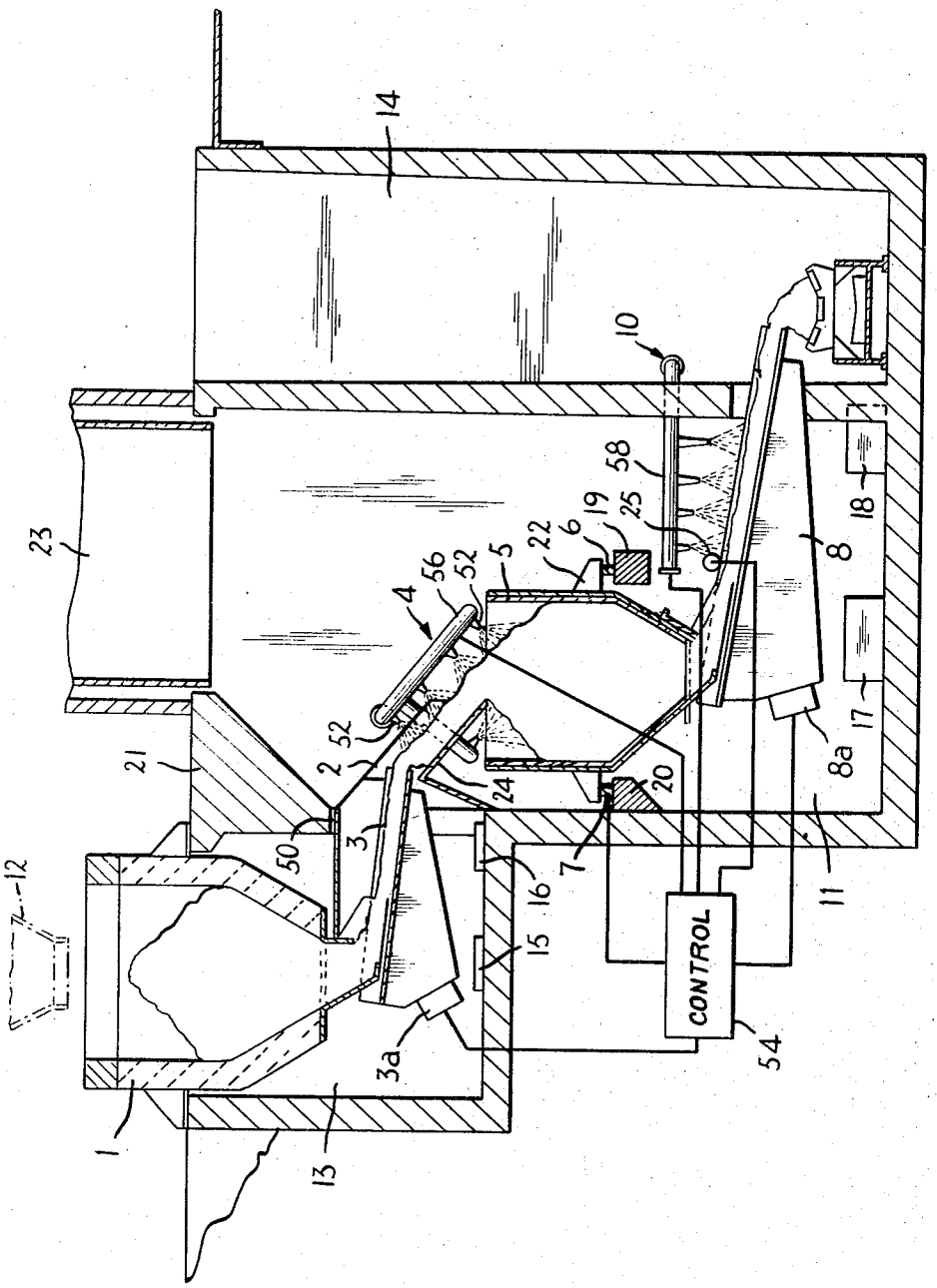
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COKE QUENCHING METHOD AND DEVICE

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COKE QUENCHING METHOD AND DEVICE

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ABSTRACT OF THE DISCLOSURE

A device for continuously quenching glowing coke with water includes means for feeding the coke into a quenching tank which is arranged within a quenching chamber of a housing. The quenching apparatus is arranged along the feed of the coke and also at the quenching tank and the amount of quenching with water is regulated in accordance with the feed. The amount of feed is controlled by weighing the amount of material which is passing through the tank at any given time. The glowing coke is fed into a bin from a feeding device and a continuously operating conveyor is arranged to convey the coke from the bin continuously onto a transfer conveyor.

This is a continuation of application Ser. No. 174,645, filed Aug. 25, 1971, and now abandoned.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates in general to coking apparatus and, in particular, to a new and useful coking system in which the glowing coke is fed continuously into a tank which is continuously weighed for the purpose of controlling the amount of quenching liquid which is sprayed onto the glowing coke in accordance with the feed and away from the tank.

The prior art

The present invention deals with a water spray system for quenching glowing coke which is ejected from a coking furnace. The coke is quenched in a quenching chamber which includes a chimney flue discharge for the quenching vapors. It is desirable that the amount of water used for quenching the glowing coke is kept to a minimum and it is also desirable that the vapor clouds which escape into the atmosphere contain only insignificant amounts of liquid water drops. In addition, it is desirable that the number of dust particles carried along with the vapor clouds is as low as possible so that human settlements, traffic roads and railroad tracks in the proximity of the plant are not bothered by them.

In the known methods for quenching coke under a quenching tower, the coke is arranged in a quencher car and about 1000 to 1300 liters of water are used per ton of coke. Of these quantities of water about 500 liters leave the chimney in the form of vapors. The amount which is actually evaporated, however, is only about 400 liters and about 100 liters form droplets which are carried along and which are thrown high particularly at the start of the quenching operation. These particles are thrown outwardly by the compact layer of glowing coke due to the vapor explosions on the glowing surfaces and is referred to as a so-called Leidenfrost phenomenon. At the same time, considerable amounts of dust are admitted.

The amounts of water droplets which are thrown up into the atmosphere will certainly be much smaller if the coke is not quenched suddenly and not in very compact layers in the quencher car but is quenched in much

thinner layers and at a slower rate. 500 to 800 liters of the quenching water used do not evaporate at all. It flows off again from the quencher car and must be clarified and prepared in ponds before it can be pumped back into the storage tank for the quenching car. This portion of the water is used to make sure that the entire amount of coke is adequately quenched and that no glowing centers are left which must then be quenched again when the coke is spread out on the coke ramp.

A problem of quenching in the quencher car is that large amounts of coke must be quenched in a thick layer within a short time, for example, in about 100 seconds, while in a continuous quenching, there are at least several minutes available for the quenching operation. The continuous quenching may be carried out at a length of time which is equivalent to the time between two chamber furnace cycles in which the entire chamber contents are quenched in a thinner layer. This results in a continuous quenching operation, since the glowing coke of the following emission is always supplied when the coke of the preceding chamber emission is quenched. Proposals for the continuous quenching of coke are already known. Experience has taught that it is desirous to quench the coke after it is arranged in a thin layer insofar as the amount of water to be used and the quality of the outgoing vapors are concerned.

SUMMARY OF THE INVENTION

In accordance with the invention, there is provided a system in which a continuous quenching of the glowing coke with water in a quenching chamber which has a flue or chimney discharge is carried out by charging the glowing coke over a charging conveyor or charging device on which it is spread in a thin layer and moved into a tank. The tank is arranged in the quenching chamber and water spray nozzles are provided along the charging feed path and in the tank itself and they are connected through a control mechanism to the charge of the charging device so that the spring is in accordance with the amount of charge. The control mechanism acts so that more water is fed to the water nozzles if the energy consumption of the drive of the charging device increases or when the amount of coke delivered increases. Conversely, the amount of water fed to the nozzles is reduced when the energy consumption of the drive mechanism diminishes, that is, when the amount of coke which is delivered into the tank decreases.

The receiving tank is also advantageously arranged on a weight measuring device to record its weight continuously. The drive of the coke discharge device from the tank is advantageously connected through a control mechanism to the weight measuring device. The control mechanism acts so that when the weight of the tank increases a larger quantity of the coke is withdrawn and when a smaller quantity of coke is withdrawn, a smaller quantity of coke is fed to the tank. In this way, the coke contents of the tank is maintained constant.

It is also possible, in accordance with the invention, to arrange above the discharge device for feeding the coke out of the tank, thermostats which control the operation of an after-quenching system in the conveyor feeding outwardly from the bottom of the tank. It is possible, therefore, to quench centers of the coke which have not been quenched in the tank.

The device for charging the material into the tank and for moving the material out of the tank comprises preferably a vibrating conveyor. When the glowing coke of the charging device arrives from a closed bin, a quenching operation is obtained, according to the invention, which is completely free of solid emissions.

With the above described arrangement, it is possible, due to the preliminary quenching in a thin layer in the

charging device and the subsequent quenching in the tank, to use much less quenching water than with the known methods. Far fewer water drops are carried along with the vapors through the chimney and far fewer water drops are discharged into the atmosphere. The vapors are drier because of the preliminary quenching in a thin layer. No excess water is required which must be decanted and prepared in clarifying basins before it can be recycled. The amounts of quenching water that are discharged with the coke from the tank are in many cases so small that preparation is uneconomical and they can be combined with the waste waters. According to the invention, the amount of quenching water used per ton of coke is from 400 to 600 liters.

Accordingly, it is an object of the invention to provide a coke quenching device which includes means for feeding coke along a conveyor into a quenching tank and means associated with the conveyor and the tank for spraying the glowing coke to effect its quenching, the moistening device being controlled to operate with a quenching water discharge in proportion to the amount of glowing coke which is fed to the quenching tank.

A further object of the invention is to provide a quenching system which includes means for continuously weighing a quenching tank and for arranging charging means at the top of the tank for supplying the glowing coke to the quenching tank and a conveyor discharge for removing the coke from the tank; and including a quenching system using quenching water which is regulated in proportion to the feed of the coke both to the tank and away from the tank.

A further object of the invention is to provide a device for quenching coke which is simple in design, rugged in construction and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its uses, reference should be had to the accompanying drawing and descriptive matter in which there is illustrated a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWING

The only figure of the drawing is a partial schematic transverse sectional view of a coking system constructed in accordance with the invention.

GENERAL DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing in particular, the invention embodied therein, comprises a quenching system which includes a housing having an antechamber or prechamber **13** in which there is arranged a coke bin **1** which discharges downwardly into a charging conveyor trough **3** which extends from the antechamber **13** into a quenching chamber **11.** The charging conveyor trough **3** rests on foundation elements or footings **15** and **16** and the conveyor extends through an opening **50** defined between the prechamber **13** and the quenching chamber **11.** The glowing coke is fed through a feeding device **12** into the bin **1** which delivers the coke in the glowing state to the conveyor **3.**

In accordance with the invention, the conveyor **3** is driven by a drive mechanism *3a* which is controlled by control means which operates in accordance with the operation of a quenching water unit generally designated **4** having a plurality of nozzle sprays **52.** The conveyor means includes a chute **24** extending between the end of the vibratory conveyor part **3** and a quenching tank **5** and through the opening **50.**

Control means are connected between quenching nozzles **52** which discharge the quenching water in the form of many sprays both at the conveyor **3,** the chute **24** and in the tank **5.** Some of the quenching nozzles **52** of the unit **4** are located within the tank **5** and some are located to provide a subsequent quenching action of the coke as it moves in a conveying stream from the conveyor **3** along the chute **24** and along the tank **5.** At the location of the tank **5,** since the quenching is a subsequent quenching action, the nozzles **52** can be controlled to discharge a denser spray than at the preliminary quenching which takes place primarily over the chute **24.**

Chute **24,** the tank **5** and the discharge conveyor **8,** which is arranged below the tank **5** in a position to continuously remove the glowing coke therefrom, are all arranged within the quenching chamber **11.** A chimney **23** connects the upper portion of the chamber **11** for the outflow of the vapors and flue gases.

The discharge conveyor trough **8** rests on foundations **17** and **18** and its extends from the quenching chamber into a separate flue **14.** Drive *8a* from the discharge conveyor **8** is also connected to the same control mechanism for regulating the quenching water supply **4** as well as a quenching water supply and after the quenching unit **10.** Control mechanism for regulating the discharge feed in the conveyor **8** is dependent upon the weight of the material in the tank **5** and this is determined by weighing means which are associated with a pressure pickup or weight responsive sensor **7** which is mounted on a fixed bracket **20** of the wall of the quenching chamber. The opposite side of the tank **5** rests on a fulcrum **6** which is supported on a beam **19** and is engaged by a side member or claw **22** of the quenching tank **5.** The tank **5** rests both on the fulcrum **6** and on the pressure pickup **7.**

A central control **54** is shown schematically as being electrically and mechanically connected to conduits **56** and **58** of the water quenching systems **4** and **10,** respectively, and to conveyor drives *3a* and *8a* as well as to the weight responsive sensor **7** in order to control the sprays at the chute **24,** the tank **5** and the conveyor **8** in accordance with conveyor speed and the weight of the coke in the tank **5.**

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A device for continuously quenching glowing coke, comprising a housing defining a quenching chamber having a chimney, a large size and deep quenching tank in said quenching chamber capable of containing a substantial vertical column of coke, a coke charging device connected to said tank for charging it with coke including a first conveyor along which a layer of coke is moved to said tank, a first water quenching spray located over said tank and also over said conveyer for spray quenching the coke first as it is moved to said tank and thereafter as it is delivered to and also after it is deposited in said quenching tank, a second conveyor connected to the lower end of said quenching tank and extending outwardly of said chamber, a second water quenching spray located over said second conveyor for spray quenching the coke along said conveyor as it leaves said tank and is moved outwardly of said chamber and drive means connected to said first and second conveyors for moving the coke and controlling the speed thereof in accordance with the quantity of coke in said tank.

2. A device according to claim **1,** including means for sensing the weight of said tank with the coke therein connected to said drive means for regulating the speed of said drive means.

3. A device according to claim **2,** including means for sensing the temperature of the coke at least at a location where it leaves said tank and connected to said drive means for varying the speed of said conveyors in accordance with the temperature of said coke.

4. A device for continuously quenching glowing coke, according to claim **1,** including weight sensor means carry-

ing said tank for sensing the weight of coke within said tank, said drive means being connected to said weight sensor means and being responsive thereto for regulating the speed of said charging device.

5. A device for continuously quenching glowing coke, according to claim 1, including weight sensor means for sensing the weight of coke in said tank in the form of a pressure pickup connected to said tank.

6. A device for continuously quenching glowing coke, according to claim 1, wherein said second spray comprises an after quenching water spray, and a thermostat connected to said after quenching water spray for regulating the after quenching spray.

7. A device according to claim 1, wherein said first conveyor comprises a vibrating conveyor.

8. A device for continuously quenching glowing coke, according to claim 1, wherein said housing defines an antechamber having an opening into said quenching chamber, said first conveyor extending from said antechamber into said quenching chamber, means in said antechamber for feeding glowing coke to said first conveyor, said first conveyor including an inclined chute extending into said quenching tank, said water quenching spray being located over the said inclined chute and in said quenching tank.

9. A method for continuously quenching glowing coke using a relatively large size tank arranged in a quenching chamber with a chimney comprising conveying coke through a closed path and delivering it in a relatively thin layer into the top of the tank to accumulate a large quantity of coke in the tank, and spraying the thin layer which is being delivered to the tank and also the coke as it is delivered into the tank and after it arrives in the tank, continuously removing coke from the bottom of the tank and conveying it in a relatively thin layer out of the quenching chamber while continuously spraying the coke as it is being moved from the tank out of the quenching chamber and regulating the speed of delivery of the coke to and from the tank in order to maintain a predetermined quantity therein.

10. A method according to claim 9, including continuously sensing the weight of the coke in the tank and regulating the speed of delivery of the coke to and from the tank in order to maintain a predetermined quantity therein.

11. A method according to claim 9, including continuously sensing the temperature of the coke and regulating the speed of advance of the coke and the water spraying thereof in accordance therewith.

12. A method according to claim 11, wherein the temperature of the coke is sensed after it leaves the tank and wherein the spray of the liquid onto the coke is regulated in accordance with the sensed temperature.

13. A method according to claim 9, wherein the weight of the tank is continuously sensed in order to determine the weight of the coke therein and the temperature of the coke is sensed and the speed of advance of the coke into the tank and out of the tank is regulated in accordance therewith and in addition the quantity of the spray which is directed against the coke is also regulated in accordance therewith.

14. A device for continuously quenching glowing coke, comprising a housing defining a quenching chamber having a chimney, a large size and deep quenching tank in said quenching chamber capable of containing a substantial vertical column of coke, a coke charging device connected to said tank for charging it with coke including a first conveyor having means for moving a layer of coke at a controlled rate and an inclined portion extending between said first conveyor portion and said tank over which the coke is spread in a thin layer for flow by gravity to said tank, a first water quenching spray located over said tank and over said inclined portion of said conveyor for spray quenching said coke first as it is moved to said tank and thereafter as it is delivered to and also after it is deposited in said quenching tank, a second conveyor connected to the lower end of said quenching tank and extending outwardly of said chamber and having means for moving a layer of coke at a controlled rate so as to spread the coke out in a thin layer along said second conveyor, a second water quenching spray located over said second conveyor for spray quenching the coke along said second conveyor as it leaves said tank and as it is moved outwardly of said chamber, and drive means connected to said first and second conveyors for moving the coke positively along the respective conveyors at a controlled speed and in accordance with the quantity of coke in said tank.

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