

[54] COKE QUENCHING APPARATUS

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263, 262; 214/18 R

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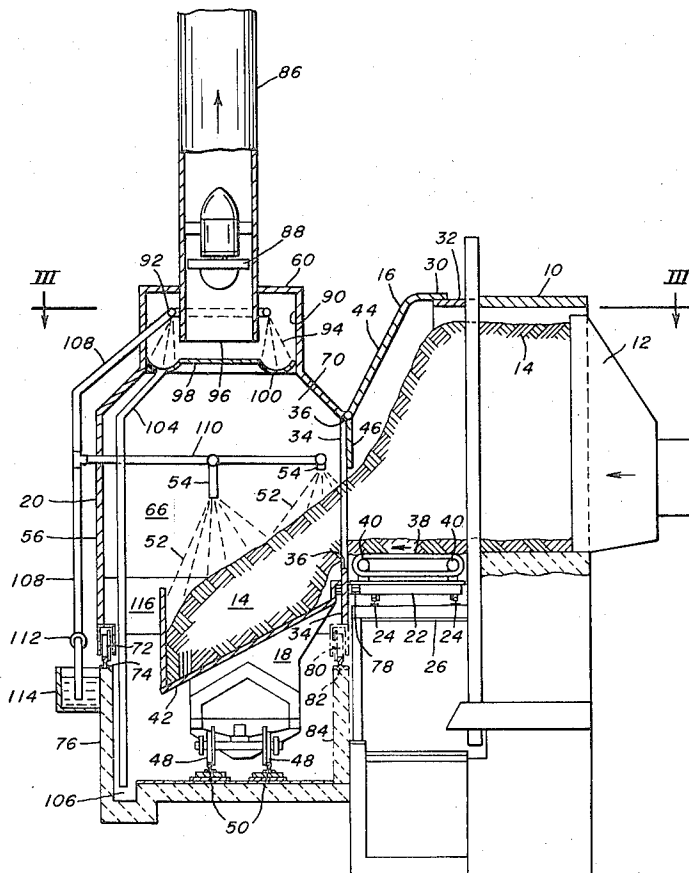
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[57] ABSTRACT

Apparatus for quenching coke without polluting the surrounding atmosphere, wherein a coke guide carriage has a conveyor-belt floor for transferring coke from an oven to a quench car through a tubular guide, and the quench car being contained within a hood having top, end, and side walls for confining smoke, fumes, and dust generated by the movement of the coke from the oven to the quench car; the hood including a sprinkling system for spraying water onto the coke in the quench car and the hood including vent means in the top wall which vent means includes a stack having a gas inlet end that is enclosed within a gas plenum chamber having a water sprinkling system therein for providing a curtain of water around the inlet end for washing the gas as it enters the stack, whereby the conveyor belt, the sprinkling system and the vent cooperate to minimize any smoke and dust created.

6 Claims, 3 Drawing Figures



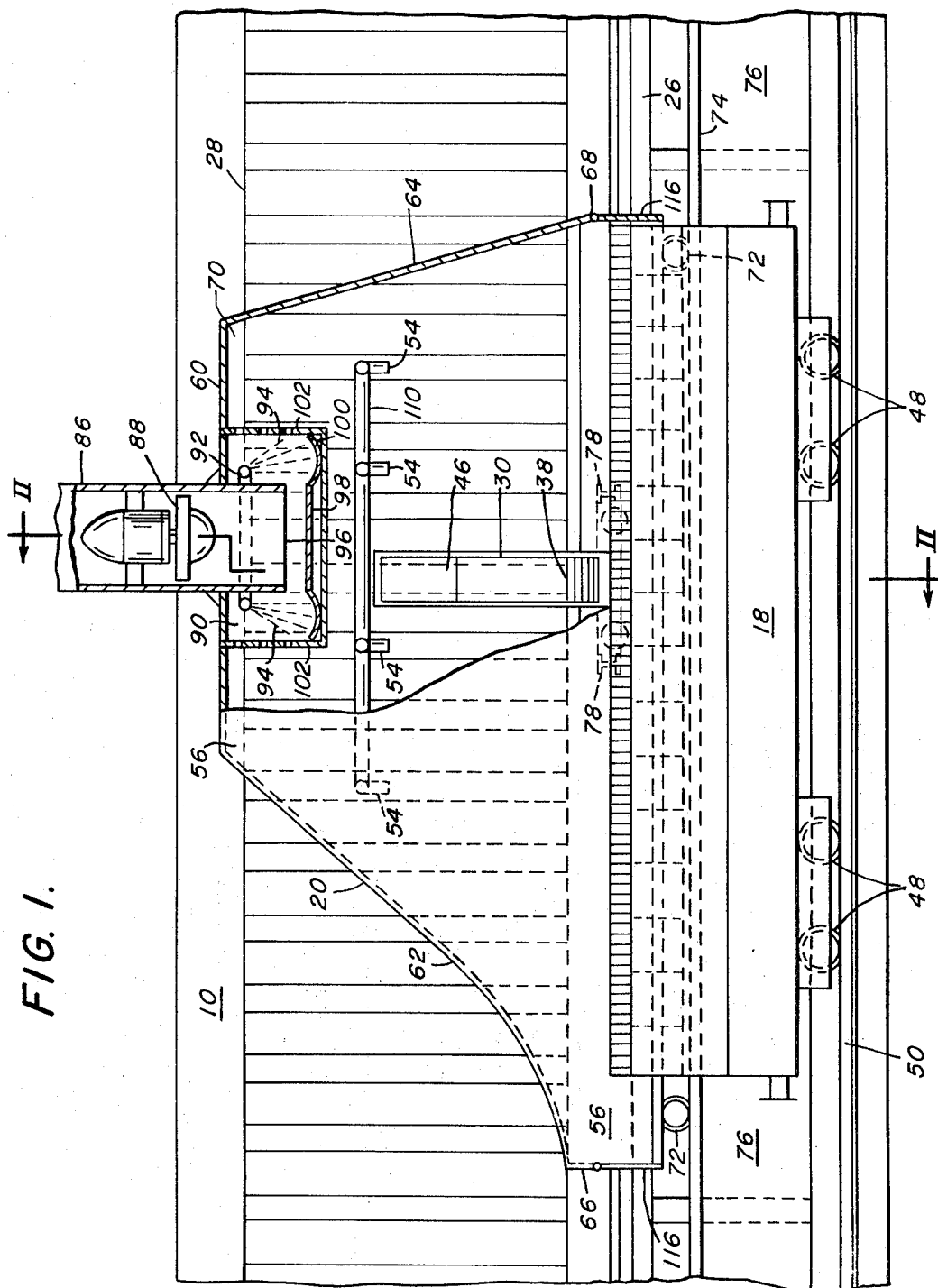
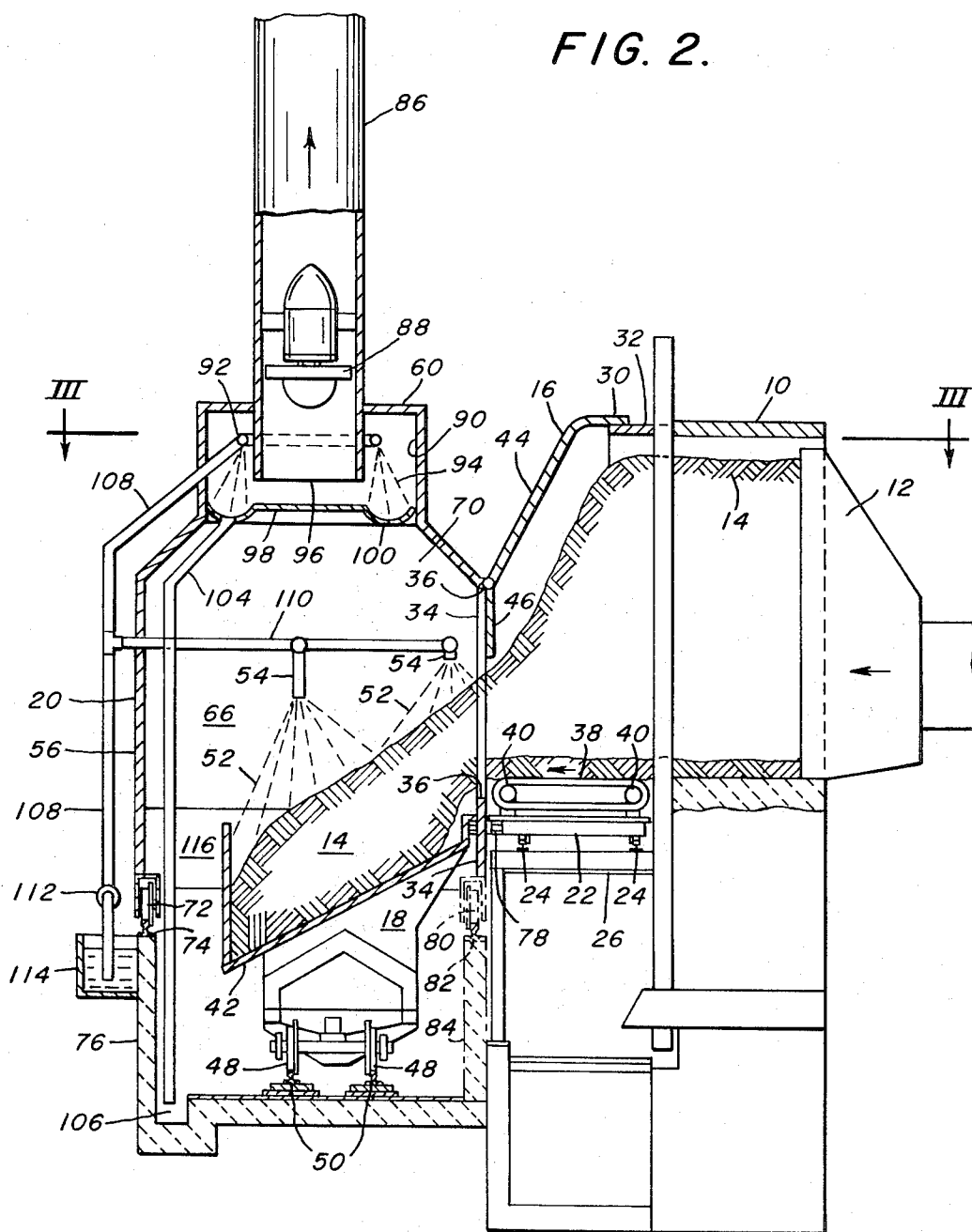


FIG. 1.

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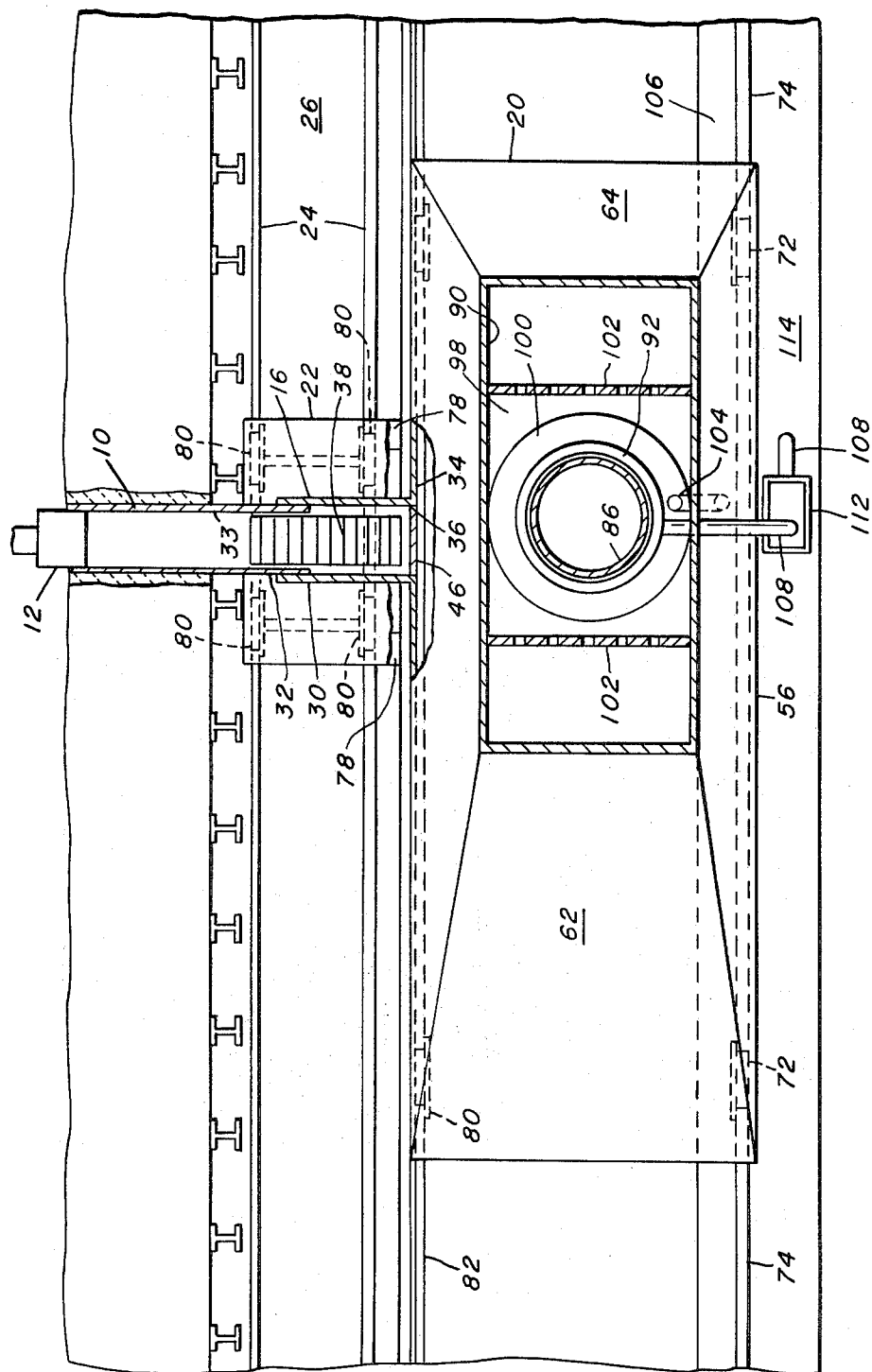
FIG. 2.



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FIG. 3.



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COKE QUENCHING APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to apparatus for discharging and quenching coke from by-product coke ovens, and more particularly it pertains to a system for sprinkling water on the coke and on smoke and dust generated thereby for minimizing air pollution.

2. Description of the Prior Art

In the by-product type of coke ovens after the coke is prepared it is discharged from the ovens through a coke guide and into a quench car by which the incandescent coke is transferred to a quenching tower. During that discharge operation and a subsequent quenching there is considerable pollution of the atmosphere due to coke fumes, dust as well as steam which under prior procedures were permitted to befoul the atmosphere and surrounding things with impunity.

The current trend to improve man's environment has resulted in many devices for the abatement of noxious smoke fumes, and dust. Prior known devices have been impractical and have not really solved the problems of pollution of the environment by coking plants.

Associated with the foregoing has been the problem of violent combustion which occurs in the coke as soon as it is discharged from the reducing atmosphere of the coke oven and enters the air. Normally, the combustion continues until the quench car arrives at the quenching tower where abundant quantities of water quench the coke combustion.

SUMMARY OF THE INVENTION

It has been found in accordance with this invention that the foregoing problems may be overcome by containing the incandescent coke as it is discharged from a coke oven within a smoke-confining hood which restricts the heretofore unlimited dissemination of smoke and dust, reduces the amount of air that that contacts the coke, and sprays quenching water on the coke as soon as it enters the quench car.

Moreover, the apparatus includes means for minimizing the amount of smoke and dust incurred during the collapse of the coke mass as it is discharged from the oven and falls into the quench car as well as means for washing all traces of smoke, noxious fumes, and dust from the air as it is discharged from the smoke-confining hood.

The advantage of the apparatus of the present invention is that not only is the air cleaned to remove noxious fumes and dust before it is discharged from the hood, but the amount of dust and smoke is minimized due to the manner in which the coke is conveyed from the oven to the quench car; that is, with a minimum of precipitous collapse immediately upon discharge from the oven chamber, a more gradual breakdown of the cake-like mass of coke occurs, whereby smoke and dust are minimized.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view, partly in section, of the apparatus of the present invention;

FIG. 2 is a vertical sectional view taken on the line II—II of FIG. 1 and showing coke being discharged from an oven and into a quench car; and

FIG. 3 is a sectional view, taken on the line III—III of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in FIGS. 1 and 2, a coke oven which is part of a plurality of similar ovens in a battery of by-product coke ovens is generally indicated at 10. A so-called pusher or discharge ram 12 is used for pushing a cake-like mass of coke 14 from the oven 10 through a coke guide 16 and into a quench car 18, the latter of which is enclosed within an elongated hood 20 (FIG. 1) which is slightly longer than the quench car 18.

As shown more particularly in FIG. 2, the coke guide 16 is mounted on a carriage 22 which travels along a track 24 on a platform 26 in front of a battery of coke ovens 28 (FIG. 1). The coke guide 16 is a tubular member through which the coke 14 passes and is preferably rectangular in cross section. The end of the coke guide 16 adjacent to the front wall of the battery 28 of coke ovens has suitable means for engaging the frame of the oven in a substantially air-tight manner. More particularly, the coke guide 16 includes a pair of telescoping tubular sections 30 and 32, the latter of which after being brought into proper alignment with the oven 10 to be discharged by travel of the carriage 22 is moved to the right (as viewed in FIG. 2) and brought into substantial airtight contact with the frame of the oven. The location of the telescoping section 32 in contact with the oven 10 is shown more particularly at 33 in FIG. 3.

In addition, the coke guide 16 may be an integral part of the hood 20 or the coke guide may be a vehicle separate therefrom. Where the coke guide 16 is an integral part of the hood 20, the telescoping section 30 is attached to and extends outwardly from a side wall 34 of the hood in which wall an opening 36 (FIG. 2) is provided for communication between the interior of the coke guide and the hood. The floor of the interior of the coke guide 16 includes a plate-type conveyor belt 38 which extends between and around driven rollers 40, the upper portion of which belt travels to the left as shown in FIG. 2 for moving the coke 14 through the sections 30 and 32 and onto the sloping bottom 42 of the quench car 18. The roof of the section 30 slopes downwardly at 44 to minimize the space within the chamber formed by the coke guide 16. A pendulum flap 46 suspends from the top of the opening 36. The coke 14 collapses from its higher level within the oven 10 due to the action of the plate conveyor belt 38. The flap 46 serves as a baffle for the coke and limits the smoke, steam, and dust which develop within the hood 20 from flowing into the chamber of the coke guide.

The quench car 18 having wheels 48 is mounted on tracks 50 which tracks are parallel to the battery of ovens 28 and which are located at a level below that of the tracks 24. Accordingly, as it is discharged by the pusher or ram 12 the coke 14 is moved through the coke guide 16 and on the plate conveyor belt 38 into the quench car 18, where a water 52 is sprayed from nozzles 54.

The hood 20 includes spaced vertical side walls 56 and 34 as well as a top wall 60 with sloping end portions 62 and 64 as well as opposite end walls 66 and 68. The walls 34, 56, 60-68 form a hood chamber 70 in which smoke, fumes, dust and steam, arising from the sprayed coke 14, is confined and prevented from escaping into the surrounding atmosphere until after it has been cleaned. As shown in FIG. 2, the lower edge of the side wall 56 is supported on spaced wheels 72 which travel

on a rail 74 which is mounted on a wall 76. The side wall 34 is supported in one of two ways.

As was stated above, the coke guide 16 may be an integral part of the hood 20 in which case the telescoping section 30 is attached to the side wall 34 around the opening 36, and the right side of the hood 20 (FIG. 2) is attached to the carriage 22 by spaced connecting members, such as reinforcing I-beams 78, in which case a portion of the weight of the hood is borne by the carriage 22 which has wheels 80 which are supported by the tracks 24. Where the coke guide 16 is a vehicle separate from the hood, alternate support means are required. For that alternative, the right side wall 34 is supported on wheels 80 that travel on a track 82 in a manner similar to the wheels 72 and track 74 at the lower end of the left side wall 56. The wheels 80, the track 82 and a support wall 84, are shown in broken lines as alternative support means for the hood. With the alternate support means, the telescoping section 30 of the coke guide 16 is separate from the side wall 34, but is sufficiently proximate thereto as to provide a snug, substantially air-tight connection between the interior of the coke guide section 30 and, the opening 36 in the side wall.

At the upper portion of the hood 20, vent means are provided for the gases within the hood chamber 70 which means include a stack 86, a centrifugal separator or fan 88, a boxlike plenum chamber 90, and sprinkling means 92 within the chamber for spraying a water curtain 94 for washing the gas before it enters the stack 86. More particularly, the lower open end 96 of the stack 86 is disposed within the plenum chamber 90 and spaced above a bottom wall 98, the periphery of which includes a trough 100 for gathering water from the water curtain 94 during operation of the flue. In addition, (FIGS. 1 and 3) two perforated partitions 102 are provided to facilitate the filtering of dust from the gases in the hood which gases enter the plenum chamber 90. A suction created in the plenum chamber 90 by the fan 88 pulls the smoke-filled air through the water curtain 94 and the air is cleaned before it enters the stack 86.

A drain 104 extends from the trough 100 to a trough 106 at the lower end of the support wall 76 which trough 106 extends continuously along the path of travel of the hood 20. Means for supplying water to the sprinkling means 92 as well as the nozzles 54 include supply pipes 108 and 110, as well as a pump 112 and the lower end of the conduit 108 extends into a water trough 114 which is likewise coextensive with the path of travel of the hood 20.

In order to distribute the coke evenly over the entire length of the quench car 18, the car is moved slowly during the discharge process of coke 14 from the oven and a portion of the car usually passes under and beyond one end of the hood during the discharge process. For that reason, similar pendulum flaps 116 are provided along the lower edges of the end walls 66 and 68 which flaps permit movement of the car in the manner described while providing additional smoke-confining walls.

In operation, the smoke and dust problem which is ordinarily a concomitant part of the coke discharge and quenching operation is substantially eliminated. Although the extent of sprinkling of the coke onto the hood is usually sufficient only to the point at which no smoke forms and no violent combustion occurs, sufficient quenching may occur to completely quench the

mass of coke under the hood. The total time for quenching one discharge of coke from an oven is usually three minutes. However, intermittent or partial quenching may be used where more accurate dosing of the total water quantity is used.

At the same time, the device provides a conveyor belt by which the cake-like mass of coke as it issues from the oven is not only conveyed more expediently to the quench car but is broken up into smaller pieces more rapidly due to its greater speed of movement, such as three or four times that of the pusher or ram 12, and thereby induces a collapse of the coke within the coke guide as it falls into the quench car. As a result, the coke drops over a more gradual slope into the quench car and thereby creates less smoke and dust.

Furthermore, inasmuch as the hot coke within the quench car is disposed below the hood as well as the sprinkling means, the combustion of the coke is minimal and there's a corresponding reduction in smoke and noxious fumes. The resulting smoke and fumes are washed from the air as it passes through the water curtain and flue.

Although the invention has been shown in connection with a certain specific embodiment, it will be readily apparent to those skilled in the art that various changes in form and arrangement of parts may be made to suit requirements without departing from the spirit and scope of the invention.

What is claimed is:

1. Apparatus for preventing air pollution during discharge of coke from coke ovens disposed side-by-side in a row, comprising a carriage movable along the row of ovens, a quench car movable along a path of travel parallel to and on the side of the carriage opposite that of the row of ovens and on a level below that of the carriage, tubular guide means on the carriage and alignable selectively with each oven for receiving coke from an oven and guiding the coke to the quench car, conveyor belt means in the bottom wall of said tubular guide means for moving coke through the guide means, a hood above the quench car and having a side wall on opposite sides and a top wall above the quench car, track means on opposite sides of the quench car on which the hood is rollably mounted parallel to the path of travel of the quench car, the side wall facing the ovens having an opening communicative with the tubular guide means, means within the hood for spraying water onto the coke in the quench car, and flue means on the top wall for venting non-polluting air from the interior of the hood.

2. The apparatus of claim 1 wherein a pendulum flap is suspended from the side wall forming the opening.

3. The apparatus of claim 1 wherein the hood is substantially coextensive with the quench car.

4. The apparatus of claim 1 wherein the flue means includes a stack, and means for providing a curtain of water around the inlet end of the stack for washing smoke-laden air leaving the interior of the hood through the stack.

5. The apparatus of claim 4 wherein gas suction means are in the stack for pulling air out of the hood.

6. The apparatus of claim 4 wherein the inlet end of the stack is enclosed within a box-like container in the upper end of the interior of the hood, the container including partitions having air-passages therethrough, and the means for providing the curtain of water being disposed between the partitions and the inlet end of the stack.

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