Specification of William Foster : steam boiler furnaces.

A.D. 1858, 23rd APRIL. N° 900.

SPECIFICATION

OF

WILLIAM FOSTER.

STEAM BOILER FURNACES.

LONDON:
PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
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Price 10d. 1858.

A.D. 1858, *23rd April.* N° 900.

Steam Boiler Furnaces.

LETTERS PATENT to William Foster, of Black Dike Mills, near Bradford, in the County of York, Spinner and Manufacturer, for the Invention of "IMPROVEMENTS IN MULTITUBULAR AND OTHER BOILERS FOR THE PREVENTION OF SMOKE AND ECONOMISING FUEL."

Sealed the 25th June 1858, and dated the 23rd April 1858.

PROVISIONAL SPECIFICATION left by the said William Foster at the Office of the Commissioners of Patents, with his Petition, on the 23rd April 1858.

I, WILLIAM FOSTER, of Black Dike Mills, near Bradford, in the County of York, Spinner and Manufacturer, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN MULTITUBULAR AND OTHER BOILERS FOR THE PREVENTION OF SMOKE AND ECONOMISING FUEL," to be as follows, that is to say:—

This Invention relates to certain improved constructions and arrangements of the furnaces of multitubular, Cornish, or marine boilers, and in the means of supplying the same with air, whereby considerable economy of fuel and the prevention of smoke is effected.

According to this Invention, a fire-brick bridge is built immediately behind the fire bars, which bridge is carried up considerably higher than usual, so as to confine the flames blown over by the fan herein-after referred to. A few inches behind this bridge is built a second bridge of the same height as the first one, and behind this second bridge are constructed longitudinally with the fire-box, a number of fire-brick walls or partitions, extending from the bottom to the top of the fire box or flue, and having intermediate spaces between them for the passage of the flame and unconsumed gases, which will be ignited and burnt by the action of the heat of the partitions. The air is supplied to the furnace or furnaces by means of one or more fan blowers, the air pipes from which

enter the furnaces immediately beneath the fire bars, the ash-pits being entirely closed in, excepting at the part where the air pipes enter. A hinged regulating valve is placed in each air pipe for the purpose of stopping or controlling the draught when fresh fuel is being supplied, and the heads of the air pipes are made to open so as to admit of the ashes in the ash-pits being removed. Holes are made in the furnace doors to admit the poker, so that the bars may be cleaned without opening the furnace doors.

Another arrangement for more effectually consuming the smoke and retaining the heat consists in lowering the two bridges slightly, and lining with fire bricks the whole of the roof of the fire box from end to end of the fire bars.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said William Foster in the Great Seal Patent Office on the 23rd October 1858.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, WILLIAM FOSTER, of Black Dike Mills, near Bradford, in the County of York, Spinner and Manufacturer, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Twenty-third day of April, in the year of our Lord One thousand eight hundred and fifty-eight, in the twenty-first year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said William Foster, Her special license that I, the said William Foster, my executors, administrators, and assigns, or such others as I, the said William Foster my 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 MULTITUBULAR AND OTHER BOILERS FOR THE PREVENTION OF SMOKE, AND ECONOMISING FUEL," upon the condition (amongst others) that I, the said William Foster, by an instrument in writing under my hand and seal, 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 William Foster, do hereby declare the nature of my said Invention, and in what manner the same is to be pre-

formed, 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 :—

My said Invention relates to certain improved constructions and arrangements of the furnaces of multitubular, Cornish, or marine boilers, and in the means of supplying the same with air, whereby considerable economy of fuel and the prevention of smoke is effected.

According to this Invention a fire-brick bridge is built immediately behind the fire bars, which bridge is carried up considerably higher than usual, so as to confine the flames blown over by the fan herein-after referred to, which fan may, however, be dispensed with if found desirable. A few inches behind this bridge is built a second bridge, of the same height as the first one, and behind this second bridge are constructed a number of fire-brick walls or partitions disposed either longitudinally or transversely in the fire-box, and extending, when placed longitudinally, from the bottom to the top of the fire-box or flue, intermediate spaces being left between them for the passage of the flame and unconsumed gases which will be ignited and burnt by the action of the heat of the partitions. When disposed transversely, these partitions assume the form of a succession of bridges projecting from the bottom and top alternately of the fire-box or flue, with intervening spaces between for the free passage of air and flame. The air is supplied to the furnace or furnaces by means of one or more fan blowers, the conducting pipes from which enter the furnaces immediately beneath the fire-bars, the ash-pits being entirely closed in excepting at the part where the air pipes enter. A hinged regulating valve is placed in each air pipe for the purpose of stopping or controlling the draught when fresh fuel is being supplied, and the heads of the air pipes are made to open, so as to admit of the ashes being removed. Holes are made in the furnace doors to admit the poker, so that the fire-bars may be cleaned without opening the doors.

Another arrangement for more effectually consuming the smoke and retaining the heat consists in lowering the two bridges slightly, and lining with fire-brick the whole of the roof and ash-pit of the fire box, from end to end of the fire-bars.

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

Figure 1 of the annexed Sheet of Drawings represents a longitudinal

vertical section of a multitubular boiler with the two fire boxes constructed according to my present Invention; Figure 2 is a sectional plan of the same; Figure 3 is an end elevation of the boiler; Figure 4 is a transverse section taken along the line 1—2, in Figures 1 and 2; and Figure 5 is a similar section taken along the line 3—4, in Figures 1 and 2. A, A, are the two fire boxes, and B the series of tubes. A fire-brick bridge C is built in each fire box or furnace immediately behind the fire-bars, and is carried up considerably higher than usual, as shewn in the Drawings, for the purpose of confining the flames blown over by the fan-blower D, herein-after more particularly referred to. A short distance behind the bridge C is built a second bridge E, of the same height as the first one, and behind this last bridge are constructed a number of fire-brick walls or partitions F, F, disposed longitudinally inside the two fire boxes, and extending from the bottom to the top of the same. Intermediate spaces are left between these partitions to admit of a free circulation of the air, flame, and gases, which latter are ignited and burnt by the heat of the fire-brick partitions. The air may or may not be supplied by a fan-blower, shewn at D, the air pipes G from which, when employed, enter each furnace separately immediately beneath the fire bars. The ash-pits H, H, are entirely closed, excepting at the part where the air pipes enter. I is a hinged valve for adjusting or regulating the air supply when fresh fuel is being thrown on. The heads of these pipes are made to open or turn back, as shewn at K, for the purpose of enabling the ashes to be cleared out of the ash-pit; L, L, are holes in the furnace doors, to admit of a poker being introduced for the purpose of removing clinkers and cleaning the fire bars; M represents a fire-brick lining to the roof of the fire box, such lining extending along the entire length of the fire bars, and greatly assisting the combustion of the smoke and gases by reason of the great heat which it imparts to them on their passage along the furnace; Figure 6 represents a longitudinal vertical section of a multitubular boiler similar to the former, but shewing another modification of my improvements; Figure 7 is a corresponding sectional plan of the same; Figure 8 is a transverse section taken along the line 1—2, in Figures 6 and 7; Figure 9 is a similar view taken along the line 3—4; Figure 10 is a section taken along the line 5—6; and Figure 11 is a similar view taken along the line 7—8, in Figures 6 and 7. According to this modification, I effect a more perfect combustion of the smoke and gases in steam boiler furnaces by lowering slightly the bridges C and E, and lining both the roof and bottom of the fire box internally with fire-brick, as shewn at M, the lining extending along the whole length of the furnace. F, F, are partitions of fire-brick arranged transversely across the fire boxes or flues behind the

two bridges C and E. These partitions have each an opening in them sufficiently large to allow of the free passage of the flame and gases, but at the same time they are so constructed and disposed with regard to the bridges C and E, as to impede to a certain extent the passage of the smoke and gases, and cause them to pass in a serpentine or zig-zag course, as shewn by the arrows, and become consequently heated and ignited by being brought in contact with the large amount of heated surface of the fire-brick bridges and partitions. The bridge E is curved at the top, as shewn in Figure 10, and is nearly closed up under the roof of the fire box; small spaces are left between the ends of the bricks, as shewn at *e*, *e*, to allow of the passage therethrough of a portion of the flame and gases. The arrangements for the air supply may be precisely the same as herein-before described in reference to the first modification, and need not therefore be recapitulated.

Having now described and particularly ascertained the nature of my said Invention, and the manner in which the same is or may be used or carried into effect, I would observe, in conclusion, that I do not confine or restrict myself to the precise details or arrangements which I have had occasion to describe or refer to, as variations may be made therefrom without deviating from the principles or main features of my said Invention; but what I consider to be novel and original, and therefore claim as the Invention secured to me by the herein-before in part recited Letters Patent, is,—

First, the general constructions and arrangements of steam boiler furnaces with or without fan blowers for supplying air thereto, as herein-before described.

Second, the system or mode of supplying air to steam boiler furnaces by blowing such air immediately under the grate or furnace bars.

Third, the systems or modes of confining the flames and gases by the employment of three or more fire-brick walls or partitions arranged either longitudinally or transversely in the fire box, as herein-before described.

Fourth, the lining of the fire box and ash-pit with fire-brick along the entire length of the furnace bars, as herein-before described.

In witness whereof, I, the said William Foster, have hereunto set my hand and seal, this Twenty-first day of October, One thousand eight hundred and fifty-eight.

WILLIAM FOSTER. (L.S.)

LONDON:
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A. D. 1858. April 23. Nº 900.
FOSTER'S Specification.

[1 SHEET.]

FIG. 1.

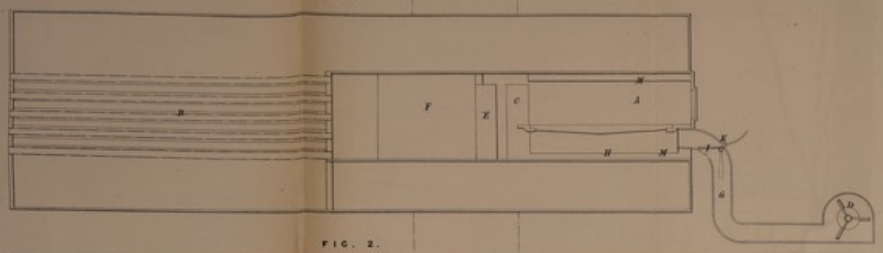


FIG. 3.

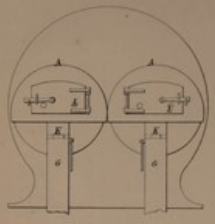


FIG. 2.

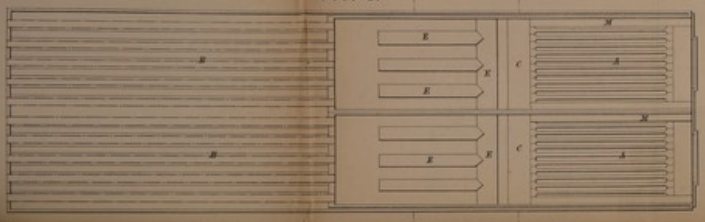


FIG. 4.

FIG. 5.

FIG. 6.

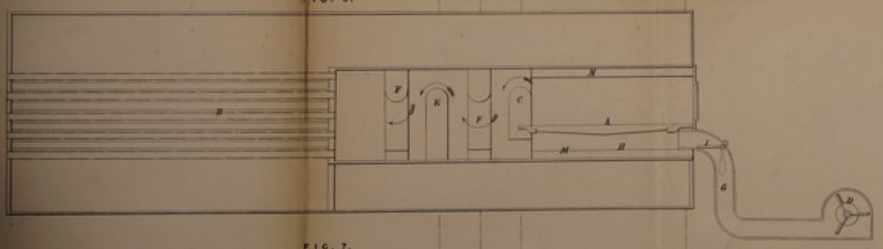


FIG. 8.

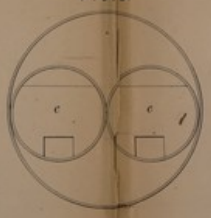


FIG. 9.

FIG. 7.

FIG. 10.

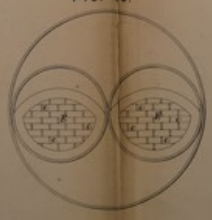
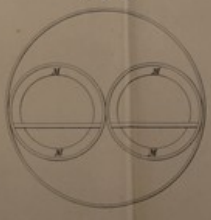


FIG. 11.



The filed drawing is partly colored.

Drawn on Stone by Molly & Sons

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