Specification of Richard Guest Rainforth : apparatus for consuming smoke.

A.D. 1870, 29th SEPTEMBER. N° 2589.

SPECIFICATION

OF

RICHARD GUEST RAINFORTH.

APPARATUS FOR CONSUMING SMOKE.

LONDON:
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1871.

A.D. 1870, 29*th* SEPTEMBER. N° 2589.

Apparatus for Consuming Smoke.

LETTERS PATENT to Richard Guest Rainforth, of the Town of Kingston-upon-Hull, in the County of the same Town, Steam Tug Owner, for the Invention of "IMPROVEMENTS IN THE MEANS OF AND APPARATUS FOR CONSUMING SMOKE."

Sealed the 24th March 1871, and dated the 29th September 1870.

PROVISIONAL SPECIFICATION left by the said Richard Guest Rainforth at the Office of the Commissioners of Patents, with his Petition, on the 29th September 1870.

I, RICHARD GUEST RAINFORTH, of the Town of Kingston-upon-Hull, in the County of the same Town, Steam Tug Owner, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN THE MEANS OF AND APPARATUS FOR CONSUMING SMOKE," to be as follows:—

My Invention relates to certain improvements in the means of consuming smoke, and in the apparatus to be used for such purpose, the object of the Invention being to economize fuel in steam boiler furnaces by causing the products of combustion to be consumed, thus affording increased heating power from a given quantity of fuel and preventing

the escape of smoke from the fire. In order to effect these objects I propose to apply to the fire-door an air spout or flat tube, which is inserted in an aperture made in the door of the fire-box, and placed in a slanting position, so that its internal portion shall point upwards and above the level of the fuel. The tube or spout may be made nearly equal to the width of the fire-door, so that the air ascending from the outside of the furnace passes in a current of such width directly into the fire-place, and instantly becoming heated mingles with the smoke and other gaseous products, and enables the fire to consume them. This appliance increases the draught of air at all conditions of the fuel, and maintains a very powerful heat. Regulating slides or flaps on hinges may be arranged on the tube to decrease the supply of air when the fuel is reduced to an incandescent state. In cases where the level of the burning fuel is considerably beneath the stoke-hole, the air spout or spouts and tubes may be inserted below or under the fire-door, but just above the level of the fire, as in the former example. The latter method is more especially applicable to locomotives, and may be in substitution for or in addition to the entrance in the furnace or fire-door. In these instances the spout or tubes need not project inside the furnace, but if they are made to project they may be protected from the flames and heat by enclosing or encasing them in a box or chamber or boxes or chambers opening into the fire-box. Or in lieu of a flat spout or tube I introduce through the fire-door, or through the front of the furnace below the door a row or series of tubes. Two or more series or rows of tubes may be arranged below the fire-door, either in the same line or at different levels. The tube or tubes or air spout may project into the furnace and be protected by the external case, or a chamber may be formed in front of the fire door or boiler, and the tubes or spout inserted therein so as not to project above the flame.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Richard Guest Rainforth in the Great Seal Patent Office on the 29th March 1871.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, Richard Guest Rainforth, of the Town of Kingston-upon-Hull, in the County of the same Town, Steam Tug Owner, send greeting.

Rainforth's Improvements in Apparatus for Consuming Smoke.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Twenty-ninth day of September, in the year of our Lord One thousand eight hundred and seventy, in the thirty-fourth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Richard Guest Rainforth, Her special licence that I, the said Richard Guest Rainforth, my executors, administrators, and assigns, or such others as I, the said Richard Guest Rainforth, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "IMPROVEMENTS IN THE MEANS OF AND APPARATUS FOR CONSUMING SMOKE," upon the condition (amongst others) that I, the said Richard Guest Rainforth, my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said Richard Guest Rainforth, do hereby declare the nature of my said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My Invention relates to certain improvements in the means of consuming smoke and in the apparatus to be used for such purpose, the object of the Invention being to economize fuel in steam boiler furnaces by causing the products of combustion to be consumed, thus affording increased heating power from a given quantity of fuel and preventing the escape of smoke from the fire. In order to effect these objects I propose to apply to the fire-door an air spout or flat tube which is inserted in an aperture made in the door of the fire-box and placed in a slanting position, so that its internal portion shall point upwards and above the level of the fuel. The tube or spout may be made nearly equal to the width of the fire-door, so that the air ascending from the outside of the furnace passes in a current of such width

directly into the fire-place, and becoming heated by passing through the air spout, mingles with the smoke and other gaseous products and enables the fire to consume them. The air spout extends sufficiently into the fire-place to be acted upon by the heat; in ordinary flue boilers about five inches from the inside of door. The form of spout is wedge shape, thicker where it passes through the door, and gradually tapering to interior end; but the passage for the air is of equal dimensions throughout. Outside the door is the thickest part forming a head or flange, which rests against the front of door and partly holds the spout to its position. On the head or flange outside are two projections or lugs both top and bottom, forming a hold for fastening bolts outside. The door has an aperture made to allow the air spout to be placed or inserted, which aperture has perpendicular slots top and bottom for the fastening bolts to pass through as shewn in the Drawings. It is fastened in position by bolts which pass between the lugs on the air spout and through the perpendicular slots, and are secured by nuts inside the door as shewn. This appliance increases the draught of air at all conditions of the fuel and maintains a very powerful heat; regulating slides or flaps or hinges may be arranged on the tube to decrease the supply of air when the fuel is reduced to an incandescent state. In cases where the level of the burning fuel is considerably beneath the stoke-hole, the air spout or spouts may be inserted below or under the fire-door, or opposite or at sides of fire-box, but just above the level of the fire as in the former example. The latter method is more especially applicable to locomotives, and may be in substitution for or in addition to the entrance in the furnace or fire-door. Or in lieu of a flat spout or tube I introduce through the fire-door, or through the front of the furnace below the door, a row or series of tubes projecting into the fire-box and over the fire. Two or more series or rows of tubes or air spouts may be arranged below the fire-door, either in the same line or at different levels. The tube or tubes or air spout may project into the furnace or into a separate chamber, or chambers may be formed in front or other part or parts of the fire-box, and the tubes or spout inserted therein so as not to project above the flame or only partially above the flame as in the Drawings.

Fig. 1 represents a front view of a boiler furnace with air tube in fire-door, Fig. 2 being a longitudinal section of the same; Fig. 3 is a

front view of a furnace with air tube below the fire-door and above the fire level, Fig. 4 being a longitudinal section of the same. Similar letters denote corresponding parts in each Figure.

a is the front of the boiler furnace; *b*, the door; *c*, the ash-pit; and *d*, the air tube passing through the door; in Figs. 3 and 4 where the fire is below the stoke-hole, as in locomotives, the air tube is shewn beneath the door and above the fire level.

Fig. 5 shews a section of a series of tubes enclosed in a case or box, and Fig. 6 is a plan view; Fig. 7 shews a section of a boiler furnace with external chamber and curved air tube, and Fig. 8 shews a regulating door or flap. The angle of the tube or tubes should be such as to cause the external air to ascend in an oblique direction just above the fire level, so that by its admixture with the smoke and gases generated by the combustion of the fuel and afford greater heating power, in addition to the consumption and prevention of smoke. Of course any suitable description of regulating valve may be applied to the entrance of the tube, spout, or tubes and spouts, to control the supply of air.

The Figures shewn at 1*a*, represent the examples of the air spout secured by screw bolts inserted through the door or front of furnace, as first described.

Having now described the nature of my said Invention and the manner in which the same is to be performed, I would remark in conclusion that I do not restrict myself to the precise details and configuration of parts which I have expressed and shewn, as the same may obviously be varied or modified to suit various examples of boiler furnaces, but what I claim and desire to be secured to me by the herein in part recited Letters Patent are, the improved means of consuming smoke in steam boiler furnaces of all descriptions, by the application of an air tube or spout, or a series of spouts or tubes (with or without an external chamber or chambers) inserted in the fire-door or beneath the same and above the level of the fire, so that the air may be heated by passing through the tube or tubes or spouts before reaching the fuel, in order that by the regulated admission of external air the products of combustion of the fuel may be consumed, thereby increasing the

heat and preventing the egress of smoke, all substantially as herein specified and shewn.

In witness whereof, I, the said Richard Guest Rainforth, have hereunto set my hand and seal, this Sixteenth day of March, in the year of our Lord One thousand eight hundred and seventy-one.

R. G. RAINFORTH. (L.S.)

Witness,

ALEX^R. PRINCE,

Office for Patents,

4, Trafalgar Square,

Charing Cross.

LONDON:

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,

Printers to the Queen's most Excellent Majesty. 1871.

A.D. 1870. Sept 29. N°2589.
RAINFORTH'S Specification.

(1 SHEET)

FIG. 1

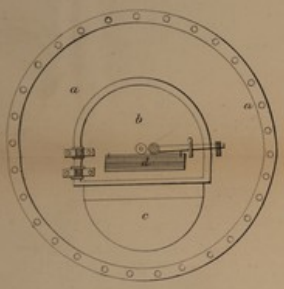


FIG. 2

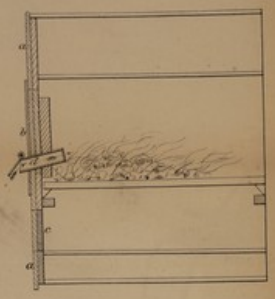


FIG. 3

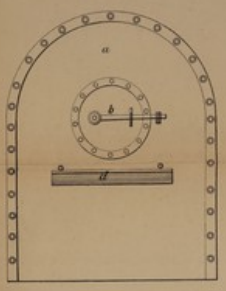


FIG. 4

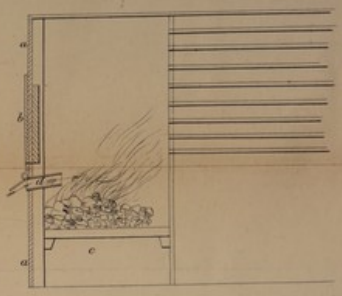


FIG. 5

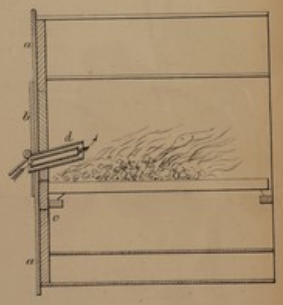


FIG. 1a

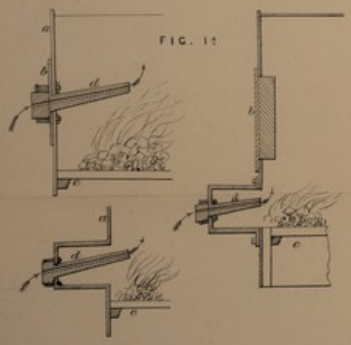


FIG. 6

FIG. 7

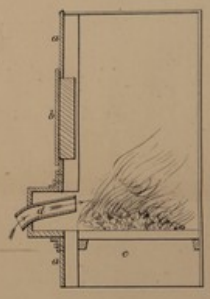
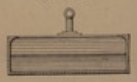


FIG. 8



The filed drawing is not colored.

Drawn on Stone by Malby & Sons.

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