CHARGING HORIZONTAL COKE OVENS

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My present invention consists in a novel method of supplying coal to be carbonized to coking chambers or retorts of the type commonly referred to as horizontal coke ovens.

The general object of the invention is to put into each such oven chamber the charge of coal to be carbonized in a simple and expedients manner and so as to avoid the difficulties heretofore experienced in the usual method of charging such ovens from the escape of gases from the oven chambers through the charging openings during the charging operation. The invention is characterized by the fact that its practice requires little or no modification in principle or form of the usual type of horizontal coke ovens or of the usual accessories now in use.

The drawing is a somewhat diagrammatic elevation in section of the coking chamber of a horizontal coke oven battery.

In the drawing I have conventionally illustrated a horizontal coke oven battery A of the type most widely known and used in byproduct coke oven practice throughout the world. The battery A comprises a multiplicity of side by side coke oven chambers A' with heating flues in the masonry between the different adjacent pairs of oven chambers. Each chamber A', which is ordinarily some eight or ten times as high as it is thick, and three or four times as long as it is high, has open ends normally closed by doors B and B' which are removed at the end of each coking operation to permit the coke mass to be removed by a ram or plunger D which is moved into the oven chamber at one end and pushes the coke out of the chamber at its opposite end. E represents the usual levelling bar for insertion into the oven chamber through the levelling bar opening formed in the oven door B and normally closed by the removable cover C. In ordinary practice, the levelling bar is mounted on a pusher machine (not shown) which supports, and is provided with mechanism for operating both the pusher ram D and the levelling bar E in the oven discharging and charging operations. As is common in many installations and as is required for the practice of the present invention, an outlet A' for the escape of the gases of distillation is provided adjacent each end of each coking chamber. Each outlet A', as shown, is provided with the usual standpipe connection F for connecting the outlet to the corresponding connecting main G. The two mains G, one at each side of the battery, run along the length of the battery and each is connected to all of the outlets A' at the corresponding side of the battery. Steam jets may be discharged into the standpipe connections F from steam supply pipes F', as has long been common practice, to produce a gas impelling effect on the gas moving through each standpipe connection during the charging operation, and during such additional portion of the coking operation as may be desirable.

The oven chamber A' is provided with a plurality of charging openings A" in its roof, each charging opening being normally closed by a corresponding removable cover H which is usually luted in place at the end of the charging operation. As shown, the oven is provided with three charging openings A", one located approximately midway between the ends of the oven, and the others located about midway between the central opening and the ends of the oven.

I represents a charging lorry of conventional type, running on track rails I' mounted on the battery roof. The lorry is provided with as many hoppers I', I" and I', as there are charging openings A" in each oven, and each hopper terminates at its lower end in a dependent chute portion which registers with the corresponding charging opening when the lorry is in the oven charging position. I" represents the gates or valves which normally close the lower ends of the hopper discharge chutes, and which may be of any usual or suitable type.

In charging the oven A' in accordance with the present invention, coal is first put into the oven from the hoppers I' and I" of the lorry I through the corresponding charging openings A", the corresponding covers H being then removed. The coal thus passed into the oven from the hoppers I' and I" is sufficient in amount to pile up beneath each
end charging opening A as indicated by the peaks in the line K, to a level approaching that of the top surface M of the complete charge. The surface M is sufficiently below the roof of the oven to provide the usual open gas passage above the charge in the fully charged level, and corresponds to the bottom surface of the path of movement of the levelling bar E. After the oven is thus partially charged through the end charging openings A, the latter are closed by putting the corresponding covers H in place, and the cover H for the central opening I is removed, and the additional coal required for the complete charge is then passed into the oven through the central charging opening A from the hopper I.

As the coal thus entering the oven through the central charging opening A piles up above the level M of the oven chamber, the levelling bar D is brought into operation and moved backward and forward in the oven chamber to move coal away from the vicinity of the central charging opening toward each end of the oven chamber, and eventually the top of the charge is thus dressed to the level M. After the amount of coal necessary to complete the charge has been passed into the central charging opening A, the cover H for the latter is put in place, and the lorry may then be moved away to facilitate the usual luting or sealing with clay of the joints at the margin of the covers H. Throughout the charging operation, the distillation gases being evolved, except for such relatively small portions as may escape through the charging openings, pass out of the oven chamber through the outlets A at the ends of the oven and through the corresponding stand-pipe connections F to the collecting main G.

In charging an oven in the manner described, the distillation gases evolved from any portion of the charge may pass freely to one or the other of the two outlets A through a path which is never obstructed by any portion of the coal in, or being charged into the oven. This means that the escape of the gas through the charging openings is reduced to an amount which is so small as to be comparatively unobjectionable, either from the standpoint of gas economy, or from the standpoint of injurious smoke pollution of the atmosphere, or annoyance to the attendants working on top of the battery. The amount of gas escaping through the charging openings of an oven charged in accordance with the present invention is insignificant in comparison with the amount escaping when the coal is simultaneously fed into the oven through all the charging openings, as has heretofore been the usual practice of charging ovens of the type illustrated. The much greater gas wastage with the previous method of charging referred to, has been due to the inevitable trapping of the path of gas flow from portions of the charge within the oven to the oven gas outlet or outlets by coal piling up to the roof of the oven beneath a charging opening. In such cases, the gas pressure in the trapped portion or portions of the oven fills up sufficiently to force great gusts of gas out of the charging openings. The escaping gas usually ignites on coming into contact with atmospheric air, and in any event, is objectionable not merely because of the wastage of rich distillation gases evolved and the resultant pollution of the atmosphere but because of the annoyance to the attendants working on the top of the battery, and the interference with their labors.

In charging an oven in accordance with the present invention, the work which needs to be done by the levelling bar is but little greater than that which is required when the oven is simultaneously charged through three, four, or five distributed openings A. The time period required for charging an oven in accordance with the present invention is but little greater than that required when the oven is simultaneously charged through a plurality of openings in the usual manner, since about the same amount of time is required for the levelling operation, which, in any event, takes the bulk of the time required for the complete charging operation.

But a few seconds are required for the discharge into the oven of the coal supplied through the end openings from the hoppers I' and I', and the coal thus supplied in ordinary practice will never be less, and usually will be more than half of the complete charge. The variation in the amount of coal which may thus be charged through the end openings A depends upon the dryness of the coal. When the moisture content of the coal is relatively high, the coal piles up beneath the end charging openings in quite sharply defined cones, as indicated by the line K, and in that case the amount of coal which can be advantageously charged through the end openings may amount to from 50% to 65% of the total charge. When the coal is quite dry, the contour of the portion of the charge supplied through the end openings will be approximately that indicated by the line K', and in that case from 75% to 85% of the total charge may be supplied through the end openings, the residue of the charge being supplied in each case from the central 120 hopper being correspondingly reduced. Ordinarily, as is now the usual practice preparatory to each oven charging operation, the proper amount of coal to be discharged by each of the hoppers I', I' and I' is put into the hopper from the discharge chutes J' of the usual over-head bunker or coal storage J, so that in charging an oven, each hopper I', I' and I' is completely emptied.

An important practical advantage of the
present invention is that it requires no change whatever in the construction or form of existing types of horizontal coke ovens provided with distributed charging openings and a gas outlet at each end of the oven chamber, or in the usual accessories of such ovens. While for the practice of the invention I prefer to employ three charging openings and a lorry with three hoppers, the invention may be carried out with ovens having more than three charging openings.

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

1. A method of charging a horizontal coke oven chamber which consists in passing coal into the chamber while the chamber is hot through a plurality of points distributed along the top of the chamber until the coal piling up beneath said points approaches, but does not reach the roof of the chamber, completing the charge by supplying the coal to the chamber at a single point and leveling the charge, and continuously withdrawing the gas from the chamber at opposite sides of the last mentioned point during the charging operation.

2. The method of charging a horizontal coking chamber having a plurality of charging openings in its roof distributed along the length of the chamber and having gas off-takes adjacent the opposite ends of the chamber, which consists in first passing through a plurality of said openings into the chamber while the chamber is hot coal sufficient in amount to form a major portion of the charge, but insufficient to cause the coal to pile up beneath any one of the last mentioned openings sufficiently to obstruct a free gas passage through the upper portion of the chamber between said off-takes, and then completing the charge by supplying coal through a single one of said openings and levelling.

3. The method of charging a horizontal coking chamber with wet coal which comprises simultaneously passing the coal into the chamber while the chamber is hot through non-adjacent openings of a series of charging openings spaced along the top of the chamber until the coal piling up beneath said openings approaches, but does not seal the openings, completing the charge by passing the coal into the chamber through a charging opening intermediate said first mentioned openings, levelling the charge during the completing of the charge, and continuously withdrawing the gases evolved during the charging at opposite ends of the series of openings.

4. The method of charging coal having a high moisture content into a horizontal coking chamber having a plurality of charging openings in its roof distributed along the length of the chamber and having gas off-takes adjacent the opposite ends of the chamber which comprises simultaneously passing separate batches of the coal into the chamber while the chamber is hot through non-adjacent openings until the coal piling up beneath said openings approaches, but does not seal these openings, externally closing the openings thus utilized, completing the charge by subsequently passing another batch of coal into the chamber through an opening intermediate the openings first utilized, and continuously withdrawing the gases evolved during said operations through said gas off-takes.


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