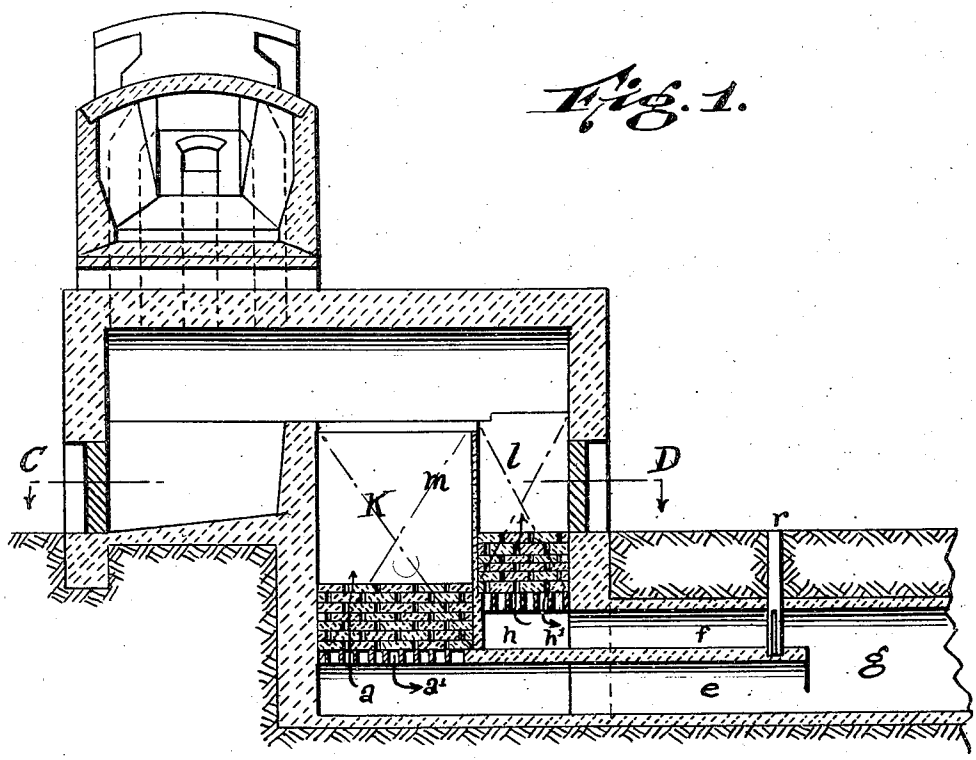
Nov. 1, 1932. F. FIORELLI 1,885,704

REGENERATOR OF SIEMENS-MARTIN FURNACES

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Fig. 1.



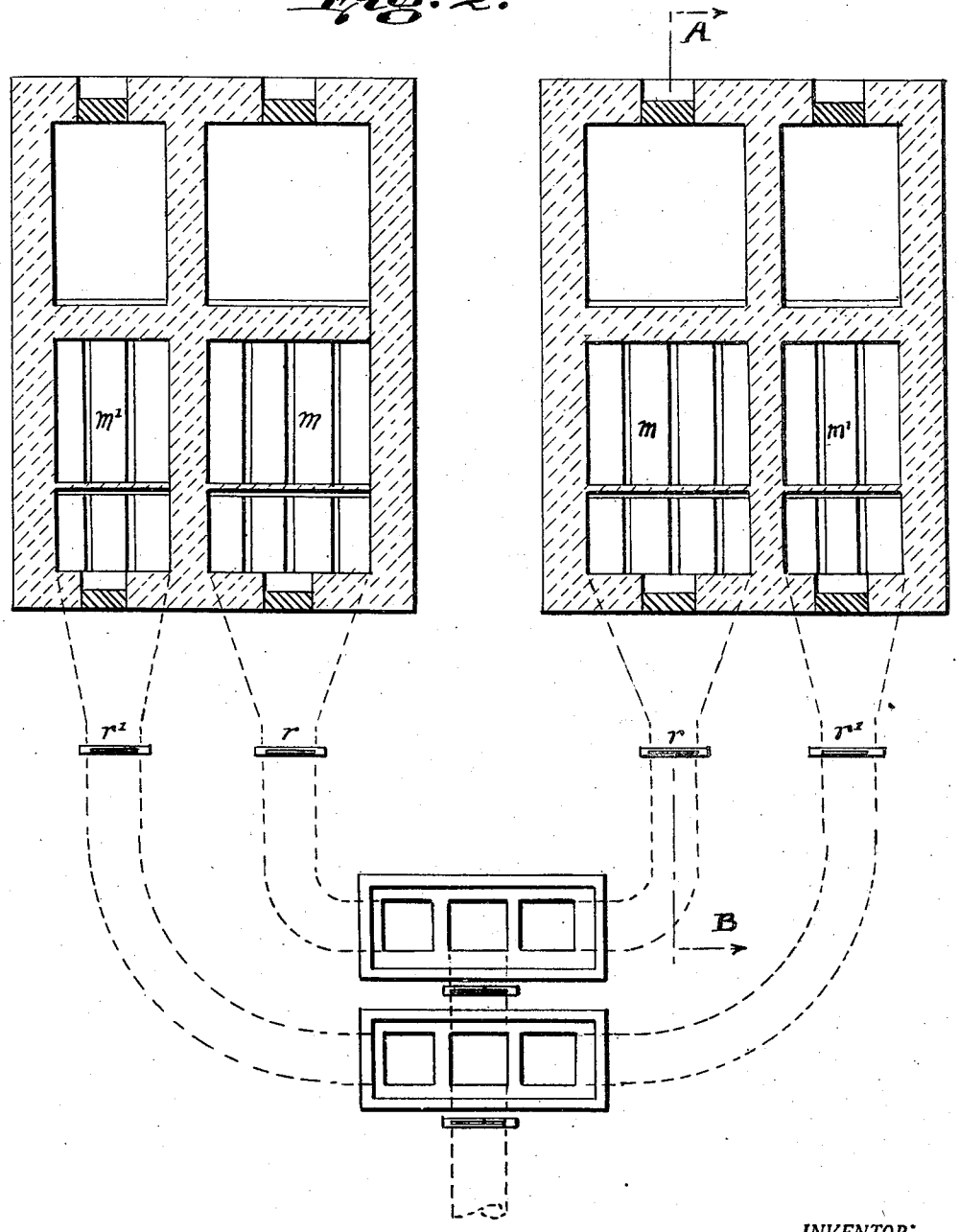
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Fig. 2.



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UNITED STATES PATENT OFFICE

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REGENERATOR OF SIEMENS-MARTIN FURNACES

Application filed January 20, 1930, Serial No. 422,136, and in Italy January 25, 1929.

In order to give the heat regenerating process its maximum efficiency in open hearth furnaces it is necessary that the weight of the checker work of the regenerator and its heated surface should be in a certain relation to the weight of the gases, and that the speed of the latter in passing through the regenerating chambers should have a determined value.

As a result, any variation of operation capable of modifying the relations which are to subsist between the shape and dimensions of heat accumulators and the weight of the gases furnished in a time unit is detrimental to the regeneration of heat and, consequently, to the total efficiency of the furnace.

It is accordingly to be noted that under this aspect the operative conditions of the Siemens-Martin furnace are wholly unfavorable. As a matter of fact the steel melting and refining operations are effected in distinct periods during which in order to obtain the most suitable combustion actions it is necessary to notably vary the gas and air quantities admitted in the time unit.

At the end of operation therefore the volumes of rising gases on the one hand, and the descending combustion products on the other hand are reduced to a fraction of their respective initial values and the thermic equilibrium for the regular regeneration of heat is materially altered, the weight of the checkerwork of the regenerator remaining constant.

It may therefore be asserted, as a principle, that the heat accumulators of the Siemens-Martin furnaces either are excessive at the end of operation, or are insufficient at the start.

The problem for eliminating the above described drawback has now been solved by the inventor and the present invention consists in vertically dividing the mass of each heat accumulator into two parts, and in excluding one of them from operation by means of dampers during the less intense refining period of the furnace. The position of the part to be periodically excluded depends upon the shape of the heat accumulator, and its weight is to be proportional to the decrease of gases obtained in said period.

With this arrangement it is not possible to obtain the desired gradual change, but the speeds and ratios of masses between the gaseous fluids and checkerwork may be kept within practical limits and only slightly different from the most favorable values.

In the annexed diagrammatic drawings is shown a furnace of the Siemens-Martin type with heat accumulating chambers. In these drawings

Fig. 1 is a longitudinal section along A—B of Fig. 2 of the regenerating chamber and

Fig. 2 a horizontal section along line C—D of Fig. 1.

Fig. 1 of the drawings shows a cross section of Siemens-Martin furnace with air and gas ducts and cross section of a regenerating chamber. The division wall for subdividing the regenerator into a primary or larger chamber *k* and a secondary or smaller chamber *l* is shown by reference letter *m* while *r* is the damper, which, when closed excludes air from the checkerwork of the smaller or secondary one of the two chambers into which the regenerating chamber is permanently divided by said wall. The path of the gases will be according to arrows *a a'*, when the damper is closed, but according to arrows *a a'* and *h h'* when the damper is open. The volume of the smaller chamber is approximately half that of the larger one.

Fig. 2 shows the section along a horizontal plane C—D of Fig. 1 of the regenerators, the divisional walls mentioned are indicated by *m m'*, while *r r'* better seen in Fig. 1, show the dampers above the same.

The galleries corresponding to the parts to be excluded in the refining period are separated from the principal galleries and connected thereto through dampers *r r'*.

At *e* is shown a gas duct leading from the melting furnace to the larger chamber *k*, while a second gas duct *f* leads from a point of junction *g* with said first duct into the smaller chamber *l*.

Having now particularly described and ascertained the nature of my said invention and in what way the same is to be performed, I declare that what I claim is:

1. A heat regenerator for a regenerative

melting furnace, the volumetric size, and the heat absorption capacity of which is controllable to accommodate the volume of the gaseous products of combustion passing through the melting furnace during both its melting and refining periods of operation, comprising a regenerating unit having a large and a small heating chamber therein adjacent to each other, each chamber having a mass of checkerwork brick therein, the total volumetric and heat absorption capacity of the two chambers and checkerwork being adapted to meet the major requirements of the melting furnace during its melting period of operation, and the capacity of the larger chamber and checkerwork being adapted to meet the lesser requirements of the melting furnace during its refining period of operation, and means for temporarily excluding the flow of gaseous products of combustion through the smaller chamber of the heat regenerator during the refining period, the volumetric size of said chambers being approximately 2 to 1.

2. A heat regenerator for a regenerative melting furnace, the volumetric size, and the heat absorption capacity of which, is controllable to accommodate the volume of the gaseous products of combustion passing through the melting furnace during both its melting and refining periods of operation, comprising a regenerating unit having a large and a small heating chamber therein adjacent to each other, each chamber having a mass of checkerwork brick therein, the total volumetric and heat absorption capacity of the two chambers and checkerwork being adapted to meet the major requirements of the melting furnace during its melting period of operation, and the capacity of the larger chamber and checkerwork being adapted to meet the lesser requirements of the melting furnace during its refining period of operation, a gas duct leading from the melting furnace to the larger chamber of the regenerator and to the chimney, a second gas duct leading to the smaller chamber and to the chimney from a point of junction with the first named duct, and damper means in the second duct for controlling the flow of gas through the smaller chamber of the regenerator the volumetric size of said chambers being approximately 2 to 1.

3. A heat regenerator for a regenerative melting furnace, the volumetric dimension of which is adapted to accommodate the volume of the gaseous products of combustion passing from the melting furnace during both its melting and refining periods, comprising a heat regenerator having a primary and secondary chamber therein of sufficient total volumetric capacity, which is approximately 2 to 1 to meet the major requirements of the melting furnace during its melting period of operation, a division wall separating said chambers, the volumetric size of the secondary chamber corresponding to the loss in volume of the gaseous products passing from the melting furnace during its refining period of operation, a gas duct leading from the melting furnace to the primary chamber of the heat regenerator, a branch gas duct leading from the first named duct to the secondary chamber, and means in the branch duct for controlling the flow of gaseous products through the secondary chamber during the refining period of operation of the melting furnace whereby both chambers are operative during the melting process, while the primary chamber alone serves during the refining period.

In witness whereof I have hereunto set my signature.

FERDINANDO FIORELLI.