by its pipe U to pipe U of the condenser, and by its pipe U' to pipe U' of the distributor.

A is the horizontal pipe or distributor above the fire tubes or flues at the surface of the water to distribute the fluid in numerous fine streams or particles and allow it to descend to the tubes and hot water in drops to evaporate uniformly and rapidly. It is fed through the pipe U' from the receiver D, and pipe U by means of the safety-pump. The perforations of the distributor should be about three-sixteenths of an inch in diameter and half an inch from center to center, and sufficiently numerous to feed any desired or given quantity of fluid.

B is the condenser consisting of a series of vertical flat tubes connected in front to the vapor-receiving cylinder C and at the back to the fluid-receiving cylinder D and inclining toward D. These flat tubes are connected by numerous horizontal tubes, *g*, answering also as stays to prevent collapse. In the top of each of these flat tubes is extended a perforated water or jet pipe, *l*, running the whole length of the flue, and all of these jet-pipes connecting in front to cross supply-pipe W, which is supplied with injection-water. The vapor used in the engine-cylinders is discharged through the pipes X into the receiver C and condenser B, where it is condensed and runs into the bottom of the receiver D, being extracted by the safety feed-pump through pipe U at its bottom. The water is extracted from this receiver by another pump, through the pipe T, above the fluid.

A perforated plate about ten inches broad with sides an inch high may be substituted for the rose-pipe A above the fire tubes or

water, and in this case, and also with the rose-pipe, the feed-pipe U may enter at its middle, and having a T-shaped or double mouth force the fluid from the middle toward both ends to quickly distribute it over the perforations. The safety feed-pump, which is an important element in the combination, regulates the supply of the fluid to the boiler by means of the pressure in the boiler by having one or more safety-valves leading back to the fluid-reservoir of the condenser, loaded or regulated by a spring with a fixed or determined pressure, which is the maximum pressure designed to be carried in the boiler, also having one or more feed-valves operated by the pressure in the boiler and the force of the pump, so that when the pressure in the boiler exceeds the fixed pressure this feed-valve will remain closed and the safety-valve will open and allow the fluid forced by the pump to pass back to the reservoir and not pass into the boiler; but when the boiler-pressure is less than the fixed pressure then this feed-valve opens and allows the fluid to pass into the boiler, while the superior fixed pressure of the safety-valve keeps it closed, and the distributor in the boiler causes the fluid to be immediately evaporated, which gives the uniform pressure to regulate the pump in its feeding. In Fig. 3, showing this safety-pump, 5 is the safety-pipe, and 7 the safety-valve, with a fixed pressure to lead back to the reservoir D', and U' is the feed-pipe, and 6 the feed-valve to supply the fluid when the pressure on this valve is less than on the valve 7, and U is the supply-pipe to the chamber containing the common valve, 8.

9 is a common safety-valve, with the pipe 10 extending back to the reservoir C, that the vapor which escapes may be condensed for use.

Y is an exhaust-pipe, with a floating valve held down by the pressure of the atmosphere, and only operating to exhaust up the chimney

in case the condenser fails to condense. This floating valve in the exhaust-pipe is the invention of Captain R. F. Loper, patented, we believe, by him.

Cold air may be passed through the spaces between the flat flues of the condenser and the cross tubes or stays by means of the blower H and its nozzle I, or by velocity and a funnel-shaped mouth of the engine, and after having acted on the condenser this air may pass back through the flue S to the furnaces M and L by keeping the doors R closed and O open, as shown.

It will be perceived that the rose pipe or plate distributor of the fluid in the boiler to give uniform evaporation and pressure from a given quantity of fluid in the boiler, and the safety-feed pump to furnish a uniform supply according to the pressure in the boiler, and the condenser to receive the fluid or vapor between the distributor and pump and return it to the reservoir of the pump, are necessarily combined to produce a safe and uniform supply, evaporation, or pressure and condensation or return of the fluid, and thus render its use safe and its escape from the cylinders economical and not obnoxious to the smell, rendering its application useful with proper safety, economy, and convenience.

What we claim, therefore, as our invention, and desire to secure by these Letters Patent, is—

The combination of the distributing perforated pipe or plate, the safety feed-pump governed by the pressure, and the condenser or its equivalent to produce a uniform supply, evaporation, and condensation or return of the fluid, substantially as described.

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