A coke quenching tower with water sprays for the quenching of coke while contained in a transfer car. An adjustable louver-like apparatus in the upper part of the tower controls the size of openings for the passage of air, quenching steam and particulate matter carried upwardly in the tower. Water sprays are used to clean particulate matter from the individual members of the louver apparatus. In one form, these members are flat plates connected to a push bar for adjustably positioning the plates. In another form, angular bars are used instead of the flat plates. In still another form, the louver members take the form of strips of web material supported by horizontally spaced rods. Other rods contact the web between its supported ends and deflect it in the horizontal direction.

8 Claims, 7 Drawing Figures
COKE QUENCHING TOWER

BACKGROUND OF THE INVENTION

This invention relates to a coke quenching tower wherein hot coke carried by a transfer car is water-quenched by sprays in the lower part of the quenching tower having at its upper part adjustable louver-type closure means to control the actual area from which steam is discharged from the tower.

The water quenching of coke in a tower produces a quenching steam which rises within the tower due to considerable updrafts as a result of the chimney effect in the tower. Attempts to clean this quenching steam included the spraying of water inside the tower but were uneffective because the water spray was carried upwardly with the rising steam. The quenching steam contains considerable amounts of solid particulate matter which gradually settle down in the vicinity of the tower and represent a great nuisance.

Efforts in the past have produced a large number of suggestions directed toward the problem of eliding such a discharge of dust particles. Some of these proposals were directed to the concept of providing closure means to retain the particles in the tower. Other past attempts were directed to a sealing off of the area wherein the actual quenching of the coke occurs. This attempt was based on the theory that when air was supplied to the quenching steam it resulted in producing a volume of polluted air such that the treatment of dust particles contained therein was made difficult. It was discovered that it is far too complicated and expensive to isolate the quenching tower by sealing it from the atmosphere. These attempts have failed to provide a sufficiently thorough scrubbing of the quenching steam in order to separate solid particles therefrom.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a coke quenching tower wherein streams of air are permitted to enter the tower during a coke quenching process and that the tower is provided with closure means in the upper part thereof for reducing to negligible proportions the discharge of dust and other particulate matter carried by the quenching steam exhausted from the tower.

In accordance with the present invention, there is provided a quenching tower for the quenching of coke in the lower part thereof and in the upper of the tower there is provided adjustable closure means constructed and arranged in such a manner so as to deflect and partially obstruct the rising air current and steam traveling in the tower, and means for adjusting the position of the closure means to control the passage of the rising air current and steam. The invention provides one form of closure means consisting of a series of flat bars extending in a horizontal, parallel spaced relation between opposed vertical walls of the quenching tower. A push bar connected to one end of each flat bar by links at one side of the tower adjustabley positions the flat bars.

In another form of the present invention, angular shaped bars extend in a spaced-apart relation horizontally between the walls of the cooling tower. In a still further aspect of the present invention, there is provided, a first and a second horizontally spaced series of bars with the bars in each series being provided with push rods for adjustably positioning the bars.

In another form of the present invention, there is provided in the upper part of the coke quenching tower, spaced-apart webs of jute or plastic material, each web being connected at its ends by an upper and lower rod extending horizontally between the walls of the quenching tower, a "U" shaped guide for each lower rod permits displacement in a vertical direction, and means are provided for contacting the web between its ends and displacing it horizontally to partially obstruct the air current and rising steam traveling vertically within the tower.

These features and advantages of the present invention as well as others will be more apparent when the following description is read in light of the accompanying drawings, in which:

FIG. 1 illustrates an elevational view of a quenching tower incorporating the features of the present invention;

FIG. 2 is an enlarged sectional view taken along the line II—II of FIG. 1;

FIG. 3 is an elevational view taken along line III—III of FIG. 2 and illustrating a first embodiment of the present invention;

FIG. 4 is a view similar to FIG. 3 but illustrating a second embodiment of the present invention;

FIG. 5 is a view similar to FIG. 3 but illustrating a third embodiment of the present invention;

FIG. 6 is a view similar to FIG. 3 and illustrating a fourth embodiment of the present invention; and

FIG. 7 is a view taken along line VII—VII of FIG. 6.

With reference now to FIG. 1 of the drawings, there is illustrated a coke quenching car 11 displaceable along rails 10 into a quenching space 12 provided within the structure of a quenching tower. A series of spaced-apart spraying devices 13 discharge water onto the coke to quench it for such periods of time as necessary to overcome the glowing of the coke pieces. This produces a considerable amount of steam which together with the air drawn into the quenching space 12 rises vertically within the quenching tower 16. Tanks 14 for the quenching water are supported above the sloping walls 15 of the tower.

In the upper part of the quenching tower, there are provided adjustable closure means which are sprayed with water by nozzles 19 for washing particulate matter and other particles that settle upon the closure means to maintain them in a clean operable state. Service platforms 17 extend around the periphery of the walls 18 which define the cooling tower 16. This platform may be used by workmen and service personnel for the purpose of carrying out adjustments to the closure means next to be described.

FIGS. 2 and 3 illustrate a first embodiment of closure means provided in the tower 16 for the quenching chamber. These closure means take the form of upper and lower rows of side-by-side and spaced-apart angle bars 20 and 21, respectively, that have their longitudinal axes extending horizontally between opposite walls 18 of the quenching tower. As clearly shown in FIG. 3 the bars have angularly extending sides. These angle bars, preferably made from an aluminum material, each have shafts 22 at their opposite ends that extend through the walls of the tower. At one side of the tower, toggle links 23a are rigidly attached to the exposed ends of the pins 22 of the upper bars and at the opposed side of the tower toggle links 23b for the lower series.
of bars are connected to the pin 22. The free ends of the link 23a are pivotally attached to a push rod 24a and the free ends of the links 23b are pivotally attached to a push rod 24b. These push rods are shifted in their lengthwise direction to rotate each link 23a and 23b whereby the bars 20 and 21 are rotationally positioned to deflect and partially obstruct in a predetermined manner the passage of quenching steam as it rises within the tower 16.

FIG. 4 illustrates a second embodiment of the adjustable closure means according to the present invention, wherein side-by-side flat bars 25 extend between the opposed sides of the tower 16. Each of these bars is provided with pins 22 for rigidly attaching the ends of the bars at one side of the tower to the toggle links 23. A push rod 24 connected to the free end of each toggle link is used to angularly displace the flat bars 25 in unison and thereby controllably deflect and partially obstruct the path of travel for the rising air current and steam within the tower.

FIG. 5 illustrates a third embodiment of the present invention wherein there is provided two rows of flat bars 25 arranged in spaced-apart, horizontal planes. The flat bars in each plane are supported by pins 22 at their ends which extend through the walls 18 of the tower. At one side of the tower, a toggle link 26 is rigidly attached to each end of the pins 22. The toggle links for the bars 25 in the upper plane extend in an upward direction and the toggle links for the bars 25 in the lower plane projecting in a downward direction. A push rod 24 is connected to the free ends of the levers 26 for the upper series of bars and the push rod 24 is connected to the free ends of the lower series, and members 25. Thus, depending upon the position of the push rods 24, the plates 25 are adjustable to various positions in such a manner that they deflect and partially obstruct the path of travel by the rising air current and steam within the walls 18 of the tower.

FIGS. 6 and 7 illustrate a fourth embodiment according to the present invention of closure means for deflecting and partially obstructing the rising air current and steam in the tower. According to this embodiment, there is employed against at least the upper portion of a web of filter material 27 such as jute or plastic. The upper end of each length of web 27 is attached at one end to a round bar 28 which is supported at its opposite ends by the walls 18 of the tower. The lower ends of each length of web is attached to round bars 29. These bars are carried in U-shaped guide members 30 secured to the walls 18 whereby the bars may slide vertically to a limited extent within the guides. The web material 27 is contacted at its midpoint by a pair of rollers 31 and 32 which are arranged at opposite sides of the web. These rollers are connected at their opposite ends by push rods 33 supported by the tower walls 18 whereby, depending upon the position of the rods 33, the web material is horizontally displaced from the rollers 28 and 29. This horizontal displacement of the web at its midpoint is clearly shown in FIG. 6 and provides the means whereby an adjustable enclosure is used to partially deflect and obstruct the path traveled by the rising air current and steam in the tower. The adjustment to the closure, it has been found, depends upon particulars such as atmospheric conditions and upon other operating conditions which change from time to time. It is to be understood that in each embodiment of the present invention described heretofore, the water sprays 19 are used to provide continuous cleaning of particulate matter from the adjustable closure means.

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

I claim as my invention:

1. A coke quenching tower in combination with a car for the quenching of coke in the lower portion of the tower, comprising:
   a coke quenching tower including walls extending vertically from said lower portion for receiving rising currents of steam produced during the quenching of coke,
   closure means including a plurality of spaced parallel members at the upper end of said tower between opposed walls thereof for deflecting and partially obstructing passage of the rising currents of steam, means for positioning said members to control the rising currents of steam within said tower and thereby control the passage of steam from the upper end of said tower, and spray means directed toward said closure members for cleaning therefrom particulate matter carried by the steam in the tower at a controlled rate as determined by said means for positioning.

2. A coke quenching tower according to claim 1 wherein said members of said closure means comprise a plurality of bars arranged in a side-by-side spaced-apart parallel relation, and means for supporting said bars for rotation about the longitudinal axis thereof.

3. A coke quenching tower according to claim 2 wherein said means for supporting the bars comprise pins arranged at opposite ends of the bars to extend through the walls of said quenching tower, a toggle link connected to each of said pins at one side of said quenching tower, and a push rod connected to each of said toggle links.

4. A coke quenching tower according to claim 3 additionally comprising two horizontally spaced rows of said plurality of bars arranged in a side-by-side spaced-apart parallel relation; the arrangement being such that said toggle links are connected to the bars in each row at opposite sides of said tower.

5. A coke quenching tower according to claim 4 wherein said plurality of bars are each further defined as bars having angularly extending sides.

6. A coke quenching tower according to claim 1 wherein said members of said closure means comprise a plurality of lengths of web material each extending horizontally between opposed walls of said tower, first support means for carrying one end of each web between said walls, second support means arranged vertically below said first support means for carrying the lower end of each web between said walls, and vertical guides carried by opposed walls of the tower for receiving said second support means in a vertically displacable manner.

7. A coke quenching tower according to claim 6 wherein said means for positioning said members comprise rod means extending horizontally between the first and second support means for displacing each of said webs in a horizontal direction.

8. A coke quenching tower according to claim 7 wherein said means for positioning said members further comprise push rods supported by the wells of said tower and connected to said rod means.