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Bricmont

[11] **3,734,834**

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[54] **APPARATUS AND METHOD FOR APPLYING A FOAM COATING TO EJECTED HOT COKE**

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[52] **U.S. Cl.** **201/39**, 202/227, 202/263

[51] **Int. Cl.** **C10b 39/00**

[58] **Field of Search** .....201/39, 41; 202/263, 202/262, 227–230, 264, 269, 226; 15/104.1 C; 169/15, 2 R

[56] **References Cited**

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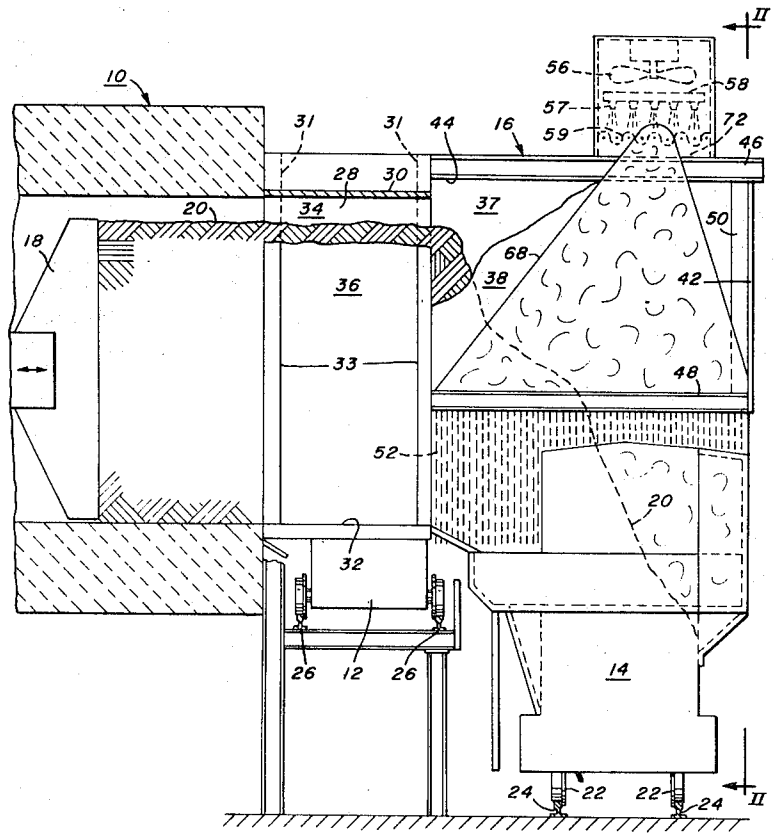
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Assistant Examiner—David Edwards
Attorney—Brown, Murray, Flick & Peckham

[57] **ABSTRACT**

Apparatus and method for applying an adherent foamy layer of bubbles on hot coke as it is ejected from an oven of a battery of by-product coke ovens, wherein a box-like housing extends outwardly from a coke oven guide carriage and over a coke transfer car which car is on a level below the coke oven guide carriage; the housing having an open end facing and alignable with the coke oven and having an open bottom side; and means associated with the housing for generating and applying a foamy coating onto the mass of coke as it passes through the housing; and the foam generating means being mounted on the housing, whereby the foamy coating excludes air from the coke and encompasses any fumes and dust generated by the coke during its ejection and fall into the transfer car.

7 Claims, 2 Drawing Figures



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2 Sheets-Sheet 1

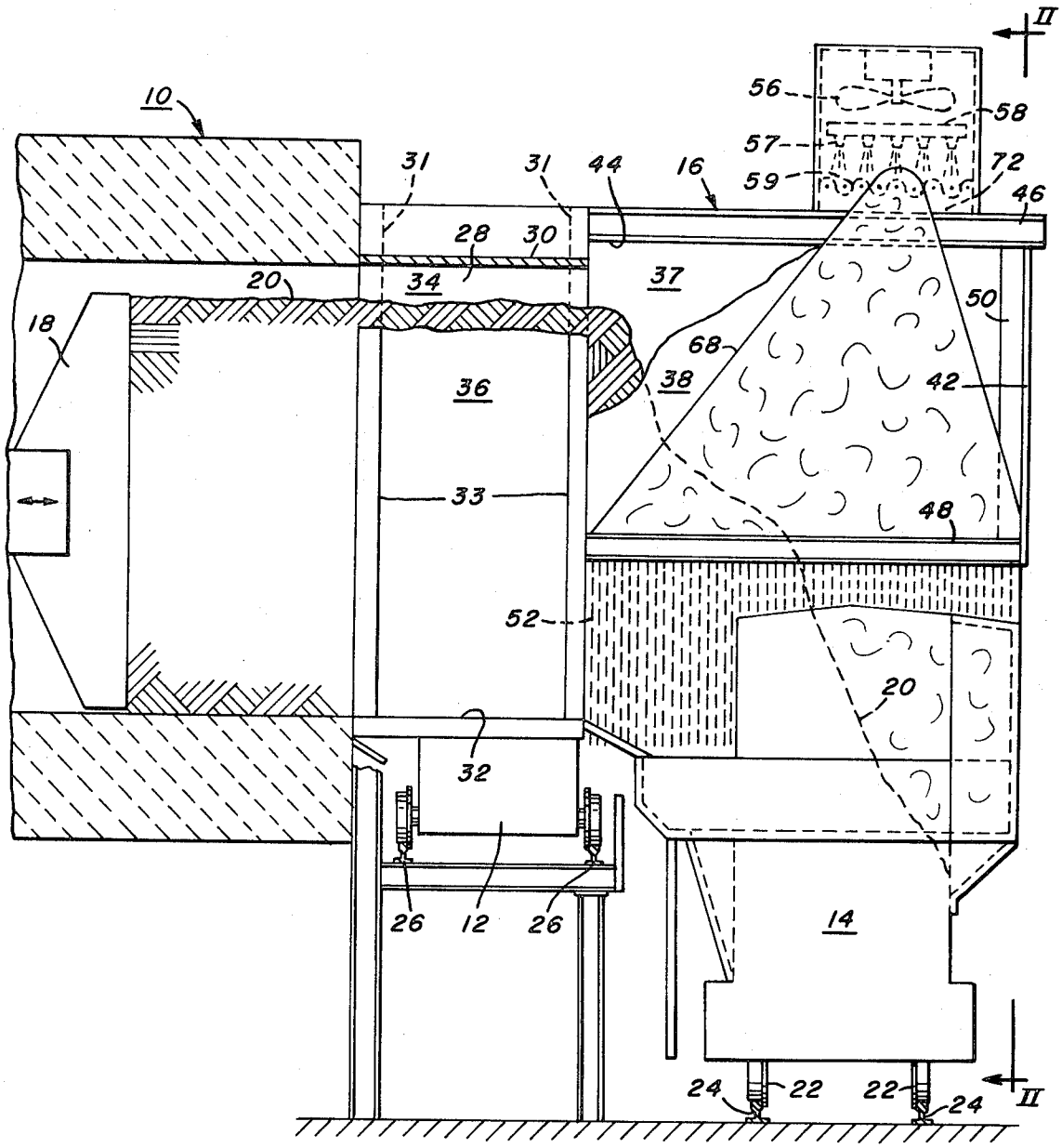


FIG. 1.

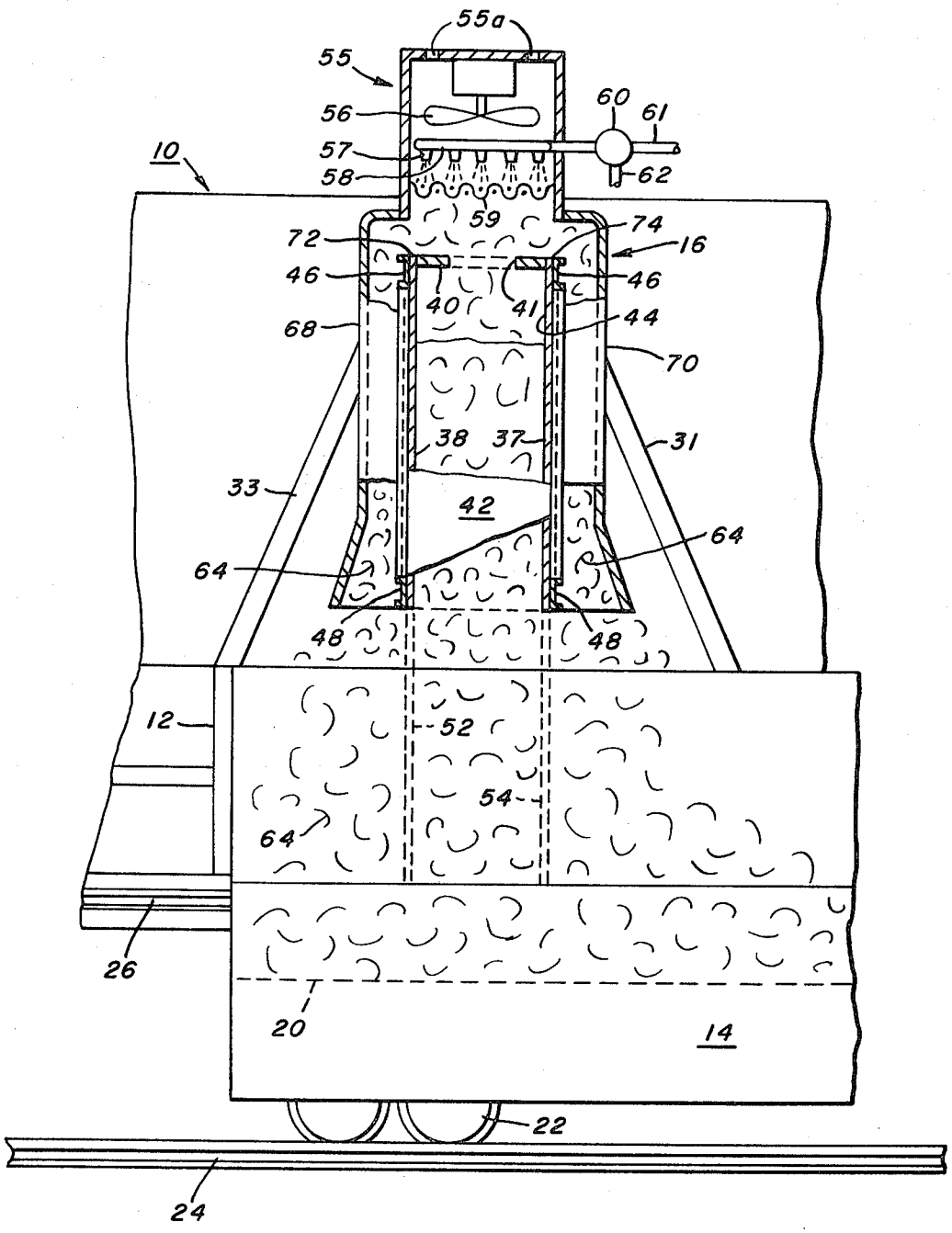

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FIG. 2.

APPARATUS AND METHOD FOR APPLYING A FOAM COATING TO EJECTED HOT COKE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a system for controlling the emanation of smoke and dust from hot coke as it is ejected from a by-product coke oven and for excluding air from the coke as it settles into a coke transfer car.

2. Description of the Prior Art

One phase in the production of coke involves the "pushing" or ejection of coke from an oven of a battery of by-product coke ovens at the completion of the coking operation which operation involves the baking of coal in the absence of air in order to obtain volatile matter from the coal and thereby produce the characteristic coke lumps. It has been the practice to dump the coke from the oven to a so-called "quench car" which operates on a ground level track parallel with the battery and below the coke ovens. During that operation, a considerable amount of smoke and dust is generated and constitutes a source of air pollution. Moreover, the coke is incandescent and begins to burn upon exposure to the air. It is the practice, however, to rapidly transfer the coke in the quench car to a quenching tower where water is showered onto the fiery mass of coke.

Heretofore few, if any, attempts have been made to control or abate the smoke and dust which is generated during the ejection of coke from the ovens into quenching cars. Indeed, contemplation of the problem normally results in a structure that would be too costly to reasonably consider. Accordingly, it has been ignored.

SUMMARY OF THE INVENTION

It has been found in accordance with this invention that the foregoing problem may be satisfied in a relatively inexpensive manner by providing nozzles on the coke guide car for directing streams of fire-extinguishing foam onto the hot surface of the coke as it is discharged from the coke oven and thereby denying the hot surface the necessary oxygen to burn openly. At the same time, the foam serves as a blanket to abate the smoke, noxious fumes, and dust that are discharged into the surrounding atmosphere. The foam layer remains on the coke surface in the quench car until it is subsequently washed away at the quenching tower.

More particularly, this invention contemplates the addition of a box-like hood to the conventional coke guide car which car is used for opening the exit door of the oven and for guiding the coke from the oven into the quench car at a lower level. The hood extends from the side of the coke guide car and over the quench car where the foam is applied before smoke, fumes, and dust have a chance to flow out and arise into the surrounding atmosphere. The hood is also provided with means for applying a layer or blanket of foam onto the surface of the coke in the quench car.

Manifestly, the advantage of the device and method of this invention is the elimination of smoke and open burning at the critical time when coke is discharged from the coke ovens and during its transfer to the quenching tower where upon the application of a shower of quenching water, the foam is washed away.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a vertical sectional view through the coke side of a by-product coke oven and showing the device of this invention extending outwardly over a quench car, and

FIG. 2 is a vertical sectional view taken on the line II—II of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The coke side of a battery of by-product coke ovens is shown wherein one oven **10** is shown in the process of being discharged together with a coke guide car or carriage **12**, a quench car or coke transfer car **14**, and a housing or hood **16** which constitutes the device of the present invention. After a door (not shown) is removed from the right end of the coke oven **10** by the coke guide car **12** in a conventional manner, a ram **18** is pushed against the mass of incandescent coke **20** from the pusher (left) side of the oven through the open (right) end thereof. As the coke **20** is discharged, it passes through the coke guide **12** and drops into the car **14** by which it is transferred to a quenching station where it is quenched with water. As shown, the car **14** is mounted on wheels **22** on tracks **24** which are on a level below tracks **26** on which the coke guide car **12** is mounted. Thus, the coke guide car **12** and the quench car **14** serve the entire battery of coke ovens.

As shown in FIG. **1**, the coke guide car **12** provides a box-like passage **28** which is disposed between upper and lower horizontal walls **30** and **32** and spaced side walls **34** and **36**, the latter of which has an upper portion broken away to show the top of the coke **20** as it is pushed through the chamber **28** during the discharge from the oven **10**. The side walls **34** and **36** are reinforced by members **31** and **33**.

The device of the present invention is the housing **16** which is attached to and extends outwardly from the coke guide car **12**. The housing **16** is a box-like structure including spaced vertical walls **37** and **38**, an upper wall **40** (FIG. 2), as well as an end wall **42** which provide a chamber **44** which is aligned with the passage **28** of the coke guide car **12** for receiving the mass of coke **20** as it is pushed through the guide passage **28**.

As viewed in FIG. **1**, the left end of the chamber **44** (opposite the end wall **42**) is open and the lower side (FIG. 2) is also open, whereby the coke **20** enters and leaves the hood **16** as it drops into the quench car **14**. The several walls **37–42** are supported by suitable metal beams including vertically spaced horizontal beams **46** and **48** and vertical beams **50** extending therebetween. The beams are disposed on opposite sides of the chamber **44**. In addition, a pair of curtains **52** and **54** of chains hang from the underside of the beams **48** to limit the lateral movement of the coke **20** as it drops into the quench car **14**.

As shown in the drawings, means for generating and distributing foam onto the coke **20** are provided on the housing **16**. The means include a foam generator unit generally indicated at **55** and including a fan **56**, a plurality of spaced nozzles **57** connected to a conduit **58**, and a woven fabric foam-forming net **59**. The foam generator **55** functions in a manner similar to that disclosed in U.S. Pat. No. 3,533,473. More particularly, the conduit **58** is connected to a valve **60** which mixes water from a pipe **61** with a wetting or foaming agent

from pipe **62.** Any suitable wetting agent or foaming agent from pipe **62** is usable to generate bubbles on the net **59.**

In operation, the solution containing a wetting agent is sprayed by nozzles **57** onto the net **59** while fan **56** forces air through housing inlets **55***a*. When the net **59** through which the air passes, is sprayed on one side with the foaming agent solution foam is formed on the lower side of the net as shown in FIG. **2.** The foam **64** is produced by the air blowing bubbles from films of liquid that extend across the holes in the net. The wetting agent accumulates and saturates the strands forming the net **59** and foam continues to form and quickly enters the chamber **44** through an opening **41** in the upper wall **50.** The foam also moves quickly into foam conduits **68** and **70** through corresponding openings **72** and **74** in the walls of the foam generator housing.

The quantity of foam generated by spraying the solution containing a wetting and foaming agent into the chamber results in the creation of water-containing bubbles which substantially instantaneously completely fill the unoccupied portion of the chamber **44** of the housing and thereby prevent any smoke, fumes or dust that would otherwise tend to arise from the coke **20** as it tumbles and falls to the quench car **14.** The quantity of foam generated is of such a magnitude that it fills the portion of the space under the housing **16** and between the chain curtains **52** and **54.** As the foam **64** contacts the incandescent coke **20** the water in the foam forms steam which smothers any fire which would otherwise occur.

The foam conduits **68** and **70** extend from opposite sides of the generator **56** and downwardly along the sides of the housing to the lower ends of the vertical walls **37** and **38.** Inasmuch as the foam expands very rapidly upon injection from the nozzles, the conduits **68** and **70** are preferably flared and extend downwardly and outwardly from their upper ends to the lower ends of the walls **37** and **38.** As the foam moves through the lower open ends of the conduits **68** and **70,** it drops onto the coke in the car **14** and provides a layer or blanket for excluding air and for suppressing any smoke, fumes or dust which would otherwise occur. Subsequently, when the coke is transferred to the quenching station it is washed away by the quenching water.

The foam which is contemplated for use herein is produced from previously known materials such as disclosed in U.S. Pat. No. 3,186,943 which have large expansion ratios in the order of from about 50/1 to 2000/1. In all cases, the air-foam solution is derived from volumetric dilution of foam-liquid concentrate. This is an important advantage in fire control in that when the bubbles burst or drain, the material in contact therewith is wetted.

For the purpose of this invention, the foam may be composed of aqueous solutions of soap and/or organic materials including protein foam as disclosed in U.S. Pat. No. 3,186,943. Another example of the effectiveness of high expansion foam for smothering fires by excluding oxygen is disclosed in U.S. Pat. No. 3,533,473.

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. In a method for pushing coke out of a by-product coke oven and into a hot coke-receiving car including the steps of ejecting the coke from the oven into the car and transporting the coke to a quenching station, the improvement comprising the step of enclosing the ejected coke within a cover by applying a coating of foam to the coke as it falls and collects in the car for excluding air from the coke and for preventing smoke, fumes, and dust from polluting the atmosphere during its ejection and transport to the quenching station.

2. The method of claim **1** wherein the foam is a bubble mass of an aqueous solution selected from a group consisting of soap and a protein.

3. In apparatus for handling ejected coke from an oven of a battery of by-product coke ovens wherein there are a coke transfer car on a level below the battery and coke guide carriage on a level with the battery and between the car and the coke oven, the improvement comprising a box-like housing extending outwardly from the carriage and over the transfer car, the housing having an open end facing and alignable with a coke oven and having an open bottom edge and extending over the transfer car, and means associated with the housing for generating and applying a foamy coating onto a mass of coke as it passes through the housing and drops into the transfer car, whereby the foamy coating encompasses any smoke, fumes, and dust generated by the coke.

4. The housing of claim **3** in which the means for generating and applying foam includes means for injecting foam into the housing.

5. The housing of claim **4** in which the means for generating and applying foam includes other means on at least one side of the housing for injecting a foamy coating upon the surface of coke in the transfer car.

6. The housing of claim **5** in which the other means includes foam conduit means leading from the foam-generating means to the lower edge of the housing for conducting and directing foam onto the coke in the transfer car.

7. The housing of claim **3** in which the foam is a bubble mass of an aqueous solution selected from a group consisting of soap and protein.

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