G. W. PARKER.

METHOD OF CONSTRUCTING A RETORT SETTING.

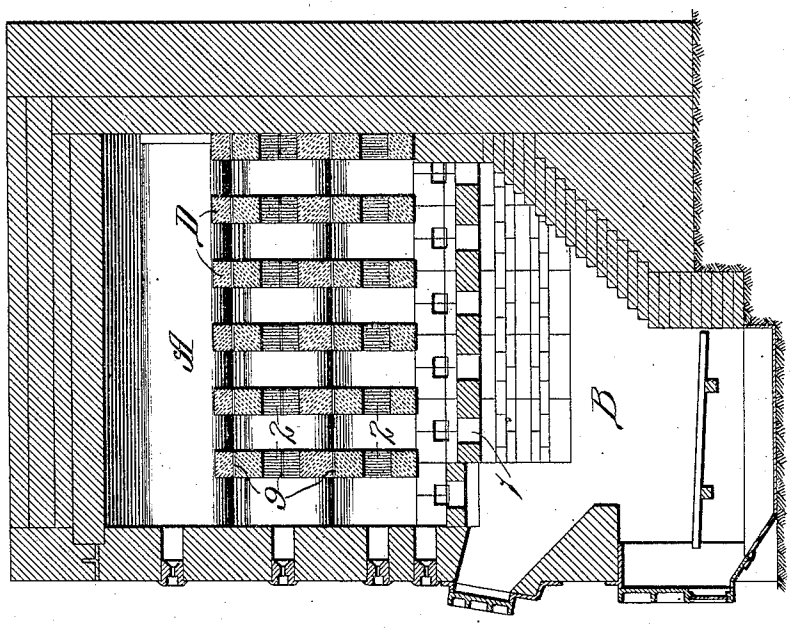
APPLICATION FILED DEC. 11, 1911.

1,037,516.

Patented Sept. 3, 1912.

2 SHEETS—SHEET 1.

Fig. 2.



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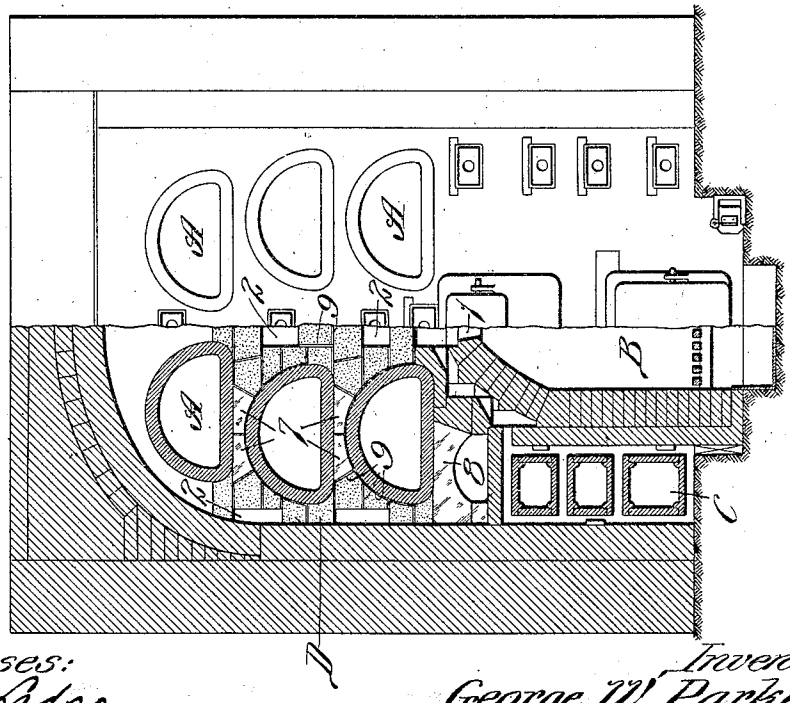

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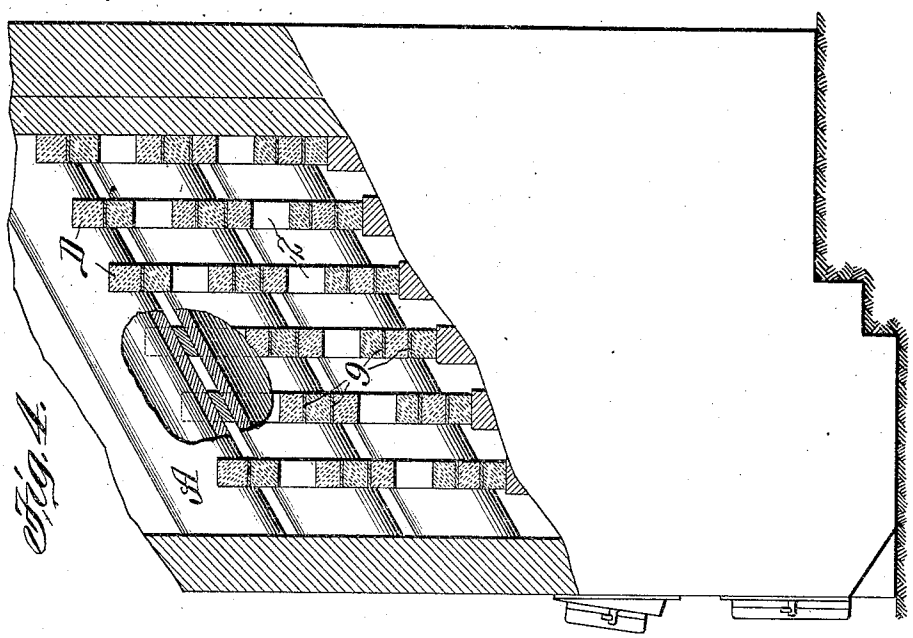

Fig. 4.

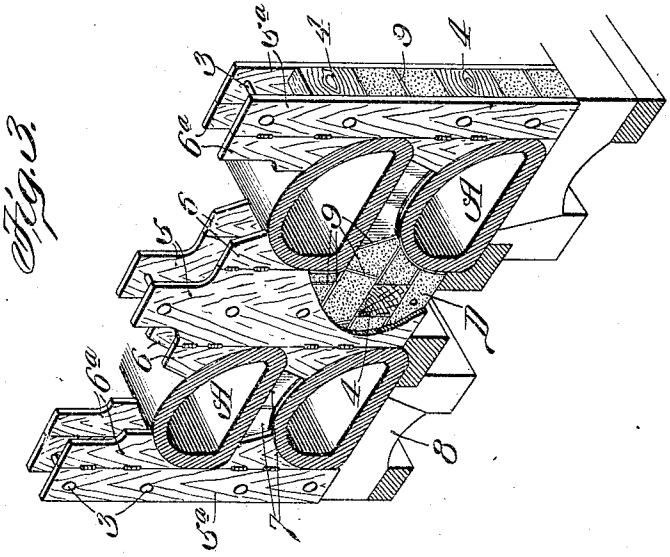

Fig. 3.

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UNITED STATES PATENT OFFICE.

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METHOD OF CONSTRUCTING A RETORT-SETTING.

1,037,516. Specification of Letters Patent. Patented Sept. 3, 1912.

Application filed December 11, 1911. Serial No. 665,129.

To all whom it may concern:

Be it known that I, GEORGE W. PARKER, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Methods of Constructing a Retort-Setting, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to retort furnaces, and particularly to the methods employed in constructing the retort setting of such furnaces.

The present method of constructing the "setting" or supporting structure for the retorts of a retort furnace is to build up vertically disposed partition walls from refractory blocks, brick or tiles of various shapes and sizes, the blocks being shipped from the factory where they are manufactured to the place where the furnace is being erected and then laid up or arranged in operative position by skilled workmen. It is very difficult to make blocks that will conform accurately to the exterior of the retorts on account of the irregular shape of the retorts and the tendency of the blocks to expand or contract and to warp while they are being burned in the kiln. Consequently, when the workmen are building the setting or arranging the blocks in operative position around the retorts, a great deal of chipping or cutting has to be done to make the blocks conform to the irregular contour of the retorts. When silica blocks are used it is extremely difficult to obtain tight joints between the retorts and the setting because such blocks are so brittle that it is difficult and requires great skill on the part of the workman to chip or cut them at just the point intended. To remedy this defect or imperfect fit the workman fills in the space between the retort and the blocks with fire-clay mortar which shrinks after the furnace has been in operation for a short period and thus permits the retorts to sag and crack. While it is difficult to build a perfect setting for retorts that are arranged horizontally, it is practically impossible to build a perfect setting for retorts that are arranged in an inclined position; especially if the retorts are tapered, owing to the numerous angles and irregular surfaces at the points where the inclined retorts pass through the vertically disposed partition walls which form the setting for the retorts. It will thus be seen that the present method of constructing the retort setting of a retort furnace has a number of objectionable features, namely, the impossibility of always obtaining tight joints between the retorts and the setting blocks which often results in materially shortening the life of the retorts, due to sagging and breaking of the retorts; the great waste of material due to waste in cutting or chipping of blocks which have to be discarded; the excessive cost of manufacturing the blocks due to the large number of special molds and dies that have to be used to form the blocks; and the high cost of the skilled labor which has to be employed to build the setting. The main object of my invention is to provide a method of constructing a retort setting that embraces the retorts so snugly that there is no possibility of the retorts sagging or cracking after the furnace has been in operation for a short period. And another object is to provide a method which makes it possible to build a retort setting of the character described cheaply and with unskilled labor.

Briefly stated, my invention consists in arranging a retort in position and then molding refractory material around a section of said retort so as to form a setting or wall through which the retort passes. Any suitable refractory material can be used to form the setting but I prefer to use silica and also provide each vertical partition wall of the setting with expansion joints so as to provide for the expansion of the silica when it becomes heated.

In the drawings I have illustrated a coal gas bench constructed in accordance with my invention, but I do not wish it to be understood that my invention is limited to a method of constructing the setting of a gas retort furnace for the broad idea is applicable to any kind of a retort furnace in which the retorts are set or mounted in a refractory supporting structure.

Figure 1 is a front elevational view partly in transverse vertical section of a gas bench

constructed in accordance with my invention; Fig. 2 is a longitudinal vertical sectional view; Fig. 3 is a perspective view illustrating the method of constructing the vertical partition walls which constitute the setting for the retorts; and Fig. 4 is a vertical longitudinal sectional view of a gas bench constructed in accordance with my invention, and provided with inclined retorts.

Referring to Figs. 1 and 2 of the drawings, A designates a plurality of retorts that are arranged in horizontal tiers above a furnace chamber B whose top wall is provided with outlet ports 1 through which the fire gases escape, the air that combines with said fire gases being heated by contact with the outer walls of the waste gas flues C of the recuperator, in a well-known manner. The setting for the retorts A consists of a number of vertically disposed partition walls D that extend transversely of the retort chamber and which are provided with alining openings or spaces 2 which form openings through which the products of combustion may travel, and which enable the operator to inspect the temperature of the setting from front to rear. Said partition walls D are formed from refractory material that is molded around the retorts in forms that are removed or burned out after said material has set or hardened. I prefer to build up the partitions D progressively, namely, first build the lower portions of said partitions around the retorts of the bottom horizontal tier, then arrange the retorts of the second tier in position and build the partitions up around said retorts, and so on, until the partitions have been carried up to the proper height on the uppermost tier of retorts. I also prefer to arrange spacing blocks 7 between the superimposed retorts so that the partition walls will not be subjected to the load or weight of said retorts while said walls are in a plastic or semi-plastic state, but it is not absolutely essential that the partition walls be constructed in this exact manner.

Any suitable kind of forms can be used for molding the material from which the vertical partition walls are made, but I prefer to use forms which are constructed in such a manner that they can be collapsed and removed easily. If desired, however, the forms can be left in position so that they will be burned out when the furnace is fired. As shown in Fig. 3, the form for each partition wall D consists of two vertically disposed parallel walls that are spaced away from each other a distance equal to the thickness of the finished partition wall. The form is provided with openings through which the retorts pass, and the front and rear walls of the form are tied together by removable bolts or other suitable fastening devices 3, some of which may pass through filler blocks 4 that are arranged inside of the form so as to form the openings or spaces 2 in the partition wall D through which the fire gases travel. Each vertical wall of the form herein shown comprises a center member 5 provided with hinged wings 6 that conform to the shape of the retorts and lap over same, and two side members 5^a are provided with hinged wings 6^a that conform to the shape of the retorts and lap over same, as shown in Fig. 3 of the drawings. The wings 6 and 6^a of the center member and side members, respectively, do not extend clear across the retorts because I prefer to use blocks 7 to form the portions of the vertical partition walls D which lie immediately between the superimposed retorts or retorts that are arranged one above the other, but it will, of course, be obvious that the wings 6 and 6^a could be extended inwardly farther so that they will meet if the entire partition wall D is molded around the retorts. Blocks 8, which conform to the shape of the under side of the retorts, are preferably used for supporting the retorts of the bottom horizontal tier so as to form a substantial support for each vertical column or tier of retorts, the bottom retorts resting upon the blocks 8, the retorts of the second horizontal tier resting upon the blocks 7 which bear upon the bottom retorts, and the top tier of retorts resting upon the blocks 7 which bear upon the retorts of the second horizontal tier. As previously stated, the object of arranging spacing blocks or fillers between the superimposed retorts is to take the weight of the retorts off the molded partition wall D before the material from which it is formed hardens, but it is not essential that these spacing devices or fillers extend the entire thickness of the partition wall D for any suitable devices that will transmit the weight of the topmost retort to the retort immediately under same, and so on down to the bottom retort, will serve the purpose for which the blocks 7 are primarily intended. After the retorts of the bottom tier have been arranged in position and the forms have been erected, refractory material in a plastic condition is poured into the forms and tamped well so as to cause the material to pack together. If silica is used it is preferable to provide the partition walls D with expansion joints, and this can be done conveniently by embedding strips of cardboard 9 or other suitable material in the plastic material in the forms during the operation of introducing said plastic material into the forms and tamping it, the most convenient way being to ram up a certain section of the form and

then lay a strip of cardboard on this rammed mass before another batch of material is introduced into the form. After the lower portions of the partition walls D have been formed the retorts of the second horizontal tier are arranged in position and more plastic material is introduced into the forms so as to carry the molded walls up to the top of the second tier of retorts, these operations being repeated until the partition walls D are carried up to the proper height around the retorts of the top tier. After the material has set or hardened it is preferable to build a small fire in the furnace chamber B so as to drive the moisture out of the material, and thereafter the forms are removed and the furnace is fired up so as to subject the partition walls D to a sufficient degree of heat to burn or fire the material from which they are formed and also destroy the strips of pasteboard 9 that were embedded in the walls, thus completing the operation of building the setting or supporting structure for the retorts. If the forms are constructed roughly of lumber so that the cost of removing same would be greater than the cost of the lumber, they are left in position, and when the furnace is fired they will be burned out.

While I have stated that the operation of building the setting is completed by subjecting same to sufficient heat to fire the material, it will, of course, be understood that the firing of the setting would not be necessary in case material is used that will become sufficiently hard and refractory without firing.

From the foregoing it will be seen that there is no liability of the retorts of a furnace of the construction above described sagging and cracking because the setting of refractory material which supports the retorts snugly embraces each retort and completely surround same. Furthermore, this method of constructing a retort setting overcomes the necessity of using high-priced blocks of special shapes and sizes, it eliminates waste of material, and it overcomes the necessity of using high-priced skilled labor as only workmen of ordinary skill are required to pour the material into the forms and tamp it properly; and in addition to the desirable features above-mentioned such a method makes it possible to produce a perfect setting for a retort furnace provided with inclined retorts, as shown in Fig. 4.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A method of constructing the retort setting of a retort furnace which consists in arranging a retort in position, and then molding refractory material around a section of said retort so as to form a wall through which the retort passes.

2. A method of constructing the retort setting of a retort furnace which consists in arranging a retort in position and thereafter molding refractory material around a portion or section of said retort so as to form a partition wall provided with expansion joints.

3. A method of constructing the retort setting of a retort furnace characterized by molding vertically disposed partition walls around the retorts from refractory material that is in a plastic or semi-plastic condition.

4. A method of constructing the retort setting of a retort furnace characterized by molding vertically disposed partition walls around the retorts from refractory material that is in a plastic or semi-plastic condition, and finally subjecting said material to a high degree of heat so as to burn or fire it.

5. A method of building the retort setting of a retort furnace which consists in arranging a number of retorts in operative position, arranging a wall form transversely of said retorts in such a manner that the retorts pass through same, and thereafter introducing a plastic or semi-plastic refractory material into said form so as to form a vertically disposed partition wall that is arranged transversely of the retorts.

6. A method of building the retort setting of a retort furnace which consists in arranging a number of retorts in operative position, arranging a wall form transversely of said retorts in such a manner that the retorts pass through same, thereafter introducing a plastic or semi-plastic refractory material into said form so as to form a vertically disposed partition wall that is arranged transversely of the retorts, and finally removing said form and subjecting the molded material to a high degree of heat so as to burn it.

7. A method of building a retort setting of a retort furnace characterized by molding the setting around the retorts, and thereafter subjecting the setting to a high degree of heat so as to burn it.

8. A method of constructing the retort setting of a retort furnace which consists in arranging a tier of retorts in position, molding the lower portion of a refractory partition wall around said retorts, then arranging another tier of retorts in position, and thereafter molding another portion of said wall so as to surround said second tier of retorts.

9. A method of constructing the retort setting of a retort furnace which consists in molding a plastic or semi-plastic refractory material around the retorts so as to form vertically disposed partition walls which ex-

tend transversely of the retort chamber, and embedding strips of paper or other suitable material in said refractory material during the operation of molding same so as to form expansion joints in the walls and thus divide the walls up into sections or pieces.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this seventh day of December 1911.

GEORGE W. PARKER.

Witnesses:
EDWARD THOMAS PALMER,
EDWARD J. LUCAS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."