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HORIZONTAL COKE OVEN WITH VARIABLE BURNERS ALONG THE FLUE LENGTH

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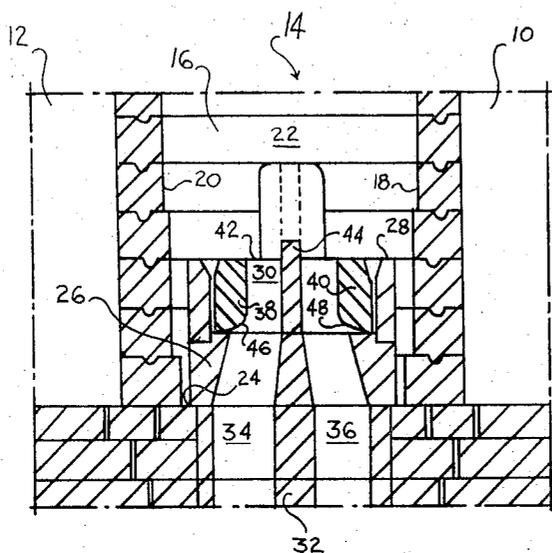


Fig. 1.

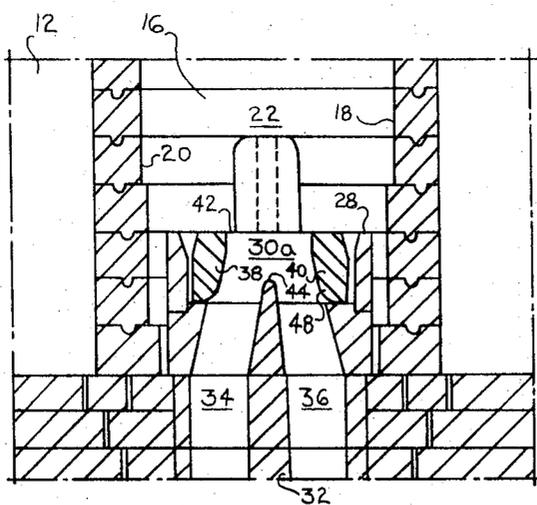


Fig. 2.

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HORIZONTAL COKE OVEN WITH VARIABLE BURNERS ALONG THE FLUE LENGTH

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6 Claims

ABSTRACT OF THE DISCLOSURE

A horizontal coke oven battery has a plurality of parallel spaced coke oven chambers with heating flues positioned therebetween. The coke oven chambers are tapered and increase in width from the pusher side to the coke side to accommodate pushing of the finished coke charge from the coking chambers. The flues increase in width from the coke side of the coke oven battery to the pusher side of the coke oven battery and the flues are provided with different types of burners adjacent the pusher side of the battery as compared with the burners adjacent the coke side of the battery. Adjacent the pusher side of the battery the flues have parallel flow burners in which the air and combustion gases admix at a location above the top of the burner to provide a relatively long flame in the heating flues. On the coke side of the oven mixing jet type burners are provided where the fuel and air are premixed within the burner and as the admixture flows out of the burner it is immediately ignited at the top of the burner and provides a shorter flame.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a horizontal coke oven battery with oven chambers increasing in width from the pusher side to the coke side of the coke oven battery and more particularly to a horizontal coke oven battery having heating walls increasing in width from the coke side to the pusher side of the coke oven battery with different types of burners therein to provide uniform heating of the coke oven chambers.

2. Description of the Prior Art

As is illustrated and described in United States Patent 2,100,762, the coke oven chambers of horizontal coke oven batteries increase in width from the pusher side to the coke side of the coke oven battery. This increase in width makes it possible to push the coke from the coke oven chamber after the coking process is completed. The increasing width of the coke oven chamber results in a proportionate increase in the volume of coal charge at every heating flue from the pusher side to the coke side of the oven and, consequently, increases the heating requirement in each flue from the pusher side to the coke side of the oven. The heating walls on opposite sides of the coke oven chamber have vertical flues therein that decrease in width from the pusher side of the coke oven battery to the coke side of the coke oven battery which is in opposition to the progressively increasing heat requirement for the increasing volume of coal to be coked at each heating flue.

To compensate for the increasing heat requirement toward the coke side, it has been the practice in the past to increase the supply of fuel to the individual heating flues progressively from the pusher side of the coke oven battery to the coke side of the coke oven battery. In the past, the same type burners were used in all heating flues

of the heating wall, with the result that the flames in the vertical flues adjacent the pusher side of the coke oven battery were relatively short and longer flames were present on the coke side as the result of the varying amounts of fuel supplied to the respective heating flues. It is desirable to provide equally long flames in all of the heating flues for a uniform vertical distribution of the heat through the heating walls to the coke charge.

As is discussed in United States Patent 2,100,762, the area of the air and gas regenerator ports in the vertical heating flues progressively decrease in cross section from the pusher side of the coke oven battery to the coke side of the coke oven battery. With this arrangement, it is stated that a relatively uniform heating of the coal charge in the adjoining chambers is obtained. The decrease in the size of the combined air and gas ports would inherently change the length of the flame within the vertical flue and thereby change the vertical distribution of the heat transferred through the heating walls to the adjacent coke oven chambers. There is a need for providing both uniform heat from all of the vertical heating flues to the coke chamber and to uniformly distribute the heat vertically in the heating flues.

SUMMARY OF THE INVENTION

The present invention is directed primarily to improvements in vertical heating flues to provide uniform vertical heat distribution and uniform heating throughout the length of the heating wall and includes parallel flow burners in the vertical flues of the heating wall adjacent the pusher side of the coke oven battery and mixing jet burners in the vertical flues adjacent the coke side of the coke oven battery. The parallel flow burners provide an elongated or extended flame in the vertical flues of large cross section with relatively small amounts of fuel. The mixing jet burners adjacent the coke side of the coke oven provide a relatively short flame in the heating flues of smaller cross section and utilize larger amounts of fuel. The uniformity of heating throughout the length of the heating wall can be obtained by providing similar parallel flow burners in one half of the heating wall beginning at the pusher side of the coke oven battery and providing mixing said burners in the other half of the heating wall beginning at the coke oven side of the coke oven battery. With this arrangement, a substantial adjustment in the flame length can be obtained. Where a more uniform flame length is desired, a series of burners may be provided that progress from the pusher side to the coke side of the coke oven battery.

Accordingly, the principal object of this invention is to provide a heating wall for a coke oven chamber in which the heat is uniformly distributed throughout the length of the heating wall.

Another object of this invention is to provide different type burners in the vertical heating flues between the pusher side and the coke side of the coke oven battery to provide substantially uniform heating throughout the length of the heating wall and provide substantially uniform vertical heat distribution through the heating wall.

These and other objects of this invention will be more completely disclosed and described in the following specification, the accompanying drawings and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary vertical section through the base of a heating wall illustrating the parallel flow type burner.

FIG. 2 is a fragmentary vertical section through the base of a heating wall illustrating a mixing jet burner.

To simplify the illustrations, only those components of the coke oven battery are illustrated which are essen-

tial to the understanding of the invention. United States Patent 2,100,762 describes and illustrates in detail a horizontal coke oven battery with the plurality of transversely extending coke oven chambers that increase in width from the pusher side of the coke oven battery to the coke side of the coke oven battery and the heating walls between the coke oven chambers. The separate flues in the heating walls with burners located in the base portion of each flue are also illustrated and described in detail in United States Patent 2,100,762. The description of U.S. Patent 2,100,762 is incorporated herein by reference and only the parallel flow and mixed jet type burners in the respective flues will be described herein.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, and particularly FIGS. 1 and 2, there is illustrated a pair of coke oven chambers 10 and 12 with a heating wall 14 therebetween. The heating wall 14 has a plurality of vertical flues 16 with side walls 18 and 20. Transverse dividing walls 22 form the separate vertical flues 16 in the heating wall 14. The flues 16 have a base portion 24 with a burner 26 that extends upwardly into the flues 16. The burner 26 has an upper surface 28 and a chamber 30 therein. A web member 32 extends longitudinally in the burner chamber 30 forming a pair of separate ducts or passageways 34 and 36 through which fuel gas and air are introduced into the burner for combustion. Bricks 38 and 40 are provided to control the opening 42 in the burner upper surface 28.

In the parallel flow burner illustrated in FIG. 1, the web 32 has an upper portion 44 that extends upwardly through the burner opening 42 beyond the burner upper surface 28. With this arrangement, the air and fuel gas introduced through the ducts 34 and 36 flow separately through the burner 26 into the heating flue 16 and are first mixed in the vertical flue 16. After sufficient mixing of the air and fuel gas has taken place, the mixture ignites and burns. The continued mixing of the air and fuel gas in the vertical flue results in a relatively elongated flame. The delayed mixing of the air and fuel in the vertical flue prolongs the combustion of the vertically rising gases to provide the desired elongated flame.

In the mixing jet burner, as illustrated in FIG. 2, the upper edge portion 44 of the web 32 terminates at a location below the tip or upper surface 28 of burner 26. Between the upper edge 44 of web 32 and the burner upper surface 28 there is provided a mixing chamber 30a in which the air and fuel gas flowing through ducts 34 and 36 are premixed before being introduced into the vertical flue 16 through the burner outlet 42. The web upper edge 44 is generally pointed, as illustrated in FIG. 2, and the bricks 38 and 40 have curved sides 46 and 48 to provide a conical configuration to chamber 30a. The conical configuration assists in the mixing of the air and fuel gas within the chamber 30a of burner 26. The premixed fuel gas and air is ignited at the top surface of the burner 16 and provides a shorter flame. The shorter flame is due to the premixing of the combustion media in the chamber 30a within the burner 26 before the combustion media is introduced into the vertical flue.

The parallel flow burners of FIG. 1 may be installed in all of the heating flues on the heating wall half toward the pusher side of the coke oven battery, and the mixing jet burners illustrated in FIG. 2 can be installed in all of the heating flues of the heating wall half toward the coke side of the coke oven battery. It is also possible to attain the above discussed uniformity of heating throughout the length of the heating wall by providing a series of burners in the flues that progress from a mixing jet type burner of FIG. 2 to the parallel flow type burner of FIG. 1. The progressive change in the burners could be effected by lowering the upper edge 44 of web 32 from the height indicated in FIG. 1 stepwise to the height of the web illustrated in FIG. 2. The conical taper of the bricks 38 and

40 may also be changed progressively from that illustrated in FIG. 1 to that illustrated in FIG. 2.

According to the provisions of the patent statutes, we have explained the principle, preferred construction and mode of operation of our invention and have illustrated and described what we now consider to represent its best embodiments.

We claim:

1. In a horizontal coke oven battery having a plurality of transversely extending coke oven chambers increasing in width from the pusher side of the coke oven battery to the coke side of the coke oven battery comprising, a transversely extending heating wall between a pair of said coke oven chambers, said heating wall having a plurality of vertical heating flues extending from said coke oven battery pusher side to said coke oven battery coke side, said vertical heating flues adjacent said pusher side of said coke oven battery having base portions with parallel flow burners therein, said parallel flow burners having separate passageways extending therethrough for separately introducing combustion gas and air into the flues so that said combustion gas and air are admixed in the flues to provide a relatively elongated flame, and said vertical heating flues adjacent said coke side of said coke oven having base portions with mixing jet burners therein, said mixing jet burners having separate passageways for separately introducing combustion gas and air into said burner, said mixing jet burners having a chamber therein, said passageways opening into said chamber so that combustion gas and air are premixed in said chamber within the burner and ignited adjacent the base portion of the flue to provide a relatively shorter flame than the flame produced in said flues having parallel flow burners.
2. In a horizontal coke oven battery as set forth in claim 1 in which, said heating flues having parallel flow burners therein extend from the pusher side of the coke oven battery to a location intermediate said coke side and said pusher side of said coke oven battery, and the remaining flues having mixing type jet burners.
3. In a horizontal coke oven battery as set forth in claim 1 in which said vertical flues having said parallel flow burners include, a burner positioned adjacent said flue base portion, said burner having a chamber therein with an upper surface, said upper surface having a gas flow outlet therein opening into said chamber, and a web member extending across said chamber and dividing said chamber into said separate passageways, said web member extending upwardly through said gas flow outlet to a location above the upper horizontal surface of said burner so that separate combustion gases flowing through said passageways mix externally of said burner.
4. In a horizontal coke oven battery as set forth in claim 1 in which said vertical flues having said jet mixing burners therein include, a burner positioned adjacent said flue base portion, said burner having a chamber with an upper surface, said upper surface having a gas flow outlet therein opening into said chamber, a web member positioned in said chamber and forming said separate passageways therein, the upper portion of said web member terminating within said chamber below the upper surface of said burner so that separate combustion gases flowing through said passageway mix in said chamber within said burner.
5. In a horizontal coke oven battery as set forth in claim 4 in which, said chamber within said burner having a generally conical configuration.

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6. In a horizontal coke oven battery as set forth in claim 1 in which, said burners in said flues progressing from said pusher side of said coke oven battery to said coke side of said battery having a web member with an upper edge portion increasing progressively in elevation from a location above the upper surface of the burner to a location below the upper surface of the burner.

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