UNTITED STATES PATENT OFFICE

JOSEPH BECKER, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO THE KOPPERS COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

RETO RT DISCHARGE COOLING SYSTEM

Application filed April 23, 1925. Serial No. 9,203.

This invention relates broadly to improvements in the art of cooling heated substances, and in its more specific aspects to means and methods for utilizing the still waste liquor of by-product coking plants for the quenching of the coke produced therein.

As an illustrative example my invention is shown herein as applied to continuous vertical coking retorts, such, for instance, as disclosed in the application of Van Ackeren—Serial No. 684,342, filed January 4, 1924, and Serial No. 1,718, filed January 15, 1925, both assigned to the same assignee as the instant case. The invention is here shown in special co-operative relationship to the quenching system designed to prevent the soaking of the coke disclosed in my application No. 9,509, filed February 16, 1925. It is obvious, however, that the present invention is not limited to use in such system, but is of general utility in association with other quenching systems or other heat transfer systems.

Inasmuch as no advantageous use is ordinarily found for still waste liquor and stringent regulations usually prohibit it from being turned into drainage systems because of the harmful character of its constituents, its disposal heretofore has often presented a serious problem.

In one of its aspects my invention contemplates the disposal of still waste liquor in conformity with existing regulations in a highly efficient and economical manner. As applied to the quenching of coke in continuous vertical retorts, or the like, the still waste liquor is introduced into the coke magazine to cool the hot coke therein, the steam and other vapors formed being vented from the coke magazine into the atmosphere while simultaneously the desired amount of the steam generated may be utilized for water gas production by allowing it to pass into the retorts. The water gas thus produced may be employed to effect the distillation of the richer gaseous distillation to any degree that may be desired. The remainder of the still waste liquor may appear as moisture in the coke or may be separated therefrom in the manner disclosed in my former application No. 9,509, supra, and returned to the liquid supply line.

My invention further contemplates a quenching system of the closed cycle type in which the liquid remaining as such after the quenching operation is separated from the coke and returned through the system to again effect a quenching action there being added from the main source of supply, as needed, the amount of liquid necessary to make up for the losses.

In order to prevent the bleeding of the gas with the vapors escaping through the vent suitable governors, known to the art, may be provided actuated by the pressure in the vertical retort in a manner to prevent the escape of the gas with the vented vapors.

In addition to the advantages of my system hereinafore enumerated various other advantages inherently resulting from my construction will be apparent on consideration of the detailed disclosure.

My invention further consists in such other new and useful improvements and has for further objects such other operative advantages or results as may be found to obtain in the methods and processes hereinafter described or claimed.

In the accompanying drawings, forming a part of this specification, and showing for purposes of exemplification, a preferred form and manner in which the invention may be embodied and practiced, but without limiting the claimed invention to such illustrative instance or instances—

Figure 1 is a vertical section cross-wise of the battery showing a vertical retort with my improvements applied thereto, and

Fig. 2 is a diagrammatic view of my system showing portions of the retorts and the coke quenching and discharging devices in section.

The same characters of reference designate the same parts in each of the several figures.

In the illustrated embodiment of my invention there is shown a vertical retort A comprising regenerators B and coking chambers C.

At the bottom of the retorts are provided coke extractor magazines 1 of the character disclosed in my hereinafter mentioned application, Serial No. 9,509, (supra) provided
with coke extractor rolls 5 and liquid seal outlet valves 7, said magazines being provided with liquid deflector plates 13 for separating the surplus liquid after quenching from the quenched coke and directing it to said liquid seal valves to maintain the level in the same as more fully set forth in said application.

Still waste liquor or other cooling medium is led through the supply line 30 to a drain tank 31, from whence it is raised by pump 32 through the line piping 33 to the storage tank 34 from which it descends by gravity through the feed pipe 35 to the quenching inlets 12 adjacent the coke extractor rolls 5. As set forth in my prior application No. 9,509, supra, a portion of the quenching liquor is converted into steam, a regulated portion of which is caused to ascend through the hot fuel in the retorts where it is converted into water gas sufficient in quantity to dilute the gases of distillation to the desired degree. The surplus cooling liquid not converted into steam or vapor is separated from the coke by the liquid deflector plates 13 by which it is led to the liquid seal valves while the surplus steam and other vapors generated are caused to pass out through the vents 20 from which they are led, preferably through a common pipe line 36, to a regulator 37 which by way of illustration is shown as of the adjustable float pressure type having an inverted cup-shaped member 38 over the vapor inlet and adjustable to varying depths below the liquid seal in said regulator to determine the venting pressure. The regulator is provided with a vent 39 for venting the surplus steam and undesirable vapors into the atmosphere. The regulator may be provided with a liquid inlet 40 and an outlet 41 for maintaining the desired level of the liquid seal therein. It is obvious that in lieu of employing a single regulator for the retorts each may be provided with a separate regulator and vent of the character indicated, but inasmuch as ordinarily substantially the same conditions obtain in each retort duplication of regulators is unnecessary and adds to the complexity and cost of the installation.

In order to prevent bleeding of the gas with the surplus steam and undesirable vapors vented through the vent pipe 39 to the atmosphere the venting pressure is adjusted by means of the venting regulator 38 relative to the pressure in the vertical retorts to cause the portion of the steam requisite to produce the desired quantity of water gas to ascend into the retorts while causing the remainder of the steam and other vapors to pass through the vent 39 to the atmosphere.

The surplus liquid overflowing the liquid seal valves 7 is led through the overflow pipes 42 back to the drain tank 31 where its losses are made up from the original source of liquid supply 30, and it is then returned by the pump 32 to repeat the quenching operation, the complete operation being of a cyclic character.

Clean-out pipes 21 may be provided for the water seal valves 7 as fully set forth in my application No. 9,509, supra.

The invention as hereinbefore set forth, or exemplified may be variously practiced or embodied within the scope of the claims hereinafter made.

I claim:

1. In a by-product coking plant comprising a continuous vertical retort, provided at its lower end with a coke discharge device thereof, separating means in said discharge device for separating spent quenching liquid from quenched coke, in combination: a drain tank and a storage tank; means for feeding liquid from said drain tank to the storage tank; means for conveying the liquid from said storage tank to a point within said discharge device above said separating means so as to flow into the same, means adapted to vent a portion of vapor, generated by the quenching operation, from the discharge device and allow another portion of the vapor to ascend through said retort; and means for conveying liquid from said separating means to the drain tank; substantially as specified.

2. In a by-product coking plant comprising a continuous vertical retort, provided at its lower end with a coke discharge device thereof, in combination: means for conveying a quenching liquid to a point within said discharge device, means adapted to vent a portion of vapor, generated by the quenching operation, from the discharge device and allow another portion of the vapor to ascend through said retort; and means for conveying liquid from said discharge device to the first above-mentioned means; substantially as specified.

3. In a by-product coking plant comprising a continuous vertical retort, provided at its lower end with a coke discharge device thereof, separating means in said discharge device for separating spent quenching liquid from quenched coke, in combination: means for conveying a quenching liquid to a point within said discharge device above said separating means so as to flow into the same, said discharge device being provided with means for venting steam and undesirable vapors generated therein by the quenching operation; and means for conveying liquid from said separating means to the second above-mentioned means; substantially as specified.

4. In a by-product coking plant, in combination: a vertical coking oven; means for conveying a quenching liquid to a point therein below the top thereof; said oven being provided with means for venting vapor generated by the quenching operation; and
means for conveying quenching liquid from said coke oven to the first-above-mentioned means; substantially as specified.

5. In a by-product coking plant comprising a continuous vertical coking retort adapted to continuously discharge finished coke at its lower end and provided with a coke extractor magazine in open communication with its lower end, said magazine being adapted to support a coking mass in said retort and to extract and accumulate for periodic discharge from the retort finished quenched coke from a mass thereof in said retort, separating means in said magazine for separating spent quenching liquid from quenching coke in said magazine, the combination of means for feeding quenching liquid into said magazine above said separating means so as to flow into the same, means for conveying spent liquid from said separating means to without said magazine, a gas-offtake for said retort communicating with the same at the upper part thereof, and venting means communicating with said magazine and adapted to vent vapor from said magazine to the air without passing through said retort.

6. In a by-product coking plant comprising a continuous vertical coking retort adapted to continuously discharge finished coke at its lower end and provided with a magazine in open communication with its lower end a coke extractor in said magazine adapted to support a coking mass in said retort and to extract for periodic discharge from the retort finished quenched coke from a mass thereof in said retort and accumulate said quenched coke in said magazine, the combination of means for feeding quenching liquid into said magazine, means for conveying spent liquid from said magazine to outside of the same, a gas-offtake for said retort communicating with the same at the upper part thereof, and venting means communicating with said magazine and adapted to vent vapor from said magazine to outside the same without passing through said retort.

In testimony whereof I have hereunto set my hand.

JOSEPH BECKER.