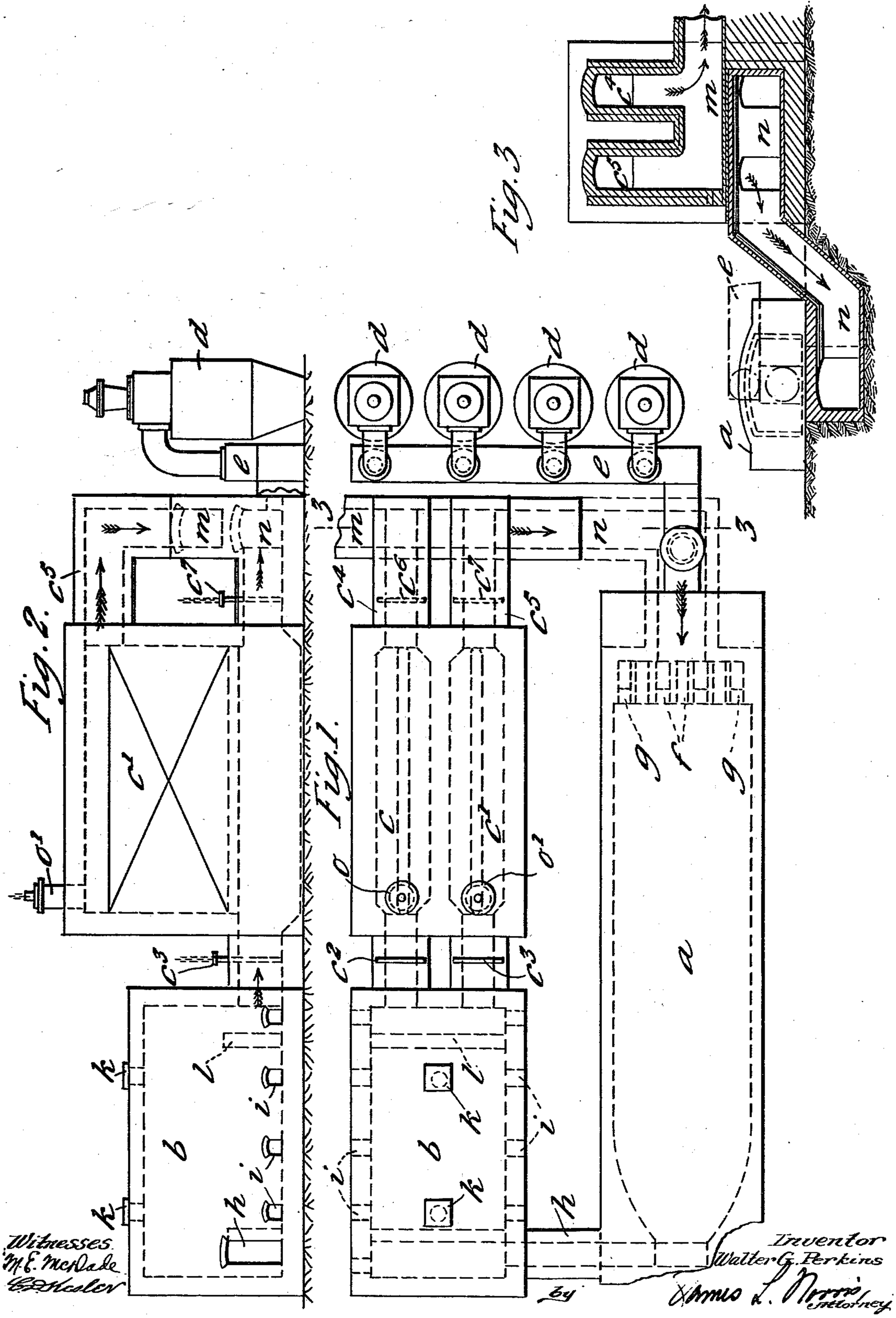
W. G. PERKINS.

COPPER SMELTING FURNACE.

APPLICATION FILED JAN. 20, 1913.

1,136,834. Patented Apr. 20, 1915.



UNITED STATES PATENT OFFICE.

WALTER GEORGE PERKINS, OF LONDON, ENGLAND.

COPPER-SMELTING FURNACE.

1,136,834. Specification of Letters Patent. Patented Apr. 20, 1915.

Application filed January 20, 1913. Serial No. 743,159.

To all whom it may concern:

Be it known that I, WALTER GEORGE PERKINS, a subject of the King of Great Britain, residing in London, England, (whose post-office address is 62 London Wall, in the city of London, England,) have invented certain new and useful Improvements in Copper-Smelting Furnaces, of which the following is a specification.

Modern reverberatory furnaces for copper smelting are of considerable length, 110 feet being a common length in certain districts. These furnaces have to be heated to a high temperature with comparatively little fall of temperature from the furnace end to the other end. It has been possible to obtain this heating where long flame coal, such as one having a calorific value of 11000–14000 B. T. U, has been readily obtainable. The supply of such fuel, however, is becoming scarce and with the average coal of calorific value about 8000 B. T. U., it is no longer possible to heat long reverberatory furnaces for copper smelting. It has therefore become an urgent necessity in copper smelting practice to apply gas-firing to such furnaces, and in view of the fact that the waste gases leave the furnace at a high temperature this mode of firing can only be profitable if regenerators are used. It is the use of regenerators, however, that has proved the obstacle to successful gas-firing. Copper smelting furnaces, have indeed been built on the principle of the regenerative steel furnaces, namely with reversible heating at the ends of the furnace, but these have proved very costly and have been abandoned owing to the necessity for frequent stoppages in order that the regenerators may be cleared of dust, which is carried away in large proportion by the waste gases of a reverberatory copper smelting furnace.

By my invention I am the first to apply successful regenerative gas-firing to reverberatory furnaces for copper smelting.

The invention consists of a non-reversible, gas-fired reverberatory furnace, a regenerator, and interposed between the furnace and the regenerator means whereby the dust carried from the furnace by the waste gases is prevented from entering the regenerator.

The accompanying drawings show by way of example a plant constructed according to this invention.

Figure 1 is a plan showing the reverberatory furnace *a*, a dust chamber *b*, a pair of regenerator chambers *c*, c^1 and the producers *d*. Fig. 2 is an elevation, the reverberatory furnace having been removed. Fig. 3 is a vertical section on line 3—3 of Fig. 1.

The producers *d* are placed as near to the furnace as possible and the gas flows through the collecting flue *e* to the gas ports *f*. Issuing from these the gas meets the secondary air issuing from ports *g* having flowed through the regenerator as hereinafter described. The flame travels along the furnace *a* and the waste gases pass through flue *h* into the dust chamber *b* provided with clearing doors *i*, man-holes *k* and a baffle wall *l*. Here the greater part of the dust carried by the waste gases is deposited and in order to avoid trouble from the rest in the regenerator, the gases leaving the dust chamber enter the regenerator at the bottom thereof so as to flow upwardly therethrough.

The regenerator chambers *c*, c^1 are constructed in the usual manner with checker brickwork. Each is connected with the dust chamber by a short flue controlled by a valve c^2, c^3, while at the upper part of the other end each communicates by a flue c^4, c^5 with the chimney flue *m* which may lead to a chimney stack, a fan or other source of draft. At the lower part of the same end each regenerator communicates through a flue controlled by a valve c^6, c^7 with the secondary air flue *n;* at the top of the regenerator at the end far from the last named valve is an air admission valve, *o*, o^1, the air flowing downwardly through the regenerator.

The chambers *c*, c^1 are worked alternately, that is to say during one period of say half an hour, valves c^2, c^7 and o^1 are open, the others being closed; under these conditions the draft draws the hot waste gases upwardly through chamber *c* and air downwardly through chamber c^1. At the end of this period the last named valves are closed and valves c^3, c^6 and *o* are opened; the waste gases are now drawn upwardly through chamber c^1 and the air downwardly through chamber *c*.

The dust-collecting chamber, as shown, is of such a size that it provides an enlarged passageway for the waste gases as compared with the flue *h* which leads thereto from the furnace and the flues which lead therefrom to the regenerator. The velocity of the waste gases is thereby reduced while such gases are on their way through the

dust-collecting chamber, thereby causing the particles of dust suspended in or carried with the gases to fall by gravity to the bottom of the dust chamber. Accumulation of dust in the bottom of the dust chamber avoids interruption or other interference with the continuous operation of the apparatus, and such accumulation can be readily removed from time to time as may be required through the clearing doors *i*.

The passages of the regenerator will be kept clear of any traces of dust which may be carried along with the gases entering the regenerator, by providing an up-draft of such gases through the regenerator and a down-draft of the air therethrough.

Having now described the nature of my said invention and the best means I know of carrying the same into practical effect, I claim:—

1. In a copper smelting plant, the combination of a non-reversible gas-fired reverberatory furnace, a checker-work regenerator and means embodying an enlarged chamber between the said furnace and regenerator adapted to remove dust from the waste gases passing from the furnace to the regenerator.

2. In a copper smelting plant, the combination of a non-reversible gas-fired reverberatory furnace, a checker-work regenerator and an enlarged dust chamber situated between the said furnace and regenerator and through which the waste gases from the furnace pass at reduced velocity on their way to the regenerator.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WALTER GEORGE PERKINS.

Witnesses:
JOSEPH MILLARD,
W. I. SKERTEN.