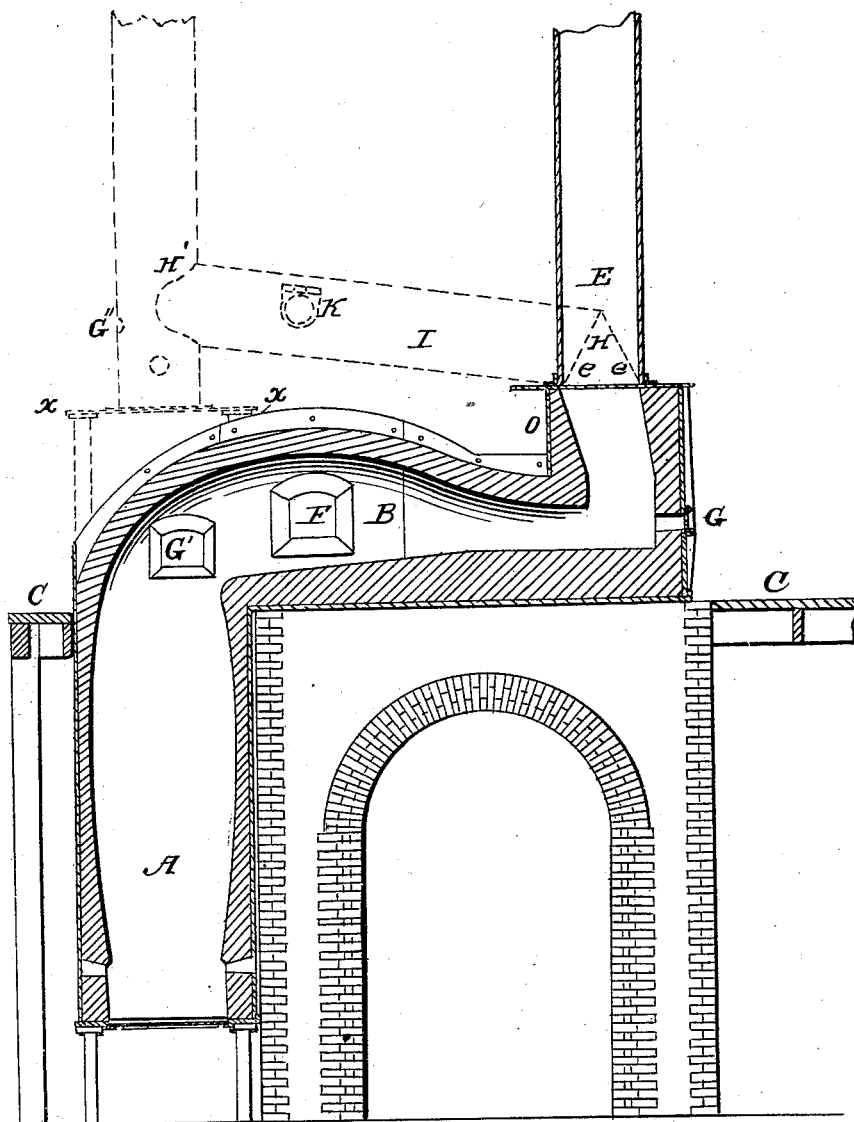


GREENE & KAY.

Cupola Furnace.

No. 67,646.

Patented Aug. 13, 1867.



Witnesses:

A. H. Smith
L. B. Smith

Inventors:

J. Paul Greene
John A. Kay
By their attorneys
Wm. H. Smith & Son

United States Patent Office.

J. DURELL GREENE, OF CAMBRIDGE, MASSACHUSETTS, AND JOHN A. KAY,
OF COLUMBIA, SOUTH CAROLINA.

Letters Patent No. 67,646, dated August 13, 1867.

IMPROVED REVERBERATORY AND CUPOLA-FURNACE.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN :

Be it known that we, J. DURELL GREENE, U. S. A., of Cambridge, Massachusetts, and JOHN A. KAY, of Columbia, South Carolina, have invented a Reverberatory Cupola for Melting Iron and other Metals; and we do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of our invention sufficient to enable those skilled in the art to practise it.

Our invention relates to that class of furnaces designed for melting iron preparatory to casting, but it is also applicable to the melting of other metals.

It consists in the combination of an ordinary cupola-furnace for the melting of the metal, with a reverberatory furnace; the function of the latter, in such combination, being not to melt but to heat to a high degree the metal prior to its introduction into the cupola-furnace; and in utilizing for this purpose a large amount of heat which would otherwise be totally lost.

It further consists in certain details of construction, hereinafter more particularly set forth.

The drawing accompanying and making part of this specification represents a vertical longitudinal section, through its centre, of a furnace embodying our invention.

A designates an ordinary cupola-furnace, the construction of which, as a whole, it is unnecessary to describe and in which the fuel and metal, when introduced, occupy their usual place upon the bed; and it is to be provided as usual with such accessories as may be needed. B represents a reverberatory furnace, which, in its general construction, may be of the usual form. This furnace is, however, connected with the top of the cupola-furnace, as shown, and in such way that the heat ascending from the latter, instead of passing directly out of the continuous vertical chimney; as usual, and thus becoming dissipated and lost, is conveyed through the reverberatory furnace, and after performing there its function of heating the bars or pieces of metal, it then passes off through a discharge-chimney, E, rising from the farther end of the reverberatory furnace B. C is a platform or floor for the workmen, and which also affords a convenient receptacle or table for the fuel or metal. The reverberatory furnace B may rest upon pillars, or upon a solid foundation of brick or masonry, as shown. F F represent the usual openings for sliding doors, placed on opposite sides of the reverberatory furnace to allow of the introduction of the metal to be heated, and which may be opened and closed at will by the aid of weighted levers connected thereto, or in any other well-known or convenient manner. G is a door at the further end of the furnace B. Another door, G', is shown, the object of which is to allow the introduction of fuel, as in ordinary cupolas. G'' is another hole or opening made in the chimney to allow the introduction by the operator of any suitable implement for the purpose of pushing the metal from the secondary or auxiliary pipe or reverberator hereinafter described, into the primary or main reverberator B when desired.

Thus far (with the exception of the allusion to the auxiliary reverberator) we have described our invention as we propose to apply it when building new furnaces, but our improvement may be readily applied to cupola-furnaces already in use by simply cutting off a portion of the chimney at and below the line *x*, closing at its bottom the opening so left, and then connecting the top of the cupola with the reverberatory furnace in the manner shown and described. The dotted lines in the drawing indicate that portion of the chimney remaining after it has been cut off, as just described. In such case, however, we dispense with the upper portion of chimney E, close up its top somewhat as shown in dotted lines *e e*, and avail ourselves instead of the upper portion of the cupola-chimney by connecting the same as at H H', by means of a pipe, I, (which can be made in the form of a reverberatory furnace and located immediately above the furnace B,) with the outlet end of B, so that the heat shall make a return course after passing through B. K is a door placed on one side or on opposite sides, if desired, of the reverberatory chamber I, and designed also for the introduction of metal to be there heated. We thus not only avoid the erection of a new chimney, but also provide an additional heating-chamber.

The operation is as follows: The cupola being stacked in the usual manner and the fire started, the workman feeds into the openings at F (and also into the opening or openings K, if desired, when the pipe or secondary reverberator is used,) any convenient quantity of metal. These doors or openings are then closed, and by the action of the intense heat passing through B and there reverberating upon the metal, the latter is soon heated to a very

high temperature, and to nearly or quite a white heat, but not melted. When sufficiently heated, the workman introduces through door G, or any other door, if convenient, any of the ordinary implements which will enable him to push the material out of furnace B into the cupola A. Now, by reason of the high degree to which the metal has already been heated, it is evident that but comparatively little further heat will be required to reduce it to a melted condition. This process is repeated by continuing to supply the furnace B (and also the pipe or secondary reverberator I, if desired, when the same forms part of the construction) with the cold metal from time to time, as needed, and transferring the same, when sufficiently heated, to the cupola, as heretofore described. When the chamber or reverberator I is used, the heated metal is transferred from it to the cupola by pushing it, as before described, into the primary reverberatory furnace B, and then pushing it thence at the proper period into the cupola.

The advantages of this improvement are apparent. The fire being started and the cupola stacked, the metal in the furnace B will be partially heated during the time in which the fuel is getting fairly ignited, and during the whole period in which the fire is kept up, the heat (which by the old practice is dissipated and lost) is utilized in heating the metal in the reverberatory furnace, and also that, if any, in the pipe or furnace I, when that is used; and from time to time, as fast as practicable, its place is supplied by a new charge of metal to be similarly heated. Inasmuch as a lesser period will be required to melt this previously heated metal than if introduced cold into the cupola, the economy of time will be evidently very great. When the workmen leave their work for the day the cupola may, by the use of any suitable dampers, be stopped up, and in this condition the metal in the reverberatory furnace will then remain at a red heat ready for the melting on the succeeding day.

What we claim, and desire to secure by Letters Patent, is—

The combination of an ordinary cupola for melting iron or other metal, with a reverberatory furnace, substantially as and for the purpose described.

The utilization of waste heat from the cupola to heat the metal prior to its introduction into the cupola, substantially as described.

In combination with the cupola and a reverberatory furnace, a supplemental heating or reverberatory chamber, substantially as described.

J. DURELL GREENE,
JOHN A. KAY.

Witnesses:

JOHN J. HALSTED,	}	to the signature of J. DURELL GREENE.
THOS. T. EVERETT,		
F. W. McMASTER,	}	to the signature of JOHN A. KAY.
J. E. DURK,		