

(No Model.)

W. N. MORRISS & R. H. SMITH.
FEED WATER HEATER AND FUEL SAVER.

No. 526,727.

Patented Oct. 2, 1894.

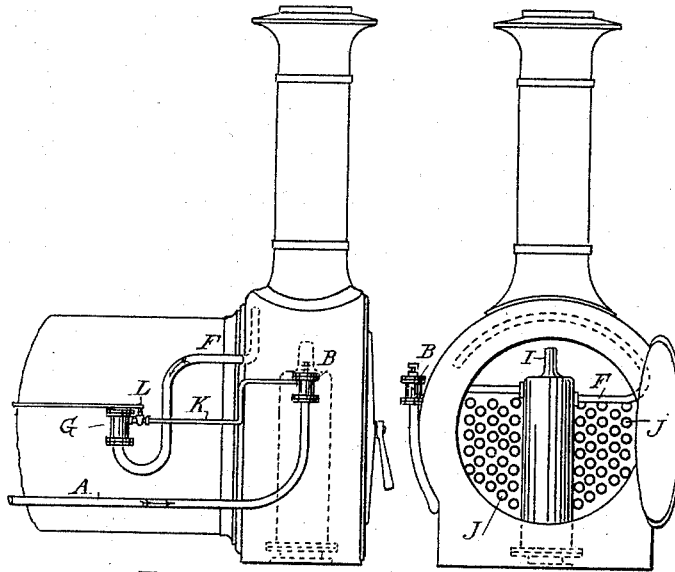


Fig 1

Fig 2

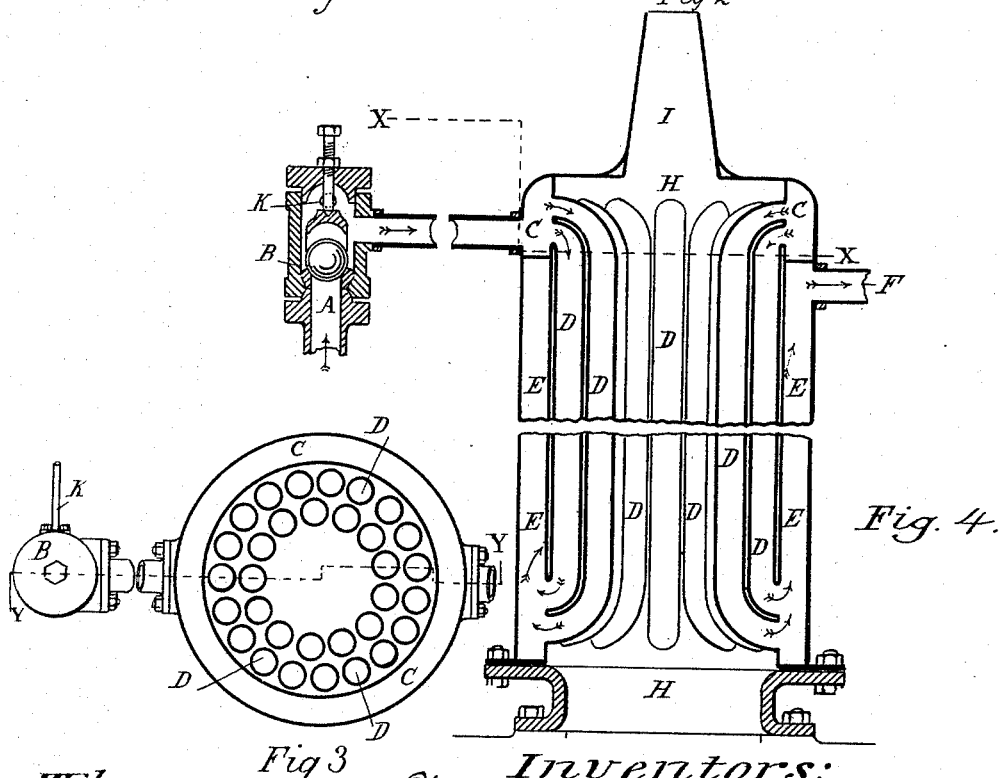


Fig 3

Fig. 4.

Witnesses:

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UNITED STATES PATENT OFFICE.

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FEED-WATER HEATER AND FUEL-SAVER.

SPECIFICATION forming part of Letters Patent No. 526,727, dated October 2, 1894.

Application filed April 13, 1894. Serial No. 507,451. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM NAYLOR MORRISS, engineer, of Moonee Ponds, near Melbourne, in the Colony of Victoria, and
5 RICHARD HALES SMITH, masseur, of Doamin Road, South Yarra, near Melbourne, in the aforesaid Colony of Victoria, subjects of Her Majesty Queen Victoria, have invented a certain new and useful Improved Feed-Water
10 Heater and Fuel-Saver; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.
15 Our invention consists of a boiler feed water heater whereby an enormous saving in consumption of fuel is accomplished. The apparatus is placed in the smoke box of a locomotive or engine and fastened to that portion
20 of same, where the exhaust steam pipe opens into the smoke box, and may be made of a size to correspond with that of the locomotive or engine in which it is intended to be used, having regard to the height of the boiler tubes.
25 It is fastened over the exhaust steam pipe, at a distance of about ten to twelve inches from the boiler tube ends, so that the draft is not lessened. The water is conveyed from the pump or injector by means of a pipe and
30 check valve to an upper chamber of the apparatus, from which it flows into tubes, placed vertically with intervening spaces. The water flowing through these tubes empties into a second or lower chamber, and a perfect circulation is thereby gained, and is then discharged into a pipe which is bent round the
35 smoke box, and carried to a valve emptying into the boiler. The action of the pump or injector forces the feed water direct from the tank through the apparatus to the boiler. The liability of a pump or injector to stop working through becoming heated is thereby obviated.
40 The apparatus is used and acts as a continuation of the exhaust pipe. The steam from the exhaust passes right through it finally escaping at the top, and at the same time, the heat, flame, &c., from the ends of the boiler tubes play upon the outer casing, and this
50 combined with the use of the exhaust steam

in manner specified, imparts heat to the water flowing through the apparatus, to the extent of not less than three hundred degrees, and thus instead of feeding the boiler with cold water, you have it running in at a great
55 heat.

The apparatus is provided with suitable connections for the inlet and outlet of the water. The number of tubes contained may be in accordance with the size, make and
60 strength of the locomotive or engine to which it is intended to be fitted.

In order to prevent the apparatus becoming overheated, when the feed is shut off, there is an auxiliary pipe connecting with the boiler
65 and direct to the upper chamber of the apparatus having a stop cock near the boiler, in order to admit of the free circulation of water from the boiler, back through the apparatus to the boiler again. Thus in effect the
70 apparatus becomes part and parcel of the boiler when the feed is shut off.

There is no back pressure on the exhaust of a locomotive or engine fitted with this apparatus, and entails no extra work or trouble
75 to the driver, the difference being that the cold water is first pumped or injected into the apparatus instead of to the boiler. The apparatus is constructed entirely of copper, and cylindrical in shape, having an upper chamber
80 and a double row of vertical tubes connected to the inner sides of same, which take cold water from the upper chamber down the entire length of the apparatus, and are elbow-jointed, and discharge to a lower chamber.
85 The lower chamber extends to the bottom of the upper chamber. Both chambers entirely surround the tubes and form the outer casing of the apparatus.

The apparatus may be constructed of copper, in one or more parts jointed, or otherwise
90 fastened, of any composition metal, and of any size. The tubes therein contained may be round, corrugated, twisted, or bent in any direction, in order to add to the heating surface. The use of this apparatus on any locomotive or engine will materially reduce the ordinary wear and tear upon a boiler, owing to the enormous saving in consumption of fuel.
95

In order that our invention may be more
100

clearly understood, reference may now be made to the accompanying drawings, wherein—

Figure 1 is a side elevation of part of a locomotive. Fig. 2 is a front elevation of the same part. Fig. 3 is a horizontal section of the apparatus, taken at the line Y Y. Fig. 4 is a vertical section of the apparatus taken at the line X X.

10 Throughout the accompanying drawings—
 A is a feed pipe from the pump or injector to the apparatus; B, a check valve, to prevent the hot water coming back on the pump; C, the upper chamber where the cold water runs
 15 into the tubes D; D, vertical tubes, elbow jointed top and bottom, commencing at the upper chamber C, and carrying the water to the bottom of the lower chamber E; E, the lower chamber immediately under the upper
 20 chamber C, and surrounds the apparatus; F, a delivery pipe running from the lower chamber E, and is bent round the top, inside the smoke box to check valve G at the side of the boiler; G, a check valve to feed the boiler
 25 with hot water served by pipe F; H, the space where the exhaust steam passes into and through the apparatus to the funnel; I, the outlet at the top of the apparatus, where the exhaust steam escapes to the funnel; J, the
 30 boiler tubes through which the heat, flame,

&c., play upon the outer casing of the apparatus, and direct onto the chamber E; K, an auxiliary pipe connecting the upper chamber C of the apparatus and the boiler—to allow the water in the boiler to circulate through the apparatus in the event of the feed being shut off. 35

L is a stop cock on the auxiliary pipe K.

Having now particularly described and ascertained the nature of our invention and in what manner the same is to be performed, we declare that what we claim is— 40

In a feed water heater an outer and an inner shell forming a space between them, a horizontal division therein forming two chambers, an inlet pipe to the upper chamber, an outlet from the lower chamber and a series of tubes extending between the two chambers within the space inclosed by the inner shell, substantially as described. 45

In witness whereof we have hereunto set our hands in presence of two witnesses. 50

WILLIAM NAYLOR MORRISS.
 RICHARD HALES SMITH.

Witnesses:

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