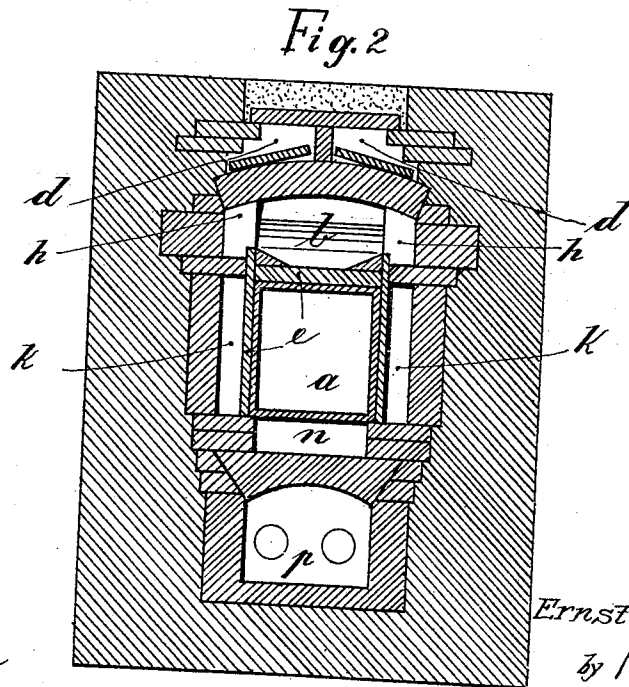
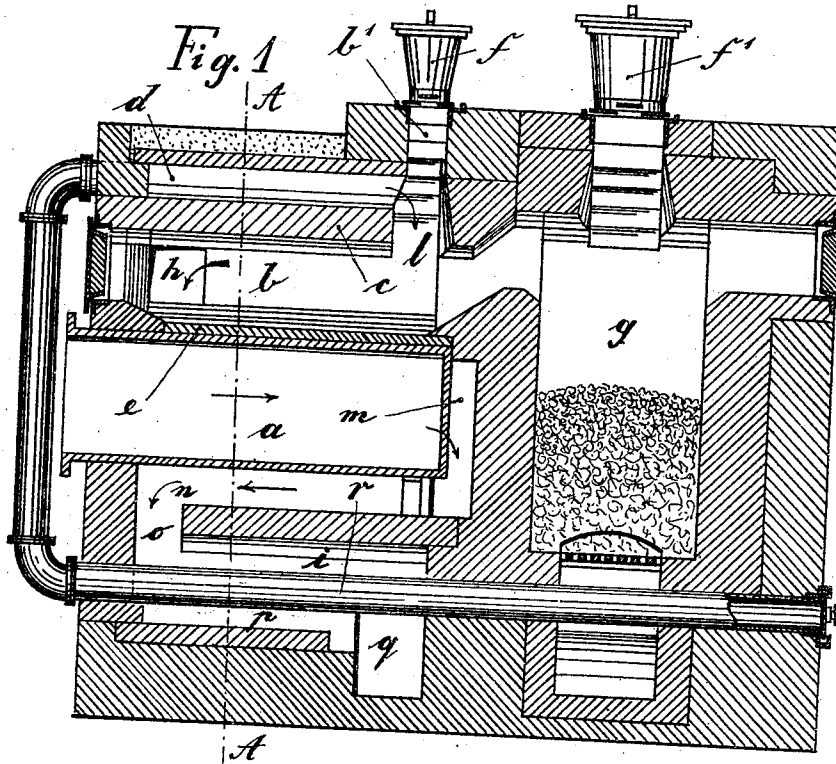


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RETORT FURNACE.
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RETORT-FURNACE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ERNST SCHMATOLLA, a citizen of the Empire of Germany, residing at London, in the United Kingdom of Great Britain and Ireland, have invented a new and useful Retort-Furnace, of which the following is a specification.

This invention relates to the firing of retort or muffle furnaces by means of producer gas and more especially to the heating by this means of retorts of iron or steel, such, for instance, as those employed in the process of calcining magnesite and at the same time obtaining therefrom carbon dioxide. This process, usually known as the magnesite process for the production of carbon dioxide, is in itself an easy and by no means an expensive one; it is however subject to the defect that the retorts used therein are liable to be rapidly worn out. The process in question is usually carried out in a furnace having built into its combustion chamber a number of retorts, usually from 4 to 6, which are heated either by direct firing or by gas firing and which, being exposed to the direct action of the fire, consequently undergo rapid deterioration. Similar defects are of course also to be observed in the case of other processes wherein iron or steel retorts are employed. It has already been proposed to provide the retorts with a fire-resisting casing or to surround them with walls, which however would considerably decrease the amount of heat reaching the retorts and cause the loss of a great deal of the heat of the fire gases.

My invention consists of an apparatus in which all these defects are obviated by the adoption of a special system of guiding the flames due to the combustion of producer gas and by a correspondingly modified form of retort.

I will now proceed to describe my invention with reference to the accompanying drawing, in which—

Figure 1 is a vertical longitudinal section through an improved retort-furnace, and Fig. 2 is a vertical cross section through the same on the line A—A in Fig. 1.

Similar letters of reference refer to similar parts in both views.

Figs. 1 and 2 show by way of example a furnace fired in accordance with this invention, and having arranged in it a single retort *a*. This retort is not of the shape

heretofore usual, that is to say, its cross-section is neither oval nor circular, but square or rectangular. In the case of a furnace of this kind the gas combustion chamber *b* is situated, not beneath the retort as heretofore usual, but above it, while the heat radiated from the roof *c* is intercepted, in air passages *d* and again returned to the furnace by means of the air that supports the combustion of the gas. This arrangement and the special cross section facilitates the protection of the retort against the injurious action of the fire at the place where it is exposed to the greatest heat by means of a casing of plates *e* of chamotte or other fire-resisting material, these plates permitting sufficient heat to pass, and at the same time reducing the temperature of the fire gases to such an extent that they can be passed over the retort without injuring it.

In the constructional form of apparatus according to this invention shown in the drawing, wherein a comparatively short retort *a* is employed, the sides of the retort *a* are also partially covered with chamotte plates *e*, which can very easily be controlled or exchanged while the furnace is in operation through a loosely bricked-up aperture provided for this purpose in the furnace front. In the case of a furnace with a longer retort the casing on its sides may be dispensed with, but the level or horizontal floor of the retort is in any event left uncovered and is directly acted upon by the fire gases so that the heat thereof can pass very rapidly into the interior of the retort.

To enable the waste heat to be utilized to the fullest possible extent there is arranged in addition to and beneath the retort setting a tubular recuperator *i* which in the constructional form shown in the drawing comprises iron pipes *r* through which air to support the gas combustion is conducted to the air chambers *d* or to the combustion chamber *b*. These pipes are extended in the direction of the producer *g* through the ash-pit thereof to the outside, and are thus further heated by the radiation from the surface of the hearth. The right ends of the pipes *r* are shown as provided with regulating slides of any known construction, but this is immaterial to my invention.

A further novelty of furnaces in accordance with this invention consists in the fact that the gas combustion chamber *b* serves at

the same time also as final heating chamber for the magnesite. The last traces of carbon dioxid consequently need not, in the case of a furnace in accordance with this invention, be driven out in the retort itself, where they can be obtained only as the result of very considerable heating, but the residue of carbon dioxid can be more easily and rapidly obtained by calcining on the hearth *b*, an advantage which results in a considerable saving of fuel. In this case the upward prolongation *b'* of the air inlet *l* is constructed as a feed aperture, which, in the case of the apparatus shown, is provided with a feed hopper *f* similar in construction to that *f'* of the producer *g*. The carbon-dioxid gained by the after-treatment of the magnesite on the hearth *h* can be collected at the opening of the feed hopper *f*. The producer *g* may be of any known construction.

It will be seen, that the fire gases from the combustion chamber *b* are conducted downward in the direction of the arrows through the channels *h h*, the flues *k k* along the chamotte plates *e* on the sides of the retort *a*, the flue *m* along the vertical bottom of the retort *a*, the flue *n* along the horizontal bottom of the retort *a*, the channel *o*, the heating chamber *p*, and the sole-flue *q* to some chimney *s* of any known construction. The fire gases part with the greater portion of their heat through the chamotte-plates *e e* to the retort *a* and give up another portion of their heat to the metal walls of the retort *a* at the rear and below, and the remainder of their heat to the air-pipes *r* in the heating chamber *p* for preliminarily heating the air.

It is obvious that the furnace may, if desired, be constructed as a double retort furnace, having its two retorts arranged adjacent to each other beneath a common gas combustion chamber *b* covered by a single roof, an additional flue being in this case provided between the two retorts, and that the furnace can still be heated by means of a single producer. In a furnace such as has been described the retorts may moreover be of much greater capacity than has heretofore been usual, so that with a comparatively small and inexpensive furnace having only two retorts a greater output and a more effectual utilization of heat can be secured than often occurs in the case of ordinary furnaces with six retorts.

The retort *a* or retorts is or are in any known manner utilized for the respective process, for which it or they are destined.

The retort-furnace described can be varied without departing from the spirit of my invention.

I claim:

1. In a retort-furnace, the combination with a gas-producer, of a horizontal retort rectangular in cross-section and having a

vertical bottom adjacent to one side of said gas-producer, a chamotte-plate on the top side of said retort, a brickwork-structure in one piece with said gas-producer and comprising a combustion chamber for same above said chamotte-plate, flues on the sides of said retort and communicating with the combustion chamber, a return flue beneath the horizontal bottom of said retort and communicating with the side flues, a heating chamber beneath the return flue and communicating therewith, and a sole-flue communicating with the heating chamber, and air-pipes passing through said heating chamber and extending upward to said combustion chamber.

2. In a retort-furnace, the combination with a gas-producer, of a horizontal retort rectangular in cross-section and having a vertical bottom adjacent to one side of said gas-producer, a chamotte-plate on the top side of said retort, a brickwork structure in one piece with said gas-producer and comprising a passage leading thereto, a combustion chamber above said chamotte-plate and communicating with the passage, air-heating passages above the combustion chamber and communicating therewith at the passage, flues on the sides of said retort and communicating with the combustion chamber on the side opposite to the passage, a rear flue on the vertical bottom of said retort and communicating with the side flues, a return flue beneath the horizontal bottom of said retort and communicating with the rear flue, a heating chamber beneath the return flue and communicating therewith, and a sole-flue communicating with the heating chamber, and air-pipes passing through said heating chamber and extending upward to said air-heating passages.

3. In a retort-furnace, the combination with a gas-producer, of a horizontal retort rectangular in cross-section and having a vertical bottom adjacent to one side of said gas-producer, a chamotte-plate on the top side of said retort and forming a hearth, a brickwork-structure in one piece with said gas-producer and comprising a passage leading thereto, an inlet in its top at the passage, a combustion chamber above said chamotte-plate and communicating with the inlet and the passage, air-heating passages above the combustion chamber and communicating with the inlet, flues on the sides of said retort and communicating with the combustion chamber on the side opposite to the passage, a rear flue on the vertical bottom of said retort and communicating with the side flues, a return flue beneath the horizontal bottom of said retort and communicating with the rear flue, a heating chamber beneath the return flue and communicating therewith, and a sole-flue communicating with the heating chamber, and air-pipes passing through

said heating chamber and extending upward to said air-heating passages, and a charging device above said inlet.

4. In a retort-furnace, the combination
5 with a gas-producer, of a horizontal retort rectangular in cross-section and having a vertical bottom adjacent to one side of said gas-producer, chamotte-plates on the top side and the sides of said retort, a brickwork-structure in one piece with said gas-producer and comprising a combustion
10 chamber for same above said retort, flues on the sides and the vertical bottom of said retort and communicating with said combustion chamber, a return flue beneath the horizontal bottom of said retort and communicating with the side flues, a heating chamber
15 beneath the return flue and communicating therewith, and a sole-flue communicating with the heating chamber, and air-pipes
20 passing through said heating chamber and extending upward to said combustion chamber.

5. In a retort-furnace, the combination
25 with a gas-producer, of a horizontal retort rectangular in cross-section and having a vertical bottom adjacent to one side of said gas-producer, chamotte-plates on the top side and the sides of said retort, a brickwork-structure in one piece with said gas-producer and comprising a passage leading
30 thereto, a combustion chamber above said retort and communicating with the passage, air-heating passages above the combustion chamber and communicating therewith at the passage, flues on the sides of said retort and communicating with the combustion
35 chamber on the side opposite to the passage, a rear flue on the vertical bottom of said retort and communicating with the side flues, a return flue beneath the horizontal bottom

of said retort and communicating with the rear flue, a heating chamber beneath the return flue and communicating therewith, and a sole-flue communicating with the heating
45 chamber, and air-pipes passing through said heating chamber and extending upward to said air-heating passages.

6. In a retort-furnace, the combination
50 with a gas-producer, of a horizontal retort rectangular in cross-section and having a vertical bottom adjacent to one side of said gas-producer, a chamotte-plate on the top side of said retort and forming a hearth, chamotte-plates on the sides of said retort,
55 a brickwork-structure in one piece with said gas-producer and comprising a passage leading thereto, an inlet in its top at the passage, a combustion chamber above said chamotte-plate forming the hearth and communicating
60 with the inlet and the passage, air-heating passages above the combustion chamber and communicating with the inlet, flues on the sides of said retort and communicating with the combustion chamber on the side opposite to the passage, a rear flue on the vertical
65 bottom of said retort and communicating with the side flues, a return flue beneath the horizontal bottom of said retort and communicating with the rear flue, a heating chamber beneath the return flue and communicating therewith, and a sole-flue communicating with the heating chamber, air-pipes passing through said heating chamber and extending upward to said air-heating
70 passages, and a charging device above said inlet.
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