

## **Specification of James Watt : furnaces and fire-places.**

### **Contributors**

Watt, James, 1736-1819.

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A.D. 1785 . . . . . N° 1485.

S P E C I F I C A T I O N

OF

JAMES WATT.

FURNACES AND FIRE-PLACES.

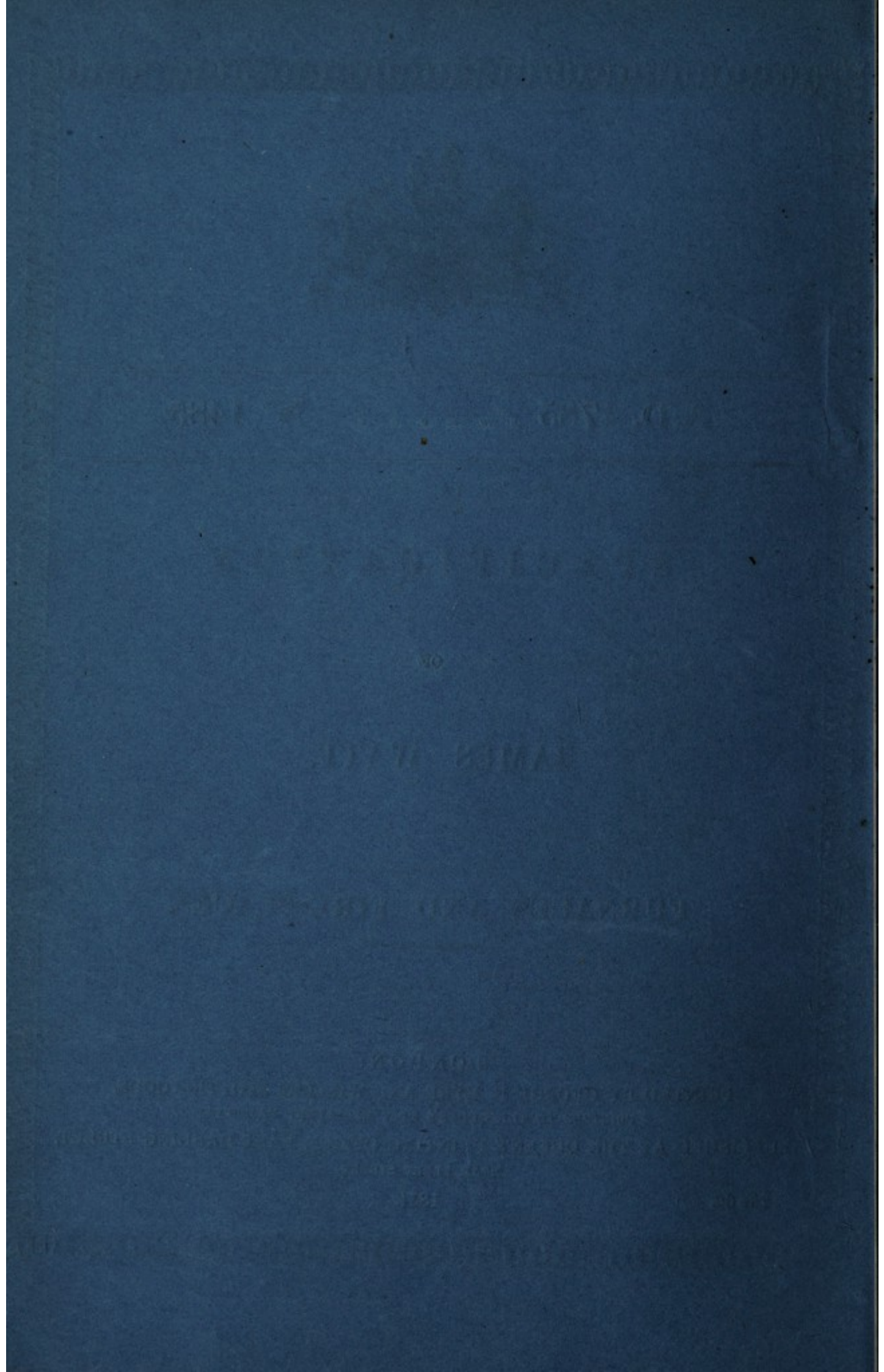
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A.D. 1785 . . . . . N° 1485.

**Furnaces and Fire-places.**

**WATT'S SPECIFICATION.**

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, JAMES WATT, of Birmingham, in the County of Warwick, Engineer, send greeting.

WHEREAS His most Excellent Majesty King George the Third, by His Letters Patent under the Great Seal of Great Britain, bearing date at Westminster, the Fourteenth day of June, in the twenty-fifth year of His reign, did give and grant to me, the said James Watt, His especial licence, full power, sole privilege and authority, that I, the said James Watt, my exors, admors, and assigns, should and lawfully might, during the term of years therein expressed, make, use, exercise, and vend, throughout that part of Great Britain called England, His Dominion of Wales, and town of Berwick upon Tweed, my Invention of "CERTAIN NEWLY IMPROVED METHODS OF CONSTRUCTING FURNACES OR FIRE-PLACES FOR HEATING, BOILING, OR EVAPORATING OF WATER AND OTHER LIQUIDS, WHICH ARE APPLICABLE TO STEAM ENGINES AND OTHER PURPOSES; AND ALSO FOR HEATING, MELTING, AND SMELTING OF METALS AND THEIR ORES, WHEREBY GREATER EFFECTS ARE PRODUCED FROM THE FUEL, AND THE SMOKE IS IN A GREAT MEASURE PREVENTED OR CONSUMED;" in which said recited Letters Patent is contained a proviso obliging me, the said James Watt, particularly to describe and ascertain the nature of my said Invention, and in what manner the same is to be performed, by an instrument in writing under my hand and seal, and to cause the same to be inrolled in His Majesty's High Court of Chancery within one calendar month next and immediate'y after the date of the said Letters Patent, as in and by the said Letters Patent

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and the Statute in that behalf made, relation being thereunto respectively had, may more at large appear.

**NOW KNOW YE**, that in compliance with the said proviso, and in pursuance of the said Statute, I, the said James Watt, do hereby declare that the following is a particular description of the nature of my said Invention, 5 and in what manner the same is to be performed (that is to say):—

My said newly improved methods of constructing furnaces or fire-places consist in causing the smoak or flame of the fresh fuel in its way to the flues or chimney to pass together with a current of fresh air through, over, or among fuel which has already ceased to smoke, or which is converted into coaks, char- 10 coal, or cinders, and which is intensely hot, by which means the smoak and grosser parts of the flame, by coming into close contact with or by being brought near unto the said intensely hot fuel, and by being mixed with the current of fresh or unburnt air, are consumed or converted into heat, or into pure flame, free from smoak. I put this in practice, first by stopping up 15 every avenue or passage to the chimney or flues, except such as are left in the interstices of the fuel by placing the fresh fuel above or nearer to the external air than that which is already converted into coaks or charcoal, and by constructing the fire-places in such manner that the flame and the air which animates the fire must pass downwards or laterally or horizontally through the 20 burning fuel, and pass from the lower part or internal end or side of the fire-place to the flues or chimney. In some cases, after the flame has past through the burning fuel, I cause it to pass through a very hot funnel, flue, or oven before it comes to the bottom of the boiler, or to the part of the furnace where it is proposed to melt metal, or perform other office, by which means the 25 smoke is still more effectually consumed. In other cases I cause the flame to pass immediately from the fire-place into the space under a boiler, or into the bed of a melting or other furnace. The Drawing, Figure first, shews a section of a fire engine boiler and its furnace or fire-place (which I have chosen for an example of the application of this new method to the heating and evapo- 30 rating of water). (A, A,) is the boiler, which may be made of any form suitable to its use. (B, B,) is a flue surrounding the boiler as usual. (C) is the uptake or passage from the space under the boiler to the flues. (D, D,) is a funnel or flue for the flame to come from the fire-place to the boiler. (E, E,) is a place to contain the ashes, and F is a door to take them out at, which must be kept 35 continually shut during the time of working. (G, H,) is the fire-place: the fresh fuel is put in at G, and gradually comes down as the fuel below consumes. The part at (H) is very hot, being filled with the coaks or coals which have ceased to smoke. (J) is an opening or openings to admit fresh air

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and regulate the fire. K is a door into the space under the boiler, which being opened admits air and stops the draught of the chimney when the operation is wanted to cease. Figure 2 is a section of the same fire-place in the other direction, in which (M, M,) is the back of the fire-place; L, the brick  
 5 arch on which the fuel lies; and (E, E,) the ash hole. Figure 3 is an outside view of the same fire-place, shewing the air holes J, J, and the ash hole door F; and Figure 4 is a plan of the same, with part of the boiler seating taken in the line z, z, of Figure 1. The dotted lines represent the flues, and the darts point out the direction of the flame. The fire is first kindled upon the brick  
 10 arch L, L, and when well lighted more fuel is gradually added until it is filled up to (G), and care is taken to leave proper interstices for the air to pass either among the fuel or between the fuel and the front wall (N), and as much air is admitted at (J, J,) as can be done without causing the smoak to ascend perpendicularly from G, which it will do if too much air is admitted at (J, J).  
 15 The dimensions of this fire-place are shewn by the scale, and are properly adjusted for burning about eighty-four pounds' weight of coals in an hour; where greater or lesser quantities are required to be burnt, the furnaces must be enlarged or diminished accordingly, or if much greater, more furnaces than one must be employed. Figure 5 represents this new fire-place as  
 20 applied to a furnace for melting iron and other metals, and constructed without the funnel or perpendicular flue D, D, in Figure 1. N.B.—The same letters refer to the same parts in all the preceding Figures. I also construct these new fire-places so that the part G, H, lies sloping or horizontal, and otherwise vary the figure or form and proportions of the same; but in all  
 25 cases the principle is the same, the fresh or raw fuel being placed next the external air, and so that the smoak or flame passes over or through the coaked or charred part of the fuel. I also occasionally cover the opening (G), and cause the air to enter only or principally at (J, J); secondly, in some cases I place the fresh fuel on a grate as usual, as at (A, A, Figure 6), and  
 30 beyond that grate, at or near the place where the flame passes into the flues or chimneys, I place another smaller grate (B), on which I maintain a fire of charcoal, coaks, or coals which have been previously burnt until they have ceased to smoak, which, by giving intense heat and admitting some fresh air, consumes the smoak of the first fire.  
 35 Lastly, be it remembered that my said new Invention consists only in the method of consuming the smoak and increasing the heat by causing the smoak and flame of the fresh fuel to pass through very hot funnels or pipes, or among, through, or near fuel which is intensely hot, and which has ceased to smoak, and by mixing it with fresh air when in these circumstances, and in the form

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and nature of the fire-places herein mentioned, described, and delineated, the boilers and other parts of the furnaces being such as are in common use. And be it also remembered that these new invented fire-places are applicable to furnaces for almost every use or purpose.

In witness whereof, I have hereunto set my hand and seal, this Eighth 5  
day of July, in the year of our Lord One thousand seven hundred  
and eighty-five.

JAMES WATT. (L.S.)

Signed, sealed, and delivered (being first  
duly stampd), and the words "which 10  
are applicable to steam engines and  
other purposes" in the fifth line, the  
words "together with a current of fresh  
air" in the tenth line, the words "and  
by being mixed with the current of 15  
fresh or unburnt air" in the twelfth  
line, the words "air is" in the twenty-  
fifth line, the word "admitting" in the  
thirty-second line, and the words "and  
by mixing it with fresh air when in 20  
these circumstances" in the thirty-  
fourth line, being all previously inter-  
lined, in presence of

JOHN SOUTHERN,  
CHARLES PORDEN. 25

**AND BE IT REMEMBERED**, that on the Eighth day of July, in the year  
of our Lord 1785, the aforesaid James Watt came before our said Lord  
the King in his Chancery, and acknowledged the Specification aforesaid, and  
all and everything therein contained and specified, in form above written. 30  
And also the Specification aforesaid was stampd according to the tenor of the  
Statutes made for that purpose.

Inrolled the Ninth day of July, in the year of our Lord One thousand  
seven hundred and eighty-five.

LONDON:

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