L. WILPUTTE.

COKE OVEN DOOR AND DOORWAY.

APPLICATION FILED JAN. 17, 1921.

1,399,594.

Patented Dec. 6, 1921.

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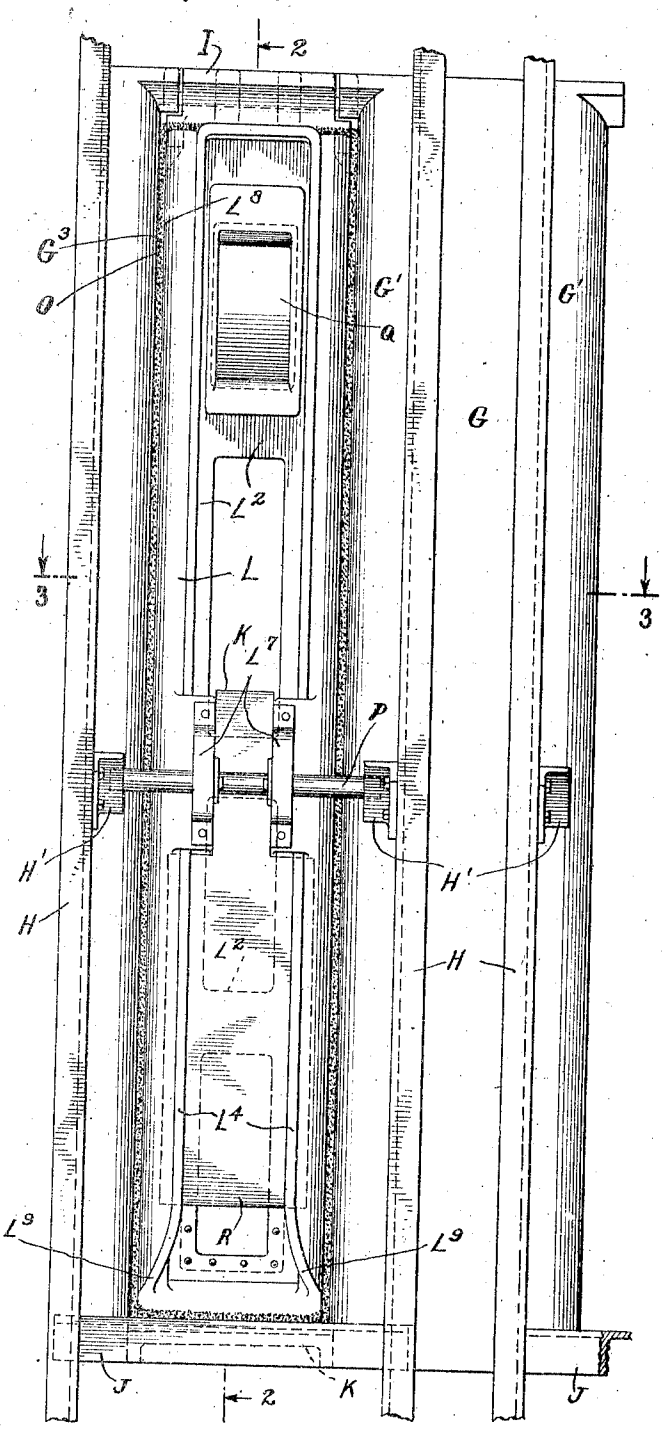
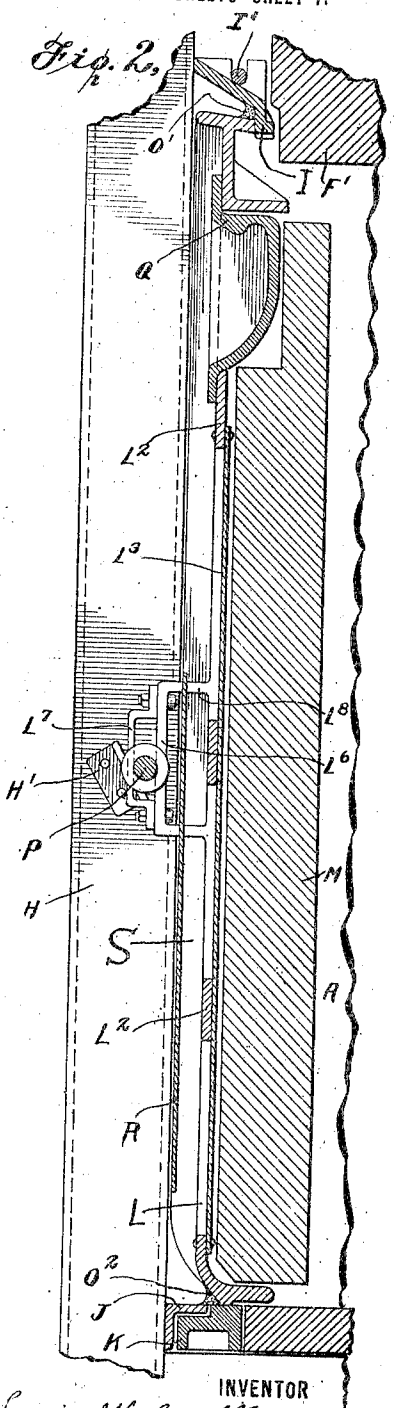


Fig. 1.

Fig. 2.



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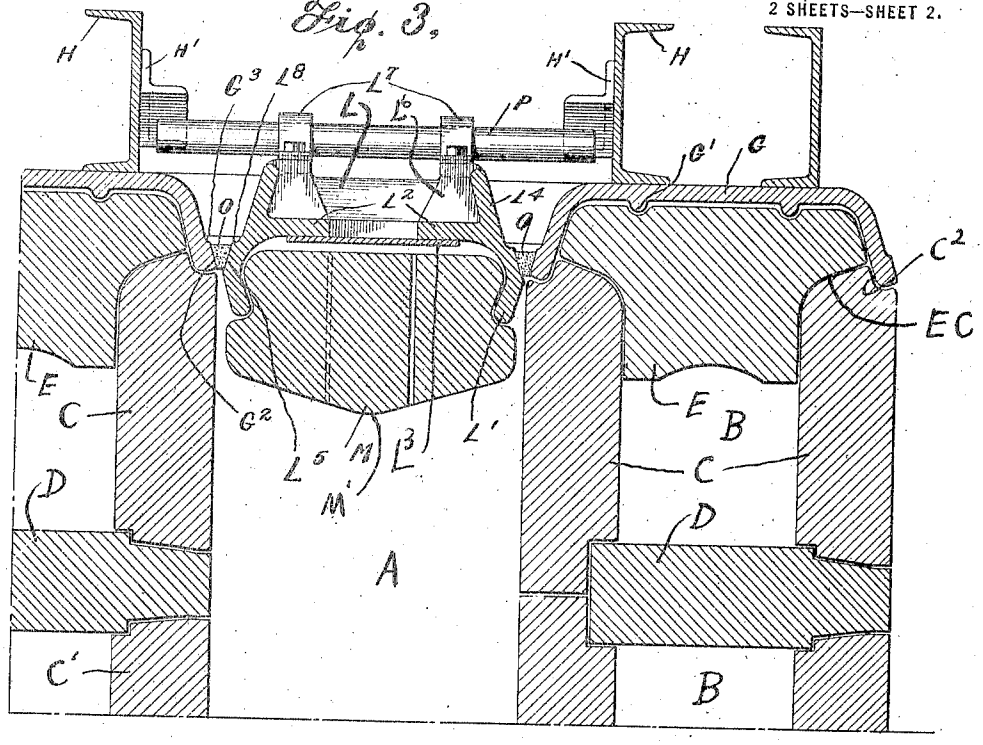
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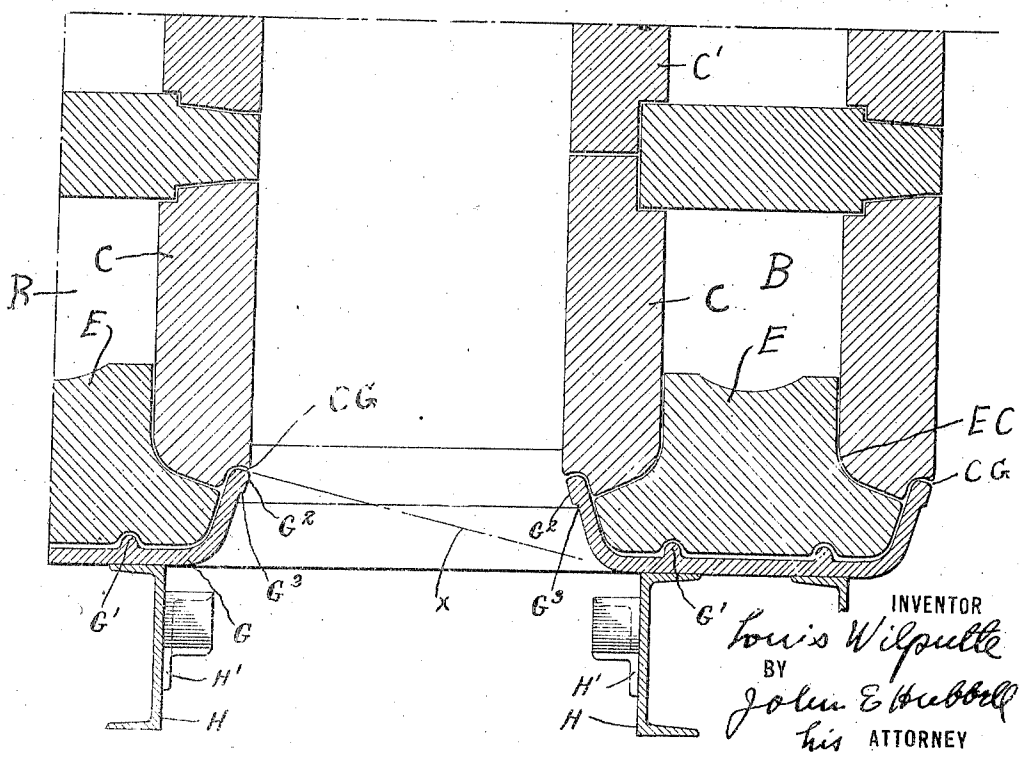
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2 SHEETS—SHEET 2.

Fig. 3.





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UNITED STATES PATENT OFFICE.

LOUIS WILPUTTE, OF NEW ROCHELLE, NEW YORK, ASSIGNOR OF TWO-THIRDS TO ALICE A. WILPUTTE, OF NEW ROCHELLE, NEW YORK.

COKE-OVEN DOOR AND DOORWAY.

1,399,594. Specification of Letters Patent. Patented Dec. 6, 1921.

Application filed January 17, 1921. Serial No. 437,647.

To all whom it may concern:

Be it known that I, LOUIS WILPUTTE, a citizen of the United States, and resident of New Rochelle, in the county of Westchester and State of New York, have invented a certain new and useful Improvement in Coke-Oven Doors and Doorways, of which the following is a specification.

The general object of my present invention is to provide an improved door and doorway construction for coking ovens especially devised for use in the horizontal coking chamber type of high capacity by-product coke ovens. Specific objects of the invention are to provide a construction which will facilitate the removal and replacement of the doors, the luting of the door joints and the elimination of leakage from the heating flues adjacent the doorways. The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, however, and the specific objects and advantages attained with its use reference should be had to the accompanying drawings and descriptive matter in which I have illustrated and described preferred embodiments of my invention.

Of the drawings:

Figure 1 is an elevation of a portion of a coke oven battery;

Fig. 2 is a section on the line 2—2 of Fig. 1; and

Fig. 3 is a sectional plan on the line 3—3 of Fig. 1.

In the drawings I have shown a portion of a coke oven structure which in its general form is of a type now in common use in high capacity by-product coke ovens. This coke oven structure is provided with horizontally elongated coking chambers A separated by heating walls in which are formed vertical flues B. The sides of the heating walls are formed by bricks C and C′, and adjacent flues are separated by a wall formed of bricks D. The end flue B in each heating wall has its outer wall formed by bricks E. The various bricks C, C′, D and E may be of the usual shape but preferably the bricks C and E are given the special shapes shown so as to provide long curved joints EC between the bricks C and E, and to so locate these joints that they may be covered at their outer edges by t e flash plates or metallic armor members G with which the ends of the heating walls are faced

As shown the flash plates G, which are ordinarily made of cast iron, are trough shaped in cross section with rounded sides, and they may well be formed as shown with ribs G′ entering grooves formed in the bricks E. The bricks E are cut away and the bricks C are recessed at C^2 so that the sides of t e flash plate members G may overlap the joints EC as shown without projecting through the planes of the side walls of the corresponding coking chambers. Preferably as shown each inner edge surface of the flash plates and the adjacent surface of the bricks C are so shaped that the plane indicated by the line X in Fig 3 of each joint CG is inclined outwardly away from the longitudinal axis of the battery. The purpose of this is to facilitate the introduction of the refractory cement employed to seal the joints CG. Such sealing material must be renewed from time to time, *i. e.*, the joints must be repointed, after the battery is in operation, and when the heat of the oven structure prevents the workman from entering or coming very close to the end of the corresponding coking chamber. With joints EC closed at their outer edges by the flash plates G as shown, the sealing of the joints EG is not of as great importance as it otherwise would be. The roof F′ of each coking chamber A is armored at its end by a metallic lintel I preferably detachably secured to the adjacent flash plates C by a removable locking bar I as set forth and claimed in my Patent No. 1,320,432. The bottom wall of each coking chamber A is preferably faced at its end by metallic door sill members J and K. The flash plates are held in place by the vertical buckstays H which may be constructed and supported in the usual manner.

The door normally closing the end of each coking chamber comprises a cast metal rim or frame L, and a refractory lining M. The cast metal rim L is provided with an internal flange L′, inturned at the sides of the door to lock the corresponding shaped brick forming the lining M in place. The rim member L is formed with a transverse web L^2 cut away, for the most part, to minimize expansion and contraction stresses, but with

the openings therein covered by sheet metal L^3. The metallic door member L is also formed with an outwardly extending rim or flange L^4 the portions of which at the sides of the door are preferably curved toward one another as shown for a purpose hereinafter explained. The door is normally locked in place by means of a locking bar P the ends of which engage brackets H' secured to the adjacent buckstays H. The locking bar P is slidingly mounted on the door by means of keepers L^7 bolted to bracket lugs L^6 forming an internal part of the metallic door member L.

Advantageously as shown a curved sheet metal plate R extends between the outer edges of the inturned portions of the door flanges L^4 at the sides of the door from a level near the bottom of the door to a level above the level of the heads of the workmen standing on the usual bench (not shown) at or slightly below the floor of the oven chamber. As shown this plate terminates at the level of the top of the lugs L^6. There is thus provided in the outer portion of the door a vertical ventilating channel S open at its upper and lower ends and some 6 or 8 feet in length. In operation the heat of the oven structure will cause the ventilating channel S to act as a chimney producing an upward flow of atmospheric air through the channel which will cool the outer portion of the door and protect men working along the side of the oven battery from excessive heat radiation from hot inner portions of the door. The plate R may be sprung into place or be slid upward into place if the flange L^4 is shaped at the bottom of the door as shown at L^9. The plate R may be frictionally held in place or otherwise secured in place by any suitable means.

The door, when in place, is sealed in the doorway to prevent air from being sucked into the oven chamber or the escape from the latter of the distillation gases, by mortarlike luting material O of clay or other usual composition at the sides of the door, similar luting O^1 between the top of the door and the lintel I, and O^2 between the bottom of the door and the door sill. The luting spaces at the top and bottom of the door can be formed and shaped in the usual manner but an important feature of the present invention is the special shape of the portions of the door and flash plates which coöperate to form the spaces receiving the luting material O at the sides of the door. The oppositely inclined outer surfaces G' and L^5 of the adjacent portions of the metallic flash plates G and the metallic door member L, respectively, provide at each side of the door a narrow trough shaped space for luting material O. Each of these trough shaped spaces must be wide enough at its inner edge to insure the proper clearance between the sides of the movable door and the fixed portions of the oven structure, and on the other hand the inner edges of these spaces should be narrow enough to prevent the luting material O, which is ordinarily thrown into place by a trowel, from passing too freely through the open inner edge of the luting spaces, and each of these spaces must be wide enough at its outer edge to permit the mortarlike luting material to be thrown into place. Advantageously as shown the sides of the flash plates G' and of the door parts L' are recessed as indicated at G^3 and L^5 respectively at the outer edges of the luting spaces.

The provision of a narrow trough shaped space for luting material at each side of the coke oven door is not now novel in itself, but the luting spaces at the sides of the door shown herein possess the novel characteristic that they are open at their inner edges. This facilitates the removal of luting material adhering to the flash plates and the door when the door is opened at each coke oven discharging operation, and also makes a failure to remove this material of much less importance than has heretofore been the case. The luting material employed is a refractory cement or mortar which, partly because of its own composition and partly because of the mixture therewith of tar and oils resulting from the distillation of the coal, frequently bakes into a very hard substance adhering very tenaciously to the surfaces of the door and oven structure with which it is in contact. When the bottom of a luting space at the side of the door is closed as by a flange or shoulder portion of the doorway against which the door seats as in the construction of my earlier patent referred to above, the luting material must be carefully cleaned from these flanges or shoulder portions each time the door is opened to permit the proper seating of the door when it is next closed. The removal of this material is difficult because of the tenacity with which it adheres, and is made doubly difficult because of the difficulty in getting at the surfaces requiring cleaning due to the lack of space and the highly heated condition of the apparatus. This is particularly true with the doors at the coke side of the battery, because of the character of the door handling mechanisms usually employed at that side of the battery. With the novel arrangement disclosed herein, however, the surfaces to be cleaned are all fully exposed when the door is opened, since none of these surfaces are at the inner side of the door. Moreover, the removal of the luting material is not a prerequisite to the proper reseating of the door in its closed position. When the door is closed, luting material adhering to the door and doorway either will not be in a position to interfere

with the movement of the door into the closed position at all, or if it is, it will be crushed and broken away between the door and doorway as much as required to permit the closure of the door. With the construction disclosed it cannot get between rigid parts overlapping along a plan transverse to the length of the oven and thus prevent proper seating of the door as may happen with such a construction as is shown in my earlier Patent No. 1,320,432 referred to above.

Luting material, tar or the like adhering to the surfaces L^6 of the door member L, or to the surfaces of the cutaway portion C^3 of the bricks C at the inner side of the luting space proper, can be removed when the door is opened as required, but in most cases the cleaning of these surfaces while the door is open is unnecessary as they will be automatically scraped off as much as is necessary when the door is closed.

Another advantage of the construction disclosed is that there is some leeway possible in the extent to which the door is entered in the doorway when the door is closed. While preferably the door in its closed position should be entered in the doorway at all levels exactly as shown in Fig. 3, no real harm will result if the bottom of the door is pushed in an inch or two farther as the door will not cut into the side walls of the oven when this is done This not only simplifies the door sealing operation but with certain types of door handling mechanism materially reduces the liability to breakage of the door or door handling mechanism.

The provisions of the recesses G^3 and L^5 gives the workman who does the luting marks to go by, and thus facilitates proper luting and the use of a minimum amount of luting material. This avoidance of excess luting material reduces the labor and cost of luting the doors and of cleaning them and itself tends to better luting for large masses of luting material are more apt to crack and leak gas when heated up than are smaller masses. The closing of the joints EC by the flash plates very materially reduces leakage through these joints which are more apt to give leakage trouble than are any other joints into the flue spaces, particularly when the bricks at the outer ends of the heating walls are made of fire clay, while the remaining brick in the oven chamber wall are made of silica bricks having coefficients of thermal expansion very different from that of brick made of fire clay. Each flashplate not only seals the corresponding joints EC but also mechanically engages and holds together the corresponding end wall bricks E and side wall bricks G. In my copending application, Serial 507,610, filed October 14, 1921, I have disclosed and generically claim constructions shown herein and other constructions in which the flashplates are constructed and arranged to mechanically engage and hold together the bricks forming the outer end and side walls of the end flue in the oven heating wall.

The brick forming the refractory lining M for the doors at the "coke" or discharge side of the oven battery are preferably shaped as shown so that the inner face of the door lining is formed of two flat faces meeting at an angle M'. In consequence each oven charge will have a trough shaped depression in its corresponding end. This expedient makes it possible to avoid the black, incompletely coked portion of the charge which is always found at the end of the charge when the latter as a whole is not over coked and doors having their inner faces of the usual shape are employed. The special shape of door lining cannot well be used at the pusher side of the oven battery since at that side of the battery the charge should present a flat surface to the pusher ram.

While in accordance with the provisions of the statutes, I have illustrated and described the best embodiment of my invention now known to me, it will be apparent to those skilled in the art that changes may be made in the form of the apparatus disclosed without departing from the spirit of my invention as set forth in the appended claims, and that under some conditions, certain features of my invention may be used to advantage without the corresponding use of other features.

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

1. In a coke oven having a vertically disposed doorway and a door removably inserted in said doorway, the improvement which consists in metallic door and doorway parts which coöperate to provide outwardly flaring troughs at the sides of the door open at their inner and outer edges and adapted to receive mortarlike luting material, and each of such width at its outer edge that the luting material may readily be thrown into it, and narrow enough at its inner edge to prevent substantial amounts of the luting material being thrown through it.

2. In a coke oven as claimed in claim 1, the provision of surfaces on the door and doorway parts forming guides for the application of the luting material.

3. A coke oven door comprising refractory lining and a metallic frame the latter being formed with outwardly projecting flanges at the sides of the door and a plate uniting with said flanges and the body of the door to form a vertical ventilating channel open at top and bottom to the atmosphere.

4. A horizontal coke oven having verti-

cally flued heating walls between the coking chambers and having trough shaped metallic parts covering the ends of said walls and forming the sides of the oven chamber doorways and having the sides of said troughs overlapping the joints between the bricks forming the outer and side walls of the end flue in each heating wall.

5. A horizontal coke oven having flued heating walls recessed at their ends between the coking chambers, and trough shaped metallic parts covering the ends of said walls and forming the sides of the oven chamber doorways and having their sides received in the wall recesses having the joints EC between said recesses and the inner edges of the side of said troughs outwardly inclined to facilitate the pointing of said joints.

Signed at New York, in the county of New York and State of New York.

LOUIS WILPUTTE.