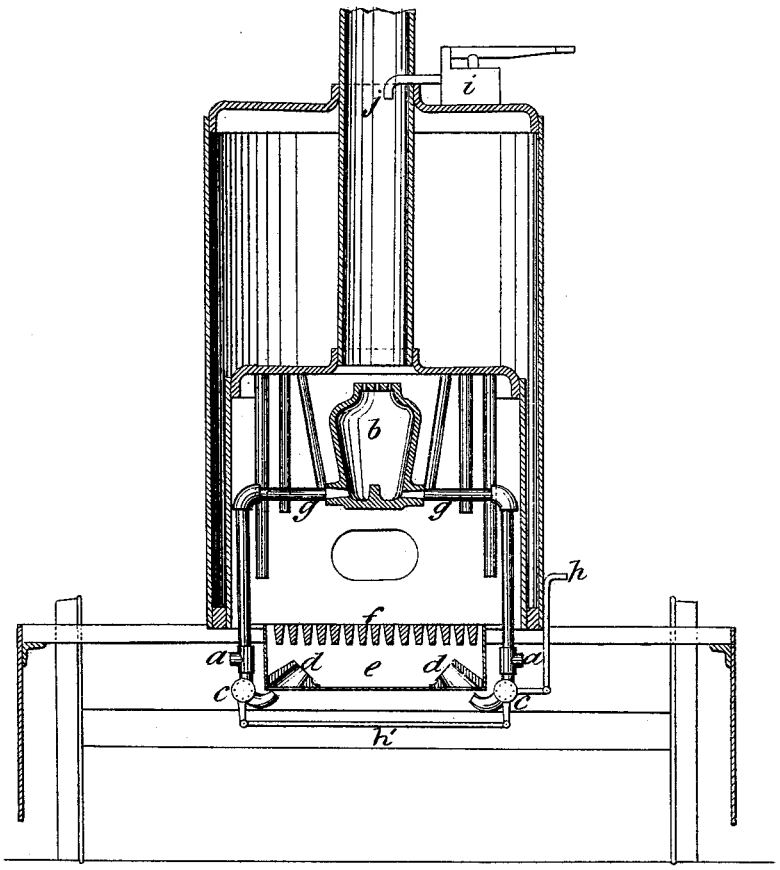
2 Sheets—Sheet 1.

J. C. & H. MERRYWEATHER & C. J. W. JAKEMAN.

SUPERHEATING AND FEEDING EXHAUST STEAM TO FURNACES.

No. 183,014. Patented Oct. 10, 1876.

FIG. 1.



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by their attorney

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2 Sheets—Sheet 2.

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FIG. 3.

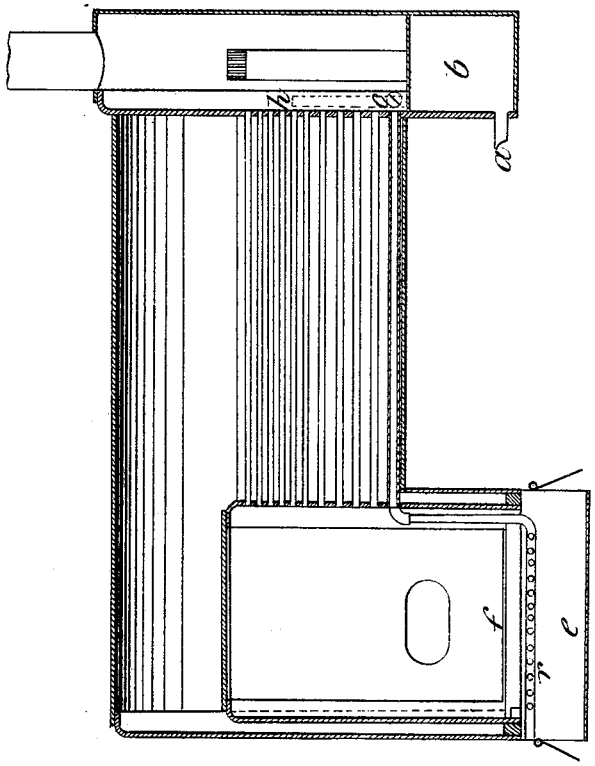
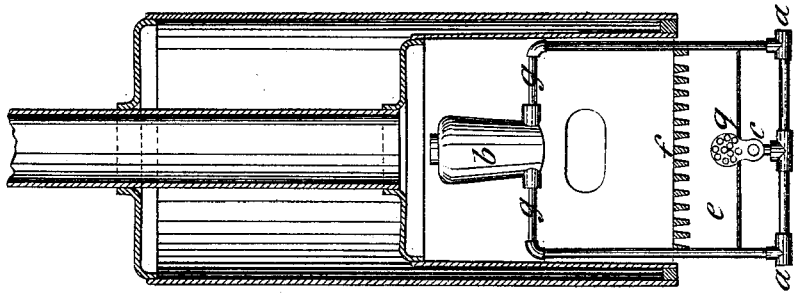


FIG. 2.



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UNITED STATES PATENT OFFICE.

JAMES C. MERRYWEATHER, HENRY MERRYWEATHER, AND CHRISTOPHER J. W. JAKEMAN, OF LONDON, ENGLAND.

IMPROVEMENT IN SUPERHEATING AND FEEDING EXHAUST STEAM TO FURNACES.

Specification forming part of Letters Patent No. **183,014**, dated October 10, 1876; application filed April 3, 1876.

To all whom it may concern:

Be it known that we, JAMES COMPTON MERRYWEATHER and HENRY MERRYWEATHER, both of the firm of MERRYWEATHER & SONS, of Long Acre, in the county of Middlesex, and Lambeth, in the county of Surrey, and CHRISTOPHER JOHN WALLACE JAKEMAN, of South Hackney, in the county of Middlesex, all in that part of her Majesty's Kingdom of Great Britain and Ireland called England, have invented new and useful Improvements in Superheating and Feeding Exhaust Steam to Furnaces, Locomotives, &c., which invention is fully set forth in the following specification, reference being had to the accompanying drawings.

This invention relates to arrangements whereby the exhaust-steam from the propelling-engines of the locomotives may be disposed of without noise or visible vapor. For this purpose the exhaust-steam, after leaving the cylinders of the engine, is caused to pass partly into a chamber situated at the base of the chimney, and having a perforated top opening into or communicating with the chimney, and partly through a rose or nozzles arranged beneath the fire-grate, through which the steam from such rose or nozzles is projected and caused to pass through a deep fire, whereby the steam is partly decomposed and partially consumed, the rest being so highly superheated as to be invisible on leaving the chimney. A cock or valve is provided on each side to regulate the quantity of steam admitted below the fire-grate. The more this is closed the greater will be the pressure in the chamber, and consequently the greater the draft through the fire. By opening or closing this cock or valve the production of steam may be regulated to meet the requirements of the engine. The steam may be projected through the fire in the form of one, two, or more conical jets drawing in air, or the steam may be injected over the fire; but we prefer passing it through the fire, as thereby its decomposition is more completely effected, the fire-bars are cooled, and considerable saving in fuel is effected. In some cases we admit air over the fire-bars to assist the combustion of the decomposed steam.

The chamber above referred to may be made of copper. The perforations or outlets at its upper part are of larger area than the steam-inlets, so that the steam in the chamber is expanded as well as heated therein, and passes noiselessly and invisibly up the chimney. In some cases the whole of the exhaust steam may be passed through the fire.

We so arrange the safety-valve that the fire is automatically deadened when more steam is produced than is being used by providing the safety-valve with a prolonged outlet, terminating in a downward direction within the chimney, or fire box or flue, in such manner that on the safety-valve being opened by excess of steam pressure within the boiler the escaping steam shall be projected onto the fire, whose surface will thereby be deadened, thus checking the production of steam. As the excessive production of steam will cease, and the valve will consequently close as soon as the top of the fire has been cooled, there will always be a solid body of fire left, which will light up immediately when the engine is started.

Our invention is applicable to engines and boilers intended for other purposes than tramway locomotives.

Such being the nature of our invention, we now proceed to describe the manner in which we carry it into practical effect, as illustrated in the accompanying drawings, premising that we do not confine ourselves to the precise arrangements shown in the drawings, as they may be modified to suit circumstances without departing from the distinctive character of our invention.

Figure 1 is a transverse vertical section of a locomotive embodying our invention. The boiler of the engine here illustrated is one of the kind now well known as the Field boiler, being constructed with pendent water-tubes; but it will be obvious that our invention is equally applicable to boilers of other constructions.

a are the exhaust-pipes leading from the cylinders of the engine. *b* is the chamber through which a portion of the exhaust steam is caused to pass, such steam being conducted into the said chamber by the pipes *g*. *c c* are

the cocks for regulating the distribution of the exhaust steam; and *h h'* the rods by which they may be operated. The more these cocks are opened the greater will be the proportion of steam escaping by the nozzles *d*, and passing through the grate *f* and fire, and the smaller will be the proportion of exhaust steam passing by the pipes *g* through the chamber *b*. *e* is the ash-pan. *h* is the lever for working the cocks *c*.

Fig. 2 shows a modified arrangement of our invention applied to an ordinary vertical boiler. In this arrangement a rose, *q*, is substituted for the nozzles *d*, (shown in Fig. 1,) and one cock, *c*, is provided. The arrangement in other respects resembles the previous one, and will be readily understood from the drawings, the parts being similarly lettered.

Fig. 3 is a longitudinal vertical section of a horizontal locomotive-boiler with the first part of our invention applied to it. In this case a perforated tube, *r*, is substituted for the rose and nozzles of previous arrangements.

What we claim is—

1. The combination, with the exhaust-steam pipes *a* of an engine, of the chamber *b*, pipes *g*, and nozzles *d*, arranged in relation to the grate *f* and the chimney of the boiler, substantially as hereinbefore described with reference to Fig. 1, for the purpose specified.

2. The regulating-cocks *c* and operating means *h*, in combination with the two discharge devices *b d*, and the connecting-pipes leading from the exhaust of an engine, and adapted to control the proportion of the exhaust steam passed through the fire, as herein specified.

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