Specification of Robert Hawthorn and William Hawthorn : promoting combustion and prevention of smoke in coal-burning locomotives, &c.;

A.D. 1859, 11th JANUARY. N° 86.

SPECIFICATION

OF

ROBERT HAWTHORN
AND
WILLIAM HAWTHORN.

PROMOTING COMBUSTION AND PREVENTION OF SMOKE IN COAL-BURNING LOCOMOTIVES, &c.

LONDON:
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1859.

A.D. 1859, 11*th* JANUARY. N° 86.

Promoting Combustion and Prevention of Smoke in Coal-burning Locomotives, &c.

LETTERS PATENT to Robert Hawthorn and William Hawthorn, both of the Town and County of Newcastle-upon-Tyne, Engineers, for the Invention of "IMPROVEMENTS IN APPARATUS FOR PROMOTING COMBUSTION AND PREVENTING SMOKE IN COAL-BURNING LOCOMOTIVES, AND OTHER STEAM BOILER FURNACES."

Sealed the 12th May 1859, and dated the 11th January 1859.

PROVISIONAL SPECIFICATION left by the said Robert Hawthorn and William Hawthorn at the Office of the Commissioners of Patents, with their Petition, on the 11th January 1859.

We, ROBERT HAWTHORN and WILLIAM HAWTHORN, both of the Town and County of Newcastle-upon-Tyne, Engineers, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN APPARATUS FOR PROMOTING COMBUSTION AND PREVENTING SMOKE IN COAL-BURNING LOCOMOTIVES, AND OTHER STEAM BOILER FURNACES," to be as follows:—

This Invention relates to a peculiar construction and arrangement of apparatus to be applied to the fire-doors or other convenient portions of locomotive or other steam engine fire-boxes or furnaces, whereby the air is supplied to the fuel in such a manner that a more perfect combustion and prevention of smoke is obtained.

According to this Invention it is proposed to employ a number of inclined deflecting plates fitted to the door or doors or other parts of the fire-box or furnace, and their length from back to front should not be less than the thickness of the casing in locomotive boilers, but should rather project beyond it inside the fire-box. Deflecting pieces may or may not be interposed

between the plates for the purpose of deflecting the air right and left over the surface of the fuel. And it is also proposed to use an arrangement of steam jets to be introduced into the fire-box or furnace through the back part and on each side of the fire door or doors to a little above the surface of the fire. These deflecting plates and the mode of applying the steam jets may be used either in combination or separately. Suitable regulating valves or adjustable apertures may be employed for regulating the supply of air to the furnace, but in all cases the air so supplied will be subdivided into a series of thin sheets, and will have its velocity greatly accelerated and temperature raised by being confined between the deflecting plates in its passage.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Robert Hawthorn and William Hawthorn in the Great Seal Patent Office on the 7th July 1859.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, ROBERT HAWTHORN and WILLIAM HAWTHORN, both of the Town and County of Newcastle-upon-Tyne, Engineers, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Eleventh day of January, in the year of our Lord One thousand eight hundred and fifty-nine, in the twenty-second year of Her reign, did, for Herself, Her heirs and successors, give and grant unto us, the said Robert Hawthorn and William Hawthorn, Her special license that we, the said Robert Hawthorn and William Hawthorn, our executors, administrators, and assigns, or such others, as we, the said Robert Hawthorn and William Hawthorn, our executors, administrators, or 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 APPARATUS FOR PROMOTING COMBUSTION AND PREVENTING SMOKE IN COAL-BURNING LOCOMOTIVES, AND OTHER STEAM BOILER FURNACES," upon the condition (amongst others) that we, the said Robert Hawthorn and William Hawthorn, by an instrument in writing under our hands and seals, or under the hand and seal of one of us, 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 we, the said Robert Hawthorn and William Hawthorn, do hereby declare the nature of our said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, reference being had to the accompanying Drawings, and to the letters and figures marked thereon, that is to say:—

Our said Invention relates to a peculiar construction and arrangement of apparatus to be applied to the fire-doors or other convenient portions of locomotive or other steam engine fire-boxes or furnaces, whereby the air is supplied to the fuel in such a manner that a more perfect combustion and prevention of smoke is obtained.

According to this Invention it is proposed to employ a number of inclined deflecting plates fitted to the door or doors, or other parts of the fire-box or furnace, and their lengths from back to front should not be less than the thickness of the casing in locomotive boilers, but should rather project beyond it inside the fire-box. Deflecting pieces may or may not be interposed between the plates for the purpose of deflecting the air right and left over the surface of the fuel. And it is also proposed to use an arrangement of steam jets to be introduced into the fire-box or furnace through the back part and on each side of the fire door or doors, to a little above the surface of the fire. These deflecting plates and the mode of applying the steam jets may be used either in combination or separately.

Suitable regulating valves or adjustable apertures may be employed for regulating the supply of air to the furnace, but in all cases the air so supplied will be subdivided into a series of thin sheets, and will have its velocity greatly accelerated, and temperature raised by being confined between the deflecting plates in its passage.

And in order that our said Invention may be fully understood we shall now proceed more particularly to describe the same, and for that purpose we shall refer to the several Figures on the Sheets of Drawings hereunto annexed, the same letters of reference indicating corresponding parts in both Sheets of Drawings.

Figure 1 on Sheet 1 of our Drawings represents a front elevation of a deflecting fire-door constructed according to our Invention; Figure 2 is a vertical longitudinal section of the same; and Figure 3 is a sectional plan of the door. A, A, is a metal frame (shewn in dotted lines in the elevation), in which frame the deflecting plates B, B, are fitted by means of bolts C, C, passing vertically through the top and bottom of the frame, and through the

deflecting plates and distance pieces interposed between them for the purpose of keeping the plates at a proper distance apart. Each of these bolts is made fast by a nut at top and bottom, and the lower portions of the bolts is slotted to receive the keys D, D, (shewn in Figure 2), for the purpose of tightening the several plates and distance pieces up against the top of the frame. A third bolt E, also fitted with distance pieces, passes through the plates at right angles to the plane of their inclination, and serves in conjunction with the front bolts C to hold the whole of the plates firmly together; F, F, are laterally deflecting pieces which may or may not, as desired, be placed or interposed between the vertically deflecting plates B for the purpose of directing the air right and left over all parts of the surface of the fuel in the fire-box or other furnace. In practice the deflecting plates F may be rivetted on to the plates B. The frame A of the fire-door is rivetted to the hinge plate G, which carries the adjustable apparatus or damper for regulating the admission of air to the furnace.

In the Drawings annexed this apparatus consists of two slotted plates H and I, the one sliding over the other so as to open or close the apertures therein, but we do not restrict or confine ourselves to this particular mode of regulation, as any other convenient arrangement may be employed to accomplish this object. To the hinge plate is also fitted the latch K of the fire-door, and on this latch is rivetted the handle L, the object of which is to enable the door to be pulled straight back before being opened or turned on its hinges. For this purpose the hinge plate traverses the slotted eyes of the brackets M, M, thereby clearing the ends of the deflecting plates from the sides of the fire hole. These slotted brackets are carried by plates N, N, firmly secured to the boiler or casing, the whole being made sufficiently strong to bear the weight of the fire-door and deflecting plates and regulators.

The length of the slots in the brackets should be equal to the thickness of the casing in locomotive boilers.

By this arrangement the deflecting plates may be allowed to fill up the entire breadth of the opening of the fire hole, thereby allowing no air to pass into the furnace but what is deflected by the plates before referred to, or the door may be fitted with an ordinary hinge without the slotted bracket M. The number of deflecting plates used in the door will be regulated by the size of such door, the quantity of air to be admitted, and the size of the intervals or spaces between the plates. It is obvious that other methods may be adopted in securing these plates which it is unnecessary to describe, as we do not confine ourselves to any particular mode of securing the same.

Sheet 2 of our Drawings illustrates the mode of applying the deflecting fire door in combination with the steam jet apparatus to an ordinary locomotive fire-box.

Figure 1 represents an end elevation of the fire-box or boiler of a locomotive; Figure 2 is a longitudinal vertical section of the same corresponding to Figure 1; and Figure 3 is a horizontal section of a portion of the fire-box end of the boiler shewing the arrangement for supplying steam jets to the surface of the fuel. The steam for supplying these jets is taken from the boiler in the ordinary manner well known to engineers, and is conveyed down to below the fire door by the steam pipe O connected to a transverse pipe P, the ends of which pass through tubular stays Q, Q, (Figure 3,) fitted on either side of the fire door. A screw thread is cut on the two inner ends of the transverse pipe P, on to which are screwed short horizontal pipes R, R, perforated with numerous small holes or jet orifices. By this means the perforated jet pipes R can be replaced with facility when requisite; the peculiar construction of the fire door also enables the deflecting plates to be readily changed and replaced by new ones.

Having now described and particularly ascertained the nature of our said Invention, and the manner in which the same is or may be used or carried into effect, we would observe, in conclusion, that what we consider to be novel and original, and therefore claim as the Invention secured to us by the herein-before in part recited Letters Patent, is,—

First, the general construction, arrangements, and combination of apparatus for preventing smoke in locomotive and other fire-boxes or furnaces, as herein-before described and illustrated by our Drawings.

Second, the application and use of a series of deflecting plates placed either in the fire hole or in any other convenient portion of a furnace for subdividing the air into a number of thin sheets, and deflecting it downwards and laterally upon the surface of the fuel, as herein-before described.

Third, the peculiar construction and arrangement of apparatus for supplying steam jets to boiler furnaces, as herein-before described and illustrated by our Drawings.

In witness whereof, I, the said Robert Hawthorn, on behalf of myself and the said William Hawthorn, have hereunto set my hand and seal, this Fifth day of July, One thousand eight hundred and fifty-nine.

ROBERT HAWTHORN. (L.S.)

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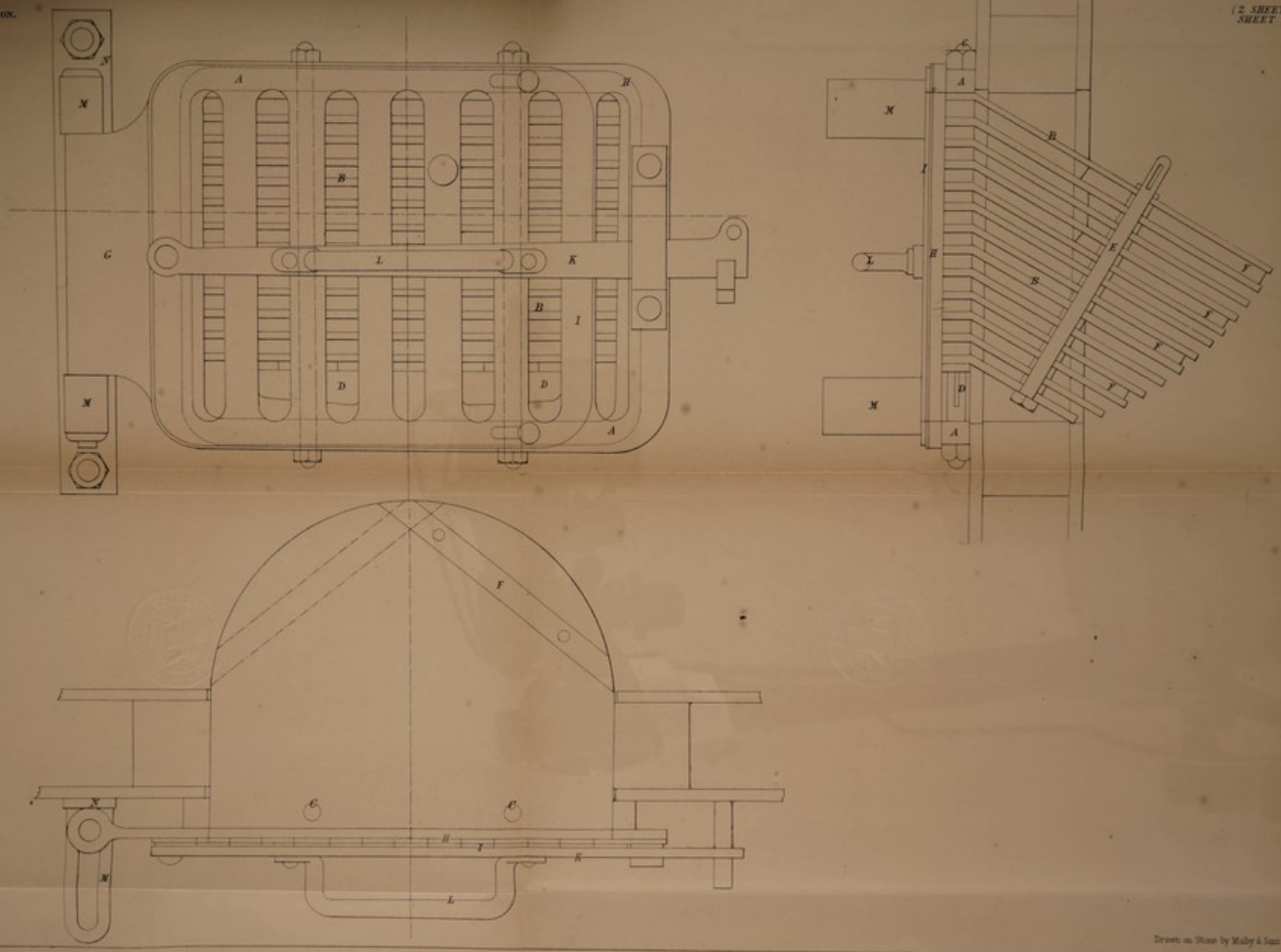
A.D. 1859. Jan. 11. N° 186.
R. & W. HAWTHORN'S Specification.

(2 SHEETS)
SHEET 1.



The filed drawing is colored.

Drawn on Stone by Malby & Sons

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(2 SHEETS)
SHEET 2.

FIG. 1.

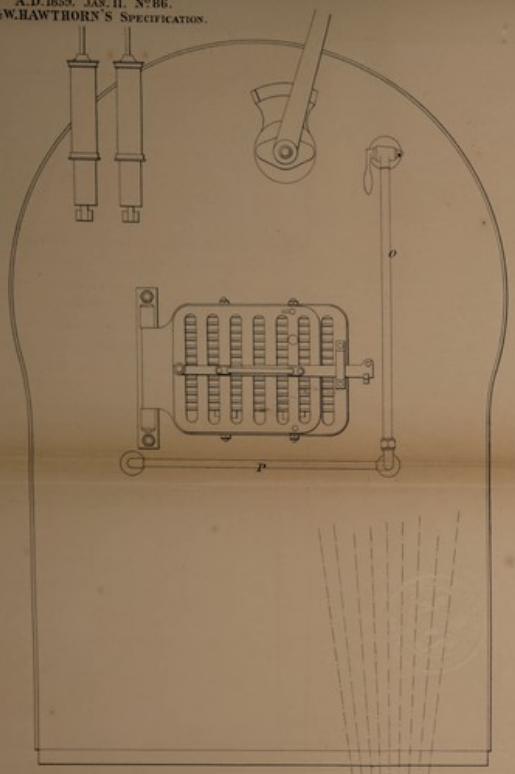


FIG. 2.

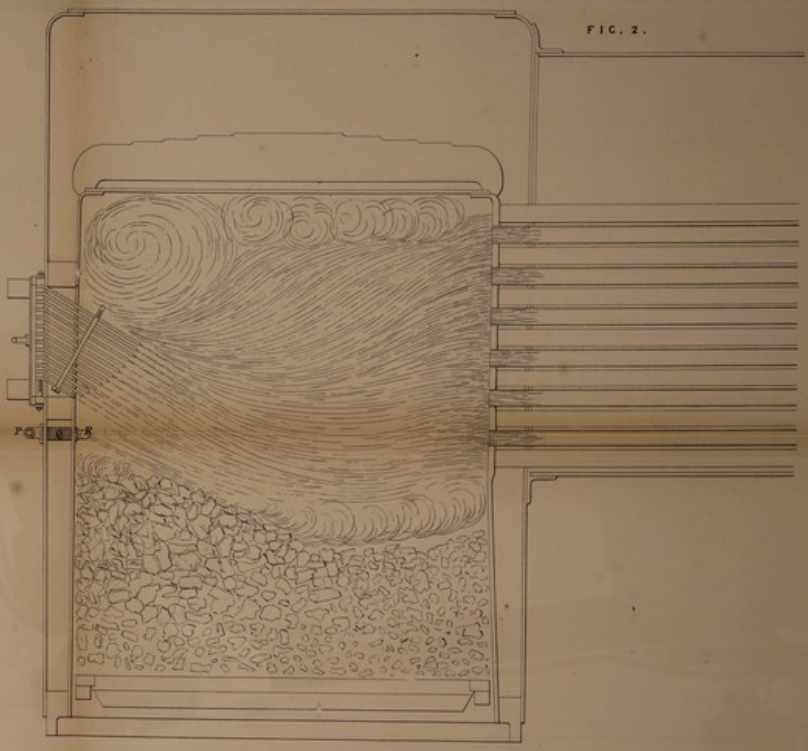
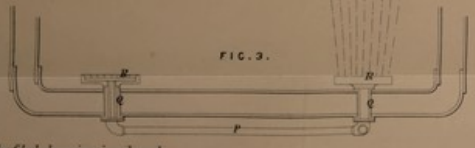


FIG. 3.



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