COKE OVEN PLANT WITH COKE QUENCHING CARS

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The present invention relates to coke oven plants equipped with coke quenching cars adapted for travelling in front of the oven battery, and more particularly to such quenching cars as are provided with inclined loading bottoms on which the coke is pushed through a coke guide car from the coking chamber, whereupon the coke is quenched while thereon by water.

Coke quenching cars are already known the loading bottoms of which show an inclination of about 28 to 30° to the horizontal. The inclination of the loading bottoms of these known quenching cars is unchangeable since the inclined bottom is firmly fixed on the bogie. Consequently the lower end of the loading bottom of the quenching car is on the same line as that at which the coke will discharge.

Because of this, a fundamental disadvantage arises in that the coke when pushed out of the coke oven chamber into the quenching car accumulates in greater depth on the deepest point of the bottom and thus the bottom of the quenching car is not covered uniformly in depth, i.e., this thickness of the coke layer is unequal.

It has been proposed to improve the distribution of the glowing coke over the loading bottom of the quenching car by the provision of tilting cars. The bottom of the quenching container is arranged in such a way as to be practically in a horizontal, or slightly inclined position, to receive the coke when it is pushed out of the chamber into the car. When adopting such tilting quenching cars for practical operation it has been found that the coke cannot slide in the direction of the deep, or discharge, side of the loading bottom, to form a layer of uniform depth for quenching, but the coke mass accumulates deeper on part of the quenching car bottom directly underneath the discharge end of the coke guide car.

Careful investigations have, however, shown that a proper and uniform distribution for uniform depth of the coke when pushed out of the coking chamber onto the loading bottom of the quenching car is obtained if the inclination of the loading bottom to the horizontal is chosen to be about 15°, and by giving to the coke reaching this loading bottom of this angle, a certain kinetic energy which corresponds to a vertical drop height for the coke of about 1 to 1.2 meters.

According to the present invention for coke oven plants in which the coke is to be quenched in a car having an inclined bottom, bottoms of the cars are arranged in such a manner that the bottom of the quenching car has an inclination of say 15° while the coke is being pushed thereon from the coking chamber, and so that during this time the upper end of the inclined loading surface or bottom of the quenching car is situated a vertical distance, amounting to about 1 to 1.2 meters, from the lower line of the slide way of the coke guide car.

If, with a car constructed according to the invention, the coke mass is pushed out of the chamber at the usual speed, and if at the same time the quenching car is slowly moved past the front of the coke guide car, arranged before the oven chamber to be pushed, the coke upon falling into the quenching car from the guide car distribution in a layer of practically uniform depth over the whole area of the loading bottom. The coke in the quenching car may therefore also be uniformly quenched so that neither too much quenching water is consumed i.e., no part of the coke will get too wet nor will it be that other parts of the coke mass are insufficiently quenched.

In order to remove the coke from the quenching container, the loading bottom is brought into a more inclined position by swinging (tilting) the quenching container bottom until it reaches the angle of inclination at which the coke may slide off automatically onto the quenching wharf.

Quenching cars built according to the present invention and in the described manner are illustrated in the accompanying drawings in which:

Fig. 1 illustrates in a schematic way a vertical cross section through a quenching car of the known type provided with a fixed unchangeable inclined bottom.

Fig. 2 likewise shows schematically a vertical cross section through a quenching car of the known type provided with a tiltable loading bottom.

Fig. 3 illustrates in vertical cross section a quenching car built according to the present invention.

As may be seen from Fig. 1, with this known construction, the coke is guided through the coke guide car, travelling in front of the oven battery, over the highly inclined bottom to the discharge end of the same where the coke accumulates and thus forms practically a horizontal surface, marked 30.
ing bottom 4 is therefore disadvantageously considerably deeper than at the upper receiving end. If quenching water is sprayed over such an unevenly deep distributed coke mass, the quenching effect will not be a good one. The shallow parts of the layer will become too wet, while the coke accumulated in deeper parts of the layer will be quenched insufficiently and incompletely.

The inclined bottom of the known car of Fig. 1 is rigidly fixed to the bogie 8. After being quenched, the coke is removed from the container by opening the flap 31. Fig. 2 shows the disadvantageous distribution as to depth of coke over the slightly inclined loading bottom 4 of the known tilting bottom quenching cars. As illustrated in Fig. 2, the coke accumulates much deeper on the part of inclined bottom 4 that is underneath the discharge end of the coke guide car 1. For the purpose of unloading the coke after the process of quenching, the inclined bottom 4 is tilted around a horizontal axis 32 so that the coke may be discharged at the deepest end of the inclined bottom. As a result of this non-uniform depth distribution of coke, these tilting quenching cars cannot be used for large scale operation compared with the results attained with quenching cars having a stationary inclined loading bottom as shown, for example, in Fig. 1.

A uniform depth distribution of coke over the whole inclined bottom is assured when the quenching car is constructed in accordance with the present invention, as along the lines shown in Fig. 3. The coke guide car 1 is provided with a coke slide way 2 which is equipped with suitable means such as flaps or chains in order to obtain an essentially vertical breaking effect of the coke mass.

The quenching container 3 arranged on a suitable bogie 8 travels in front of the car. The tilting container 3 is preferably pivoted on the bogie 8 so that the loading bottom 4 may be tilted to a certain angle to the horizontal at which the coke will slide off. The quenching container 3 is furthermore arranged opposite the coke guide car in such a way that the upper end 5 of the inclined loading bottom 4 is displaced at a vertical distance of 1 to 1.2 meters from the end of the slide way 2 of the coke guide car with the inclination of the loading bottom at an angle to the horizontal, that is, the angle marked "α" in Fig. 3, at about 15°. When adopting the arrangement according to the present invention the coke distributes in a layer of practically uniform depth over the whole area of the loading bottom 4, as indicated at 6.

The container bottom 4 is pivoted to tilt around the horizontal axis 10 in bearings 9 arranged in the middle of the bogie 8. The discharge side of the container 3 is formed by the fixed, deep, long side wall 7 rigidly connected with the undercarriage by means of the struts 11 through the intermediary of fixed parts 12 of the split end walls, the other side parts are formed by the remaining parts 12' of the split end walls, and the shallow long wall 12", at the receiving side coke container. The wall parts 12' and 12", which are connected with the bottom 4, tilt therewith.

The tilting movement of the container bottom is effected by a piston 13 which is preferably operated by compressed air. The piston is arranged in the middle of the undercarriage 8 under the container bottom 4.

The piston rod 14 of the piston 13 is connected with a rack 15 which engages a pinion 16. The pinion 16 is rigidly connected with a shaft 17 which is supported by bearings 18 on the bogie 8. The bearings 18 are arranged on each side of the pinion 16, have flanges 19 between which the rack 15 lies and engages a guide roller 20 between the flanges 19 which holds the rack 15 in engagement with the pinion 16.

At various points over the whole length of the underframe of the container 3, there are mounted bearings 22 for the lower side of the tilting bottom. In these bearings, driving rods 23 are supported which are also connected at their other ends each with a crank 24 fixed to the shaft 17. On actuating the piston 13, the piston rod 14 will be moved to the right (as shown on the drawings) and consequently the pinion 16 and crank shaft 17 are turned in clockwise direction. Simultaneously the turning of shaft 17 throws crank 24 counterclockwise, thus lifting rods 23, and the tilting bottom will be lifted by means of the crank 24 through the movement of the cranks 23 which are fixed to the shaft 17, until the cranks 24 reach their upper dead point, and then the container bottom is in its full tilted discharging position.

When the coke is pushed out of the oven chamber it is guided by the coke guide car 1 into the quenching car container 3. The tilting bottom 4 is then, of course, in its charging position to receive the coke, which position corresponds to the position shown in full lines in Figure 3. Therefore, the coke pushed out of the coking chamber will distribute uniformly in depth in a thin layer on the bottom of the quenching car container when the quenching car is made to travel slowly and uniformly past the coke guide 1, as is customary, during the pushing out of the coke mass from the oven chambers.

In its charging position, the quenching car bottom buttts with its lower edge against the bottom of the stationary side wall 7 of the container, so that the container is closed by the edge 8 so that the loading bottom 4 may be tilted to a certain angle to the horizontal at which the coke will slide off.

For discharging the container, the bottom 4 is tilted round the axis 10 in clockwise manner by means of the action of the tilting piston 13. Thereby an opening 25 is formed between the bottom of the stationary wall 7 and the upper surface of the bottom 4, through which the coke discharges onto the coke wharf discharging bench 25. This discharging position of the container bottom is shown in dotted lines in Figure 3 of the drawings.

The bogie 8 is extended upwards to form supporting bodies 28 for the fixed wall 7. In front of the supporting bodies 28 distributed plates 29 are provided which guide the coke around the supports 28. The container bottom 4 has recesses which correspond to these distributing bodies.

I have now above described my present invention on the lines of a preferred embodiment thereof but my invention is not limited in all its aspects to the mode of carrying it out as described and shown, since the invention may be variously embodied within the scope of the following claim.

What I claim is:

Coke oven battery comprising coking chambers arranged side by side with heating walls arranged therebetween; a coke guide car travelling in front of the oven battery; and a coke quenching car including a container bottom arranged for tilting discharge action, around a horizontal
axis on an undercarriage, relative to a side wall fixed relative to the undercarriage and bottom; said fixed side wall and tiltable bottom being arranged relative to each other so that, for discharge, the bottom, on tilting, moves away from the lower edge of the fixed wall, leaving an opening for discharge, and in charging position, the bottom, in its final closed position, abuts against the lower edge of the fixed side wall; and said quenching car being arranged relative to the coke guide car, in its position alongside the battery for coke discharge, for travelling in front of the oven battery in such a way that the coke falls out of the oven chamber through the coke guide car into the quenching car; and said quenching car having its bottom at an inclination relatively to the horizontal of about 15° while the bottom of the car is in closed position to be filled with coke, and having its lower inclined end shutting the fixed wall with the higher end of the inclined bottom lying about 1 to 1.2 meters below the slide way of the coke guide car.

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