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W. CROSSLEY.

HOT BLAST OVEN.

No. 180,116. Patented July 25, 1876.

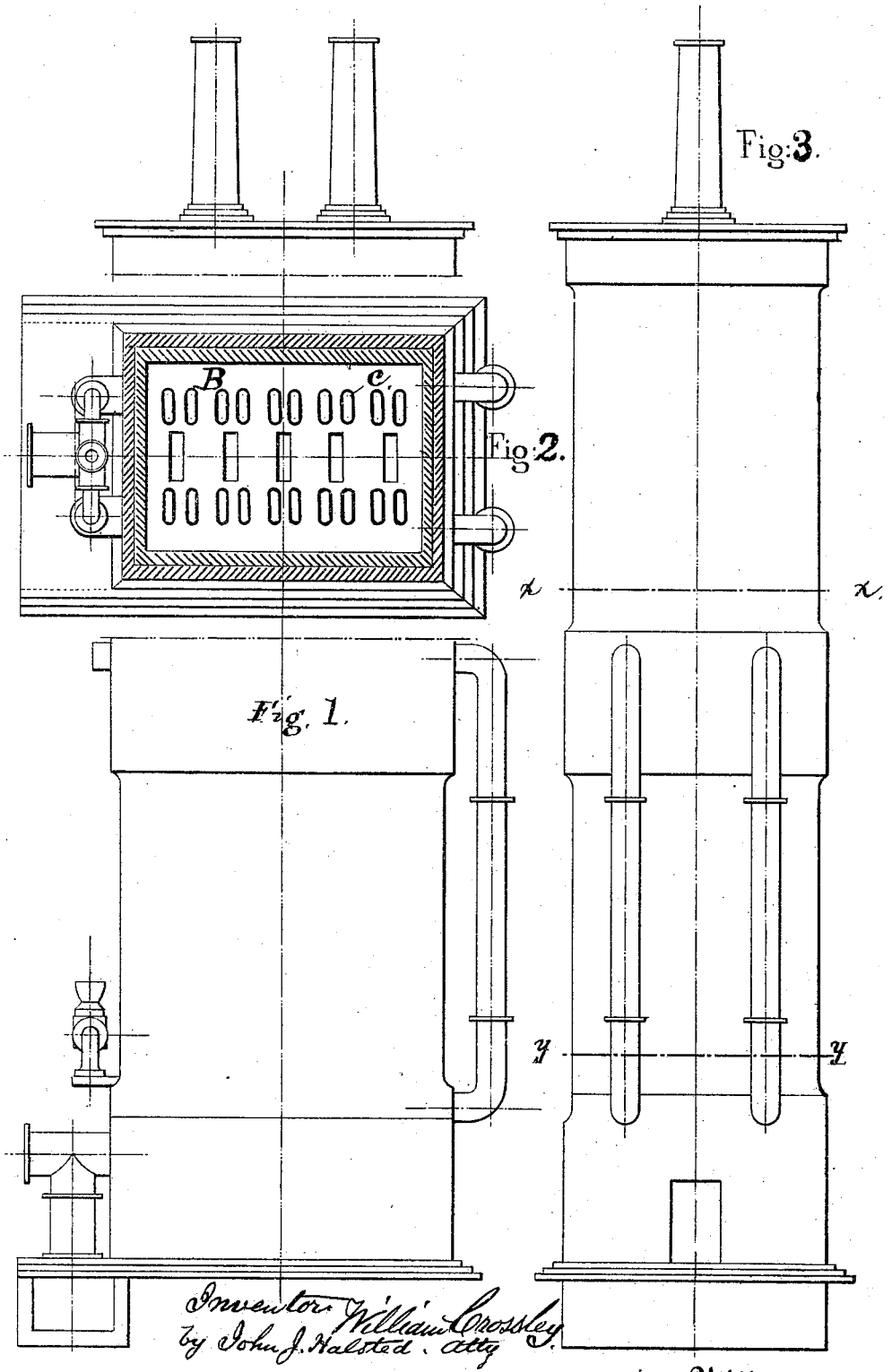

Fig. 1.

Fig. 2.

Fig. 3.

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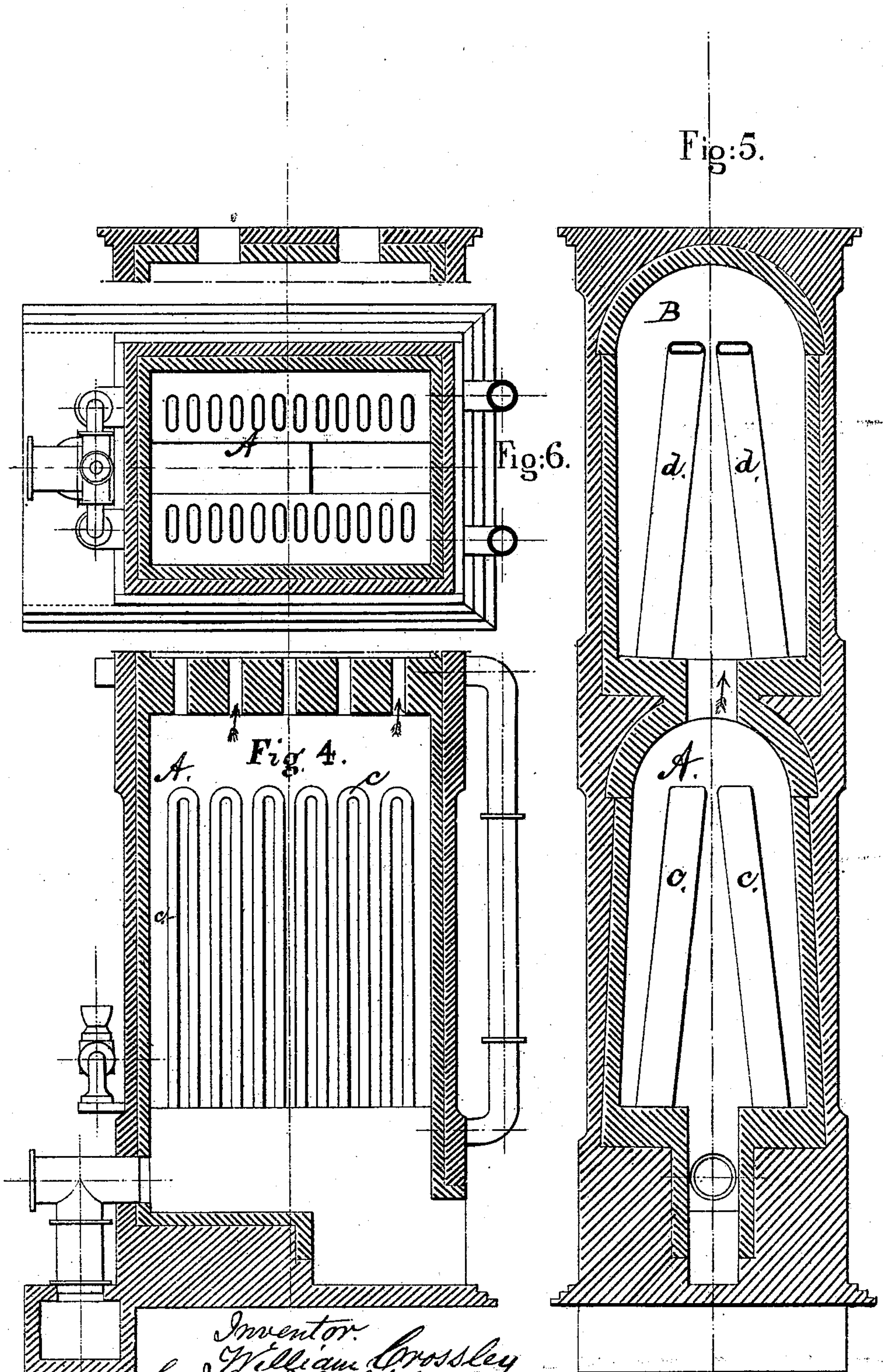

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UNITED STATES PATENT OFFICE.

WILLIAM CROSSLEY, OF GREENSCOE HOUSE, DALTON IN FURNESS, ENGLAND.

IMPROVEMENT IN HOT-BLAST OVENS.

Specification forming part of Letters Patent No. **180,116**, dated July 25, 1876; application filed February 28, 1876.

To all whom it may concern:

Be it known that I, WILLIAM CROSSLEY, of Greenscoe House, Dalton in Furness, county of Lancashire, England, have invented new and useful Improvements in the Arrangement of Stoves and Pipes for Heating Air for Blast-Furnaces, which improvements are fully set forth in the following specification, reference being had to the accompanying drawings.

This invention of improvements in the arrangement of stoves and pipes for heating air for blast-furnaces consists in arranging the ordinary hot-air stove and pipes, not as commonly employed, in one tier, but, on the contrary, in successive tiers superimposed upon each other, in such manner that the products of combustion in one chamber, having therein heated the pipes conveying the blast, are led into another similar chamber, with another set of pipes, and, after heating these pipes, are again, if required, led into another similar chamber and set of pipes, and so on, as required. In most cases two tiers are sufficient, one over the other. The lower chamber is of brick-work, as ordinarily constructed, with its series of **A**-pipes and communications, as usual, and supplied with a furnace or furnace and inlet for the gases from the blast-furnace. The crown of the chamber is perforated to allow the heated gases to escape into the upper and superimposed chamber, where it acts upon another series of pipes similar to the set below. If no more heat is required to be abstracted from the gases, a third chamber is not required; but the crown of the second chamber is fitted with a chimney or chimneys, by which the heated gas, now deprived in great measure of its caloric, escapes into the air. The cold blast is led into the pipes of the upper chamber, successively passing up and down through the series of **A**-pipes, and, having traversed the whole series, it is led into the series of the lower chamber, and, after traversing the whole of them, is passed out hot to the blast-furnace.

It will thus be seen that the upper chamber, really heated by escaping and ordinarily lost hot gas from the lower chamber, will communicate a great amount of caloric to the air passing through the pipes, and that the resulting high temperature over and above the temperature of the entering cold air, as it will then enter the pipes of the second chamber, is the measure of economy to be obtained by the adoption of this method of arranging the hot-air stoves and pipes for heating air for blast-furnaces.

The object in putting the chambers one above the other is with the twofold view of taking advantage of increased height to get a good draft, and of so arranging the arch as to properly distribute the zone of combustion.

The accompanying drawings, forming part of this specification, will more particularly set forth the manner of carrying the invention into practice.

The like letters refer to like parts in all the drawings.

Figure 1 is a partial side elevation; Fig. 2, a horizontal section through the line *x x* of Fig. 3; Fig. 3, an end elevation; Fig. 4, a longitudinal vertical section, in parts disconnected; Fig. 5, a transverse vertical section; Fig. 6, a horizontal section through the line *y y* of Fig. 3.

A, Figs. 4, 5, and 6, is the chamber, in which cast-iron heating-pipes *c* are placed, arranged in any of the approved modes. Into this chamber the gases may be admitted and used in the ordinary manner; but the method of combustion indicated is found to work satisfactorily.

B, Figs. 1 and 5, is a second or upper chamber, into which the gas is conveyed through flues, (indicated by the arrows,) and in which similarly-constructed cast-iron pipes *d* are arranged in a manner resembling that of the lower or combustion chamber. In this upper chamber the pipes may be fewer in number or less in size, and the metal used in the construction of a less thickness, than that of the pipes in chamber A. A convenient number of pipes is twelve in the lower and ten in the upper chamber.

The blast is first conducted through the heating-pipes in the upper chamber, and these heated by the escaping gases from the lower one, and in this manner it is found that the temperature of the blast may be raised to 500° Fahrenheit, (260° centigrade,) which is a clear gain to this extent over the system of heating-blast now adopted in the old form of cast-iron

hot-air stove. The blast thus heated is then conveyed (through ordinary cast-iron pipes, which may be covered with non-conducting material, or incased within a brick chamber, in order that the blast may retain the temperature already reached) into the heating-pipes of the lower chamber A, where it is further heated to the temperature required for use in the blast-furnace. This temperature may either be the same as that ordinarily obtained from cast-iron stoves, in which case it will be of a more uniform character and obtained with less heating of the pipes, consequently with less wear and tear, and at a saving of gas or other fuel, or it may be of a temperature of 1,150° Fahrenheit, (621° centigrade,) which is about 200° Fahrenheit (93⅓° centigrade) above the temperature safely obtainable in the old form of stove, and can be secured without any higher temperature of heating-pipes than that usually adopted.

The power of the stove is so great (due to the draft caused by its increased height, and also to the extent of the heating-surface) as to be found to give such control over the temperature of the blast that it may be kept constantly at very nearly the same temperature, notwithstanding disturbances in the weather or accidental occurrences at the furnace, which interfere with the quality or quantity of the gas.

Having now described and particularly set forth the nature of the said invention, and the best means I am acquainted with for carrying the same into effect, I would have it understood that what I claim and desire to secure is—

The described combination with the chamber A, provided with perforations or passages in its crown or dome, and inclosing the vertically-arranged zigzag pipes *c*, inclined toward each at their top, of the chamber B, directly surmounting the chamber A and inclosing the series of pipes *d*, inclined toward each other at their top, the heat from A passing up between the rows of pipes in B, the whole operating as and for the purpose set forth.

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Witnesses:

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