

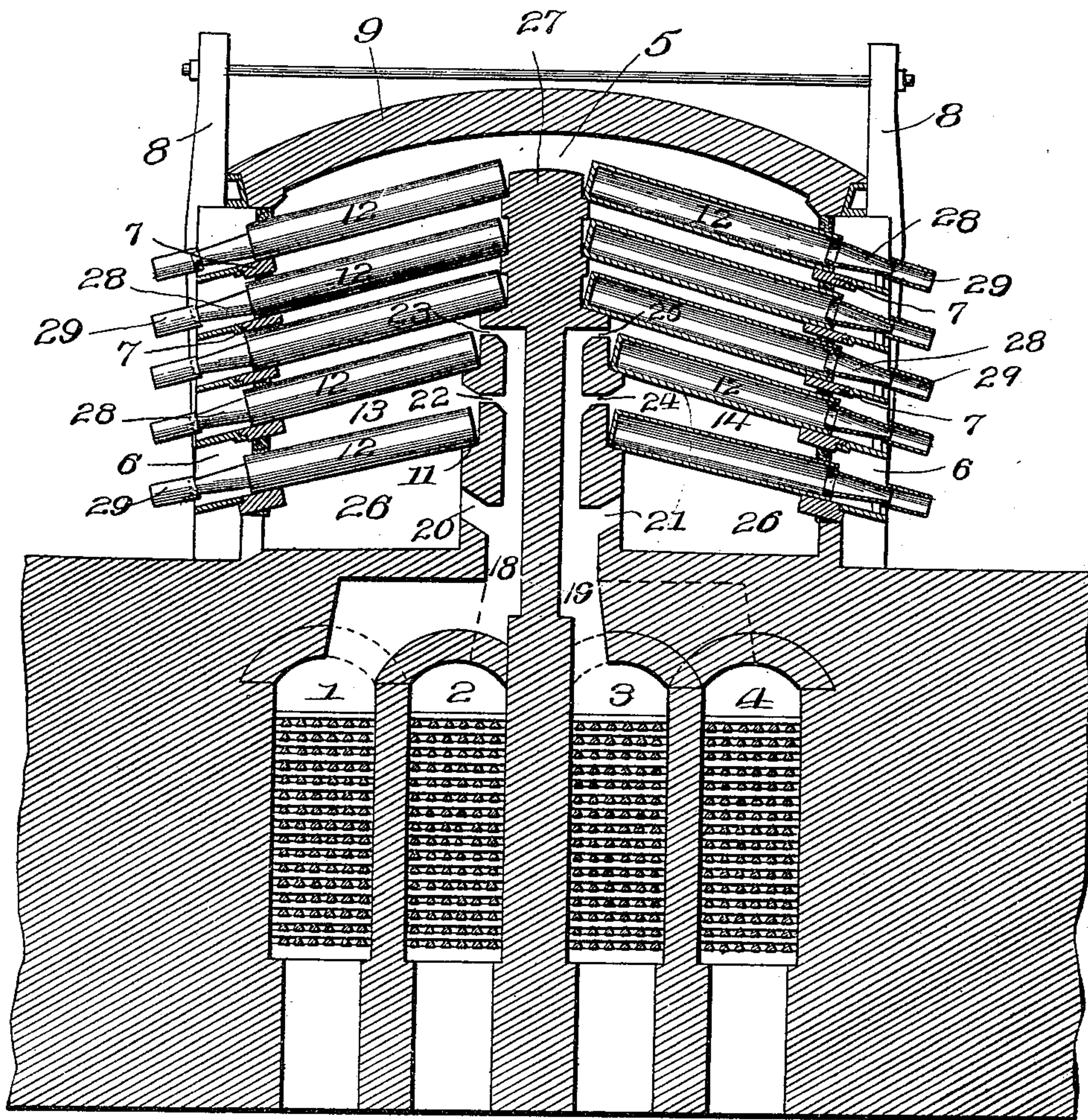
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C. F. NEUREUTHER.
REGENERATIVE RETORT HEATING FURNACE.

(Application filed Aug. 1, 1900.)

(No Model.)



Witnesses.
Allan W. Foote.
Walter Samaris

Inventor.
Charles F. Neureuther
By *Kear & Lott*
Attorneys.

UNITED STATES PATENT OFFICE.

CHARLES F. NEUREUTHER, OF PERU, ILLINOIS.

REGENERATIVE RETORT-HEATING FURNACE.

SPECIFICATION forming part of Letters Patent No. 666,390, dated January 22, 1901.

Application filed August 1, 1900. Serial No. 25,547. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. NEUREUTHER, a resident of Peru, in the county of La Salle and State of Illinois, have invented
5 a new and useful Improvement in Regenerative Retort-Heating Furnaces; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to regenerative furnaces for heating zinc-distilling retorts and other like retort-furnaces, its object being to provide a means in such a furnace for the higher and more even heating of the retorts, and therefore the more even distillation of
15 the material contained within the retort and greater proportionate recovery of zinc or other substance from the ore or other material under treatment. The difficulty in the ordinary regenerative zinc-distilling furnaces has been
20 that the zinc ore contained in the upper tier or tiers of retorts has not been as highly heated as that contained in the lower tier or tiers thereof, so that the time required for distilling the zinc from the charge has been longer
25 than desirable and there was liability of some zinc remaining in the ore. By the present invention the retorts within the chambers of these regenerative furnaces can be more highly and evenly heated, and therefore the
30 more rapid and perfect distillation of the zinc or other vapor from the charge contained in the retort be obtained.

To these ends it consists, generally stated, in a retort-heating regenerative furnace having a combustion-chamber, a vertical wall extending upwardly into the same and dividing it into two compartments and serving, with the outer walls, to support the tiers or rows of retorts, the regenerators having openings
40 entering at the base of the combustion-chamber on each side of the division-wall, and flues extending upwardly within such division-wall and opening at different heights into the combustion-chamber, one set into one compartment and the other set into the other compartment thereof, so that the gases and flame will enter the combustion-chamber at the base of one compartment and at different points above the base within the mass of retorts and
50 after passing over the division-wall into the other compartment will be carried therefrom at different heights into the other regenera-

tors, and the upper part of the combustion-chamber will thus be much more highly heated and the heat more evenly distributed throughout the same, so that the distilling action in the different tiers of retorts is more even and rapid.

It also consists in certain other improvements hereinafter more particularly set forth
60 and claimed.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawing, which illustrates by vertical
65 cross-section a regenerative furnace embodying my invention.

In the furnace illustrated the regenerators 1, 2, 3, and 4 are located under the combustion-chamber 5, and this construction is considered the more desirable, because the flues enter the center instead of the ends of the combustion-chamber. The combustion-chamber 5 is formed of the side walls, which are provided with cast-iron frames comprising
75 the vertical plates 6 and horizontal plates 7, supported in any suitable way and held in place by the buckstaves 8, which buckstaves also support the roof 9. Extending up within the combustion-chamber 5 is the central
80 division-wall 10, which is provided with ledges 11, on which the inner ends of the retorts 12 rest, the outer ends of the retorts resting upon the horizontal plates 7, above referred to. This division-wall 10 extends up toward the
85 roof, and so divides the combustion-chamber 5 into two compartments 13 and 14, which communicate with each other above the division-wall, and, as shown in the drawing, each compartment contains five tiers of re-
90 torts 12, such retorts extending up close to the roof 5.

As shown in the drawing, the furnace is provided on each side of the central wall 15 with both gas and air regenerators, having
95 the air-regenerator 1 and the gas-regenerator 2 on one side thereof and the air-regenerator 4 and gas-regenerator 3 on the other side thereof, these regenerators leading through the regular pits to the ordinary reversing-
100 valves, which are not shown. A series of flues 18, connected alternately with the air and gas regenerators on one side of the furnace, extend upwardly on one side of the cen-

ter of the partition-wall 10, and a similar series of flues 19, connected alternately with the air and gas regenerators on the other side of the furnace, extend upwardly on the other side of the center of said partition-wall. The flues 18 lead through the ports or openings 20 into the base of the combustion-chamber 13 and then extend upwardly within the division-wall 10 toward the upper end thereof and are provided with the ports 22 and 23, opening into the compartment 13 of the combustion-chamber at different heights and among the tiers of retorts, as shown, and acting to carry the gas or the air within such flue toward the upper end of the chamber before it passes into and forms combustion within the same. In the same manner the flues 19 lead through the ports or openings 21 into the base of the combustion-chamber 14 and then pass upwardly within the division-wall and open by ports 24 and 25 at different heights into the compartment 14 and among the tiers of retorts in such compartment. It is to be noted that the ports 20 and 21 are of greater area than the ports above them. They are so constructed, because it is desired to throw the main volume of gas and air and the flame and heat from the combustion thereof into the lower part of the compartment to circulate in the open space 26 before rising among the retorts, the heat being supplemented by the combustion of the gas and air entering at different heights, as above described, and economy of fuel being thus obtained. The lower portion of the division-wall 10 is made sufficiently thick to inclose and protect the flues 18 and 19 and their ports; but the upper part 27 thereof is made of less thickness, as shown, and this provides for the use of longer retorts in the upper part of the furnace.

The retorts illustrated are the ordinary zinc-distilling retorts, which are usually cylindrical in cross-section, closed at one end, as shown, and carrying at the other end the nozzles or condensers 28, the spaces around such retorts and within the frames 8 being then closed by fire-clay or any other like way, so as to seal the retorts and the inner ends of the nozzles in the furnace-wall. Beyond the nozzles metal fume-collectors 29 may be employed, if necessary. It is evident, however, that the arrangement of the retorts in the furnace will depend upon the material under treatment, and the connections for the carrying off of the vapors, fumes, or gases may be arranged as found most suitable for the purpose.

The furnace illustrated has been more particularly used in connection with the manufacture of zinc, and for that reason its operation will be described in connection with the distillation of the zinc from its ore. In carrying on such zinc-distillation process in such furnace the furnace is raised to the desired heat by the reversal of the currents of gas and air, as usual in Siemens regenerative furnaces. For example, the gas and air en-

tering through the reversing-valves pass first through the regenerators 1 and 2 and into the respective flues 18, the main part of the gas and air escaping through the ports 20 at the base of the compartment 13 of the combustion-chamber and burning therein and rising throughout the mass of retorts, but a portion of such gas or air rising through the vertical flues 18 and escaping through the ports 22 and 23 and forming combustion among the upper tiers of retorts, the flame and heated products then passing upwardly within the retorts and over the division-wall 10 and then downwardly within the tiers of retorts, such heated products escaping through the ports 25, 24, and 21 at different heights in the compartment 14 into the flue 19 and passing thence through the regenerators 3 and 4 to the stack. The gas, air, flame, and products of combustion follow this course until the proper time for reversal. Then the current is reversed by means of the ordinary valves, and the gas and air enter through the regenerators 3 and 4, are heated therein, and enter the compartment 14 at different heights through the flues 19 and ports 21, 24, and 25, and the flame and heated products passing through the several tiers of retorts in reverse course to and through the several ports 23, 22, and 20 at different heights through the regenerators 1 and 2 to the stack. In this way by carrying part of the gas and air to different heights above the base of the combustion-chamber and within the several tiers or rows of retorts I am enabled to heat all the retorts to practically the same high temperature, so that the process of distillation takes place as rapidly in the upper retorts as in the lower ones.

In distilling zinc from its ore the charge of mingled zinc ore and carbon is introduced into the retorts in the usual way by suitable charging-tools passing through the condensing-nozzles, and under the high heat generated within the furnace the zinc ore is reduced, the zinc passing off in the form of vapor or fume and being condensed in the fire-clay nozzles or condensers 28, from which it can be removed from time to time, and the zincic-oxid fumes being condensed in the cast-iron tubes or collectors 29, extending beyond the nozzles, so that the oxid can be returned to the furnace.

On account of the higher heat obtained in the upper rows or tiers of retorts I am enabled to obtain a more rapid distillation of the zinc from its ore, so largely increasing the output from the furnace, while it enables me to reduce the more refractory ores or oxids in the upper part of the furnace, and because of the higher temperature in the upper tiers of retorts the liability of the formation of zinc silicate from the charge is reduced, so that a larger proportion of output from the ore treated may be obtained. I also find it practicable to employ at least one more tier of retorts in the furnace as compared with the

regenerative furnaces in use prior to my invention and to heat the same without appreciable increase in fuel, so increasing the output and reducing the cost of distillation.

5 What I claim as my invention, and desire to secure by Letters Patent, is—

1. A retort-heating regenerative furnace having a combustion-chamber, a vertical wall extending upwardly into the same and dividing it into two compartments and serving with the outer walls to support the tiers or rows of retorts, and regenerators communicating with the compartments of the combustion-chamber, each regenerator having a port entering the base of the compartment on one side of the division-wall, and flues extending upwardly from said ports within such division-wall and opening at different heights into the compartment, one set into one compartment and the other set into the other compartment, substantially as set forth.

2. A retort-heating regenerative furnace having a combustion-chamber, a vertical wall

extending upwardly into the same and dividing it into two compartments and serving with the outer walls to support the tiers or rows of retorts, and regenerators communicating with the compartments of the combustion-chamber, each regenerator having ports entering at the base of the compartment on one side of the division-wall, and flues extending upwardly from said ports within such division-wall and opening at different heights into the compartment, one set into one compartment and the other set into the other compartment thereof, the ports opening into the base of the combustion-chamber being larger than the ports opening at different heights above the same, substantially as set forth.

In testimony whereof I, the said CHARLES F. NEUREUTHER, have hereunto set my hand.

CHARLES F. NEUREUTHER.

Witnesses:

THOMAS F. NOON,
M. D. CLOW.