H. KOPPERS.

COKE OVEN.

APPLICATION FILED APR. 3, 1912.

1,051,372. Patented Jan. 21, 1913.

Fig. 1

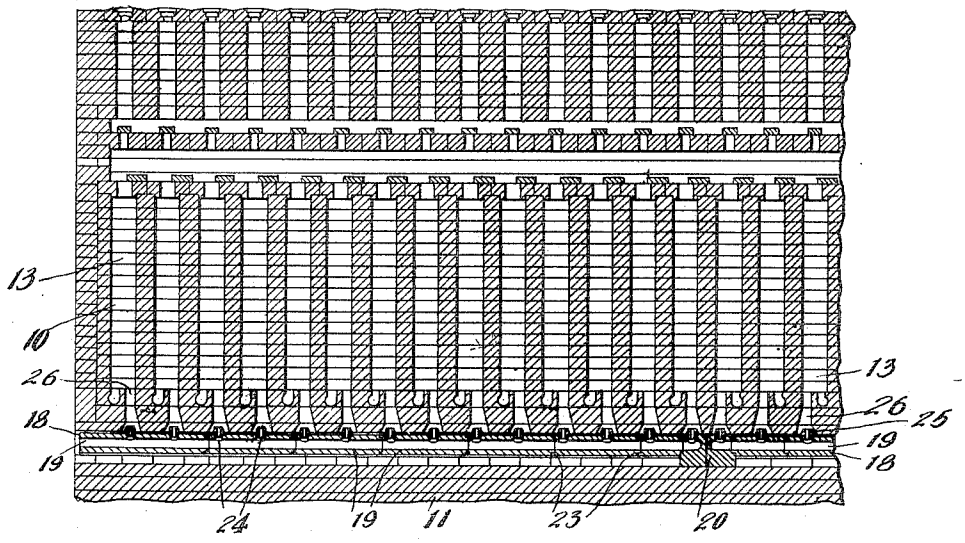


Fig. 2

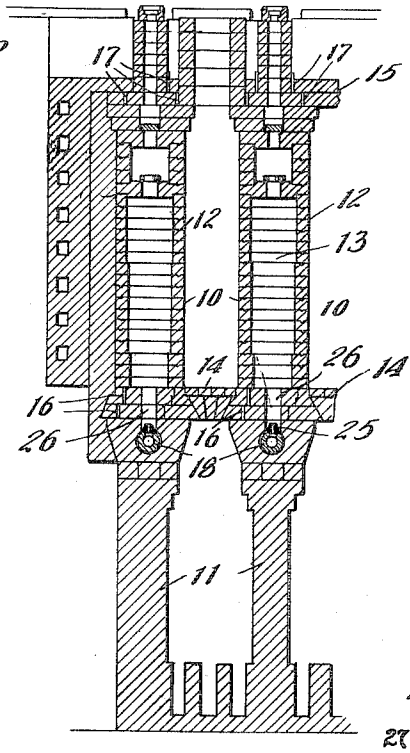


Fig. 4

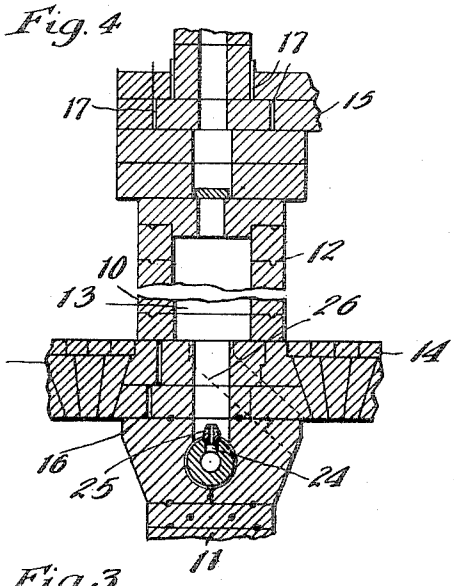
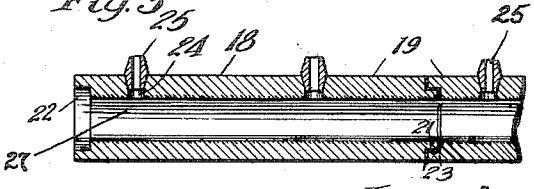


Fig. 3



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UNITED STATES PATENT OFFICE.

HEINRICH KOPPERS, OF ESSEN-ON-THE-RUHR, GERMANY.

COKE-OVEN.

1,051,372. Specification of Letters Patent. Patented Jan. 21, 1913.

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To all whom it may concern:

Be it known that I, HEINRICH KOPPERS, a citizen of Germany, residing at Essen-on-the-Ruhr, Germany, have invented a new and useful Improvement in Coke-Ovens, of which the following is a specification.

This invention relates to improvements in gas distribution pipes such as are used in connection with gas generating and coal carbonizing apparatus.

The objects of the invention are to so construct the coke oven, and particularly the gas distribution pipe in such a way that a more perfect combustion of the gas is procured than has hitherto been obtainable; to prevent clogging of the pipe due to the accumulation of carbon deposits and other foreign substances on the interior of the pipe and to prevent cracking or breaking or distortion of the pipe due to the uneven expansion of various portions of the gas oven structure.

In gas generating and coal carbonizing apparatus, the gases of distillation after coming from the oven chambers are drawn off to the condensing and by-product plants, where the gases are cleaned and then returned to the ovens by mains; and branch supply pipes lead from these mains to each of the gas distributing pipes or channels beneath the oven walls. The gas distributing pipes or channels are generally of firebrick or other refractory material, and are each provided with a plurality of gas nozzles each allowing the gases to pass to the vertical flues of the oven where the gases unite with hot air (1100 to 1200 C.) which has been passed through the regenerators. The products of combustion then pass up the heating flues and through openings at the tops thereof. Formerly, it has been the custom, where a tile or clay gas distribution pipe has been used, to lay the same in mortar at the same time that the rest of the oven is built up from the bricks and to mortar the joints of the sections of the pipe. This resulted in producing practically a solid pipe formed integrally with the rest of the brick oven structure. The intense heat of combustion produces a great amount of expansion in the tile or clay bricks forming the oven, especially in those located above the combustion pipe. And in an ordinary oven, which is from thirty-seven to forty feet long, this expansion amounts to as much as five to seven inches. The upper portions of the oven are of course heated to a higher temperature than the lower portions and the distribution pipe which is located below the area of combustion is not heated as high as the brick forming the oven located just above it, and this unevenness of expansion, as will be obvious, causes great strains in the pipe which often cause breaks and cracks therein. These cracks, both in the pipe proper and in the joints between the sections of the pipe, allow a certain amount of air to leak into the interior, which causes a cooling of the gases and a partial or imperfect combustion of the same within the pipe, which, in turn, produces deposits of some of the suspended impurities still in the gas and deposits of free carbon or soot on the inside of the pipe and in the gas nozzles. These deposits soon render the pipe unfit for use, and where the pipes are laid in the mortar in the brick forming the oven, the entire oven must then be taken down and a new pipe relaid. Another source of trouble encountered hitherto, has been due to the deposits on the interior of the gas distribution pipes of the form above described, due to a certain amount of air which diffuses through the pores of the pipe. The pipe being of refractory material, as well as the brick surrounding it, is very porous and thus allows air to pass therethrough to the interior where the gas is cooled and imperfect combustion takes place, thus producing deposits in the manner as above described.

My improvements aim to overcome the defects as above outlined, and one structure which I have shown and described comprises a coke oven, the walls of which are made of tile or clay and each wall being provided with a plurality of vertical flues to each of which leads an air duct or passageway for conducting the heated air to the combustion area, each wall of the oven having laid therein a gas distribution pipe, the same being comprised of a plurality of sections having interfitting ends preferably provided with an asbestos packing at each joint, this pipe being provided with a plurality of gas nozzles, one in each of the vertical flues, said pipe, with the exception of the center section, being laid in the brick walls without mortar and being placed in position after the wall has been built up, the whole being formed in such a way that the pipe as a whole and each section, except the center one, thereof are freely movable relatively to the adjacent tile or brick of the gas

oven wall. The gas distribution pipe is furthermore provided with a glazed interior surface to prevent the diffusion or leaking of air through the pores of the pipe to the interior thereof. Another important change I have shown consists in making that portion of the oven wall adjacent the gas distribution pipe composed of brick which are allowed to move relatively to the remaining brick of the wall to allow for expansion.

My invention furthermore consists in the improvements in the parts and devices and in the novel combinations of parts and devices herein shown, described or claimed.

In the drawing forming a part of this specification, Figure 1 is a vertical, longitudinal sectional view of one of the walls of a coke oven generating plant showing my improvements in connection therewith, the section shown being a little more than half the length of an ordinary wall. Fig. 2 is a partial, vertical, transverse section of the structure shown in Fig. 1, showing only two of the vertical walls. Fig. 3 is a section, upon an enlarged scale, of a portion of the gas distribution pipe, and Fig. 4 is an enlarged, detail, sectional view, showing portions of the walls, and particularly the expansible or loose joints.

In the drawing, 10, 10 represents the vertical walls of the oven, having the lower portions 11 which form the sides of the regenerators and the upper portions 12 in which are located the flues 13, said walls 10 being connected by horizontally extending brick walls 14 and 15, located respectively at the bottom and top of the ovens. Each of the horizontal brick walls 14 and 15 extend from one vertical wall to the other and at one end are formed with loose or expansible joints 16 and 17, whereby when the walls or tile become heated, the horizontal portions of the walls may expand without injury to the remaining portions of the wall, this expansion being, in actual practice, sometimes as great as three-quarters of an inch between each pair of vertical walls. As will be understood, these expansible or loose joints 16 and 17 extend the entire lengths of the vertical portions, thus providing for expansion at any portion throughout the length of the wall, whether the entire ovens or only portions of the same are being used.

Located in each of the vertical walls of the oven at the bottom of the vertical flues is a gas distribution pipe 18, the latter being comprised of a plurality of sections 19 and a central section 20. The latter or central section is built into the wall solidly when the same is erected, and is therefore prevented from longitudinal movement. The other sections 19, however, on each side of the member 20, are preferably inserted in the wall after the latter has been built up, these sections 19 being each provided with interfitting ends, comprising a flange 21 on one end of each section and a corresponding coöperating recess 22 on the opposite end of the adjacent section. Each joint between the sections 19 is also preferably provided with a packing or filling which may be either in the form of an asbestos ring 23 or any other suitable composition. After the sections 19 have been inserted in place, pressure is applied at each end of the pipe and the same are then squeezed together to form compact joints between each of the sections. It will be understood, however, that the sections of the gas distribution pipe are each freely movable relatively to the adjacent portions of the clay tile walls. Each section of the gas distribution pipe is provided with one or more recesses 24 in each of which is adapted to be inserted a gas nozzle 25 which conduct the gases from the pipe to the vertical flues 13. As will be understood by those skilled in the art, the gas nozzles may consist merely of perforations or vents in the pipe when it is not desired to use the inserted gas nozzles 25 herein shown and described. To prevent diffusion of air through this pipe which, as ordinarily made hitherto, is extremely porous, I make one of the surfaces of the pipe, preferably the interior, glazed, as shown at 27, Fig. 3, which prevents the passage of air therethrough. The interior surface of the pipe is the one preferably glazed, because the latter is cooler than the outer surface. Each vertical wall is provided with a plurality of passageways 26, each leading to a vertical flue 13 through which the heated air is passed up into the combustion area.

As will be obvious, the tile or brick located adjacent each gas distribution pipe immediately above the gas nozzles are heated to an intense degree, but the pipe itself, not being directly in the region of combustion, is not heated nearly so much, and therefore the expansion in the pipe will not be as great as in the brick of the wall. By making or laying the pipe 18 in sections and without mortar, and free from any binding with the brick surrounding the same, the brick and tile are each allowed to expand independently of the other, thus preventing distortion or cracking or breaking of the pipe, due to unevenness of expansion of the various portions of the oven. In practice, it ordinarily happens that only a half of the length of the oven is used at a time, and hence by laying the center section 20 of each gas distribution pipe firmly in the wall, the sections on each side thereof expand outwardly without in any way affecting the sections of the pipe on the opposite side of the central section 20.

I have shown and described one construction embodying my improvements, but it

will be understood that the same is merely illustrative, and that many changes and modifications may be made without departing from the spirit of the invention, and all such changes and modifications are contemplated as fall within the scope of the appended claims.

I claim:—

1. A coke oven having a brick wall and provided with a plurality of heating flues and hot air passages communicating therewith, a gas distribution pipe composed of refractory material and having a plurality of gas vents therein and located within said wall, said pipe having a plurality of sections movable freely relatively to the adjacent bricks of the wall and packings located between the sections of the pipe.

2. A coke oven having a brick wall and provided with a plurality of flues therein, a gas distribution pipe located within said wall, said pipe being made of refractory material and having one of its surfaces glazed, whereby to prevent diffusion of air through the pipe, substantially as specified.

3. A coke oven having a brick wall and provided with a plurality of flues therein, a gas distribution pipe located within said wall, said pipe being provided with a plurality of gas vents one for each of the flues, and being composed of refractory material, and having its interior surface glazed whereby diffusion of air through the pipe is prevented, substantially as and for the purpose described.

4. A coke oven having a brick wall and provided with a plurality of flues therein, a gas distribution pipe having a plurality of gas vents and located within said wall, said pipe being composed of refractory material and having sections movable freely relatively to the adjacent bricks of the wall, one surface of said pipe being glazed, whereby diffusion of air therethrough is prevented.

5. A coke oven having a brick wall and provided with a plurality of heating flues and hot air passages, a gas distribution pipe located within said wall, said pipe having a plurality of sections, made of refractory material, said pipe sections being movable freely relatively to the adjacent bricks of the wall to prevent cracking or distortion of the pipe due to unevenness of expansion of the various portions of the oven, and packing material disposed between the ends of each section of the pipe, said pipe having the interior surface thereof glazed, substantially as and for the purpose described.

6. An oven of the class described, having a pair of vertical spaced walls arranged parallelly, and each comprised of a plurality of bricks and provided with heating flues, a horizontally disposed brick wall extending from one of the vertical walls to the other and secured to each, said horizontal wall having an expansible or loose joint where the same connects with one of the vertical walls.

7. An oven of the class described, having a pair of vertical spaced walls arranged parallelly and each comprised of a plurality of bricks and provided with heating flues, upper and lower horizontally disposed brick walls extending between the vertical walls and secured thereto, each of said horizontally disposed brick walls having an expansible or loose joint with one of the vertical walls, said joints extending longitudinally of the vertical walls.

8. A coke oven having a pair of vertical, spaced walls arranged parallely and each comprised of a plurality of bricks and provided with heating flues, a gas distribution pipe having a plurality of gas vents located within each of said vertical walls, each of said pipes being composed of refractory material and being made in sections movable freely relatively to the adjacent bricks of the wall, and horizontally disposed brick walls extending between the vertical walls and each having an expansible or loose joint with one of the vertical walls.

9. A coke oven having a pair of vertical, spaced walls arranged parallelly and each comprised of a plurality of bricks and provided with heating flues and hot air passages, a gas distribution pipe located within each of said walls, said pipe being composed of refractory material and having one of its surfaces glazed, and horizontally disposed upper and lower brick walls extending between the vertical walls, each of said horizontally disposed walls having an expansible or loose joint with one of the vertical walls, said joints extending longitudinally of the vertical walls.

10. A coke oven having a pair of vertical, spaced brick walls arranged parallelly and each provided with heating flues and hot air passages, a gas distribution pipe located within each of said walls, composed of refractory material and made in sections, the interior of the pipe being glazed, the sections of each pipe being movable freely relatively to the adjacent bricks of the wall to prevent cracking or distortion of the pipe due to unevenness of expansion of the various portions of the oven, and horizontally extending brick walls between the vertical walls and secured to each, each of said horizontally disposed walls having a loose or expansible joint with one of the vertical walls.

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