

[54] **WET BIN FOR COLLECTION AND QUENCHING OF ASHES FROM A PULVERIZED COAL COMBUSTION CHAMBER**

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[75] Inventor: **Bernhard Michelbrink**, Bislich, Germany

Primary Examiner—Kenneth W. Sprague
 Attorney, Agent, or Firm—Roland T. Bryan

[73] Assignee: **Deutsche Babcock & Wilcox Aktiengesellschaft**, Oberhausen, Germany

[57] **ABSTRACT**

[22] Filed: **May 7, 1974**

A wet bin for collecting and quenching hot ashes discharged from an ash hopper of a pulverized coal combustion chamber includes an inclined table and scraper means which enables discharged hot ashes to be gradually quenched with increasing immersion in the water in the bin. This gradual quenching of larger lumps of hot ashes minimizes the possibility of explosive-like detonations that can accompany sudden and quick quenching. The wet bin may be sealed from the ash hopper by providing pivotally mounted flaps which extend beneath the water level in the collecting box of the wet bin to provide a barrier through which the scraper can pass without disturbing the seal since at least a pair of such flaps are provided at the sealed edge of the ash hopper discharge outlet.

[21] Appl. No.: **467,713**

[30] **Foreign Application Priority Data**
 May 22, 1973 Germany..... 2325923

[52] U.S. Cl. **110/165 R; 110/171**

[51] Int. Cl.² **F23J 1/00**

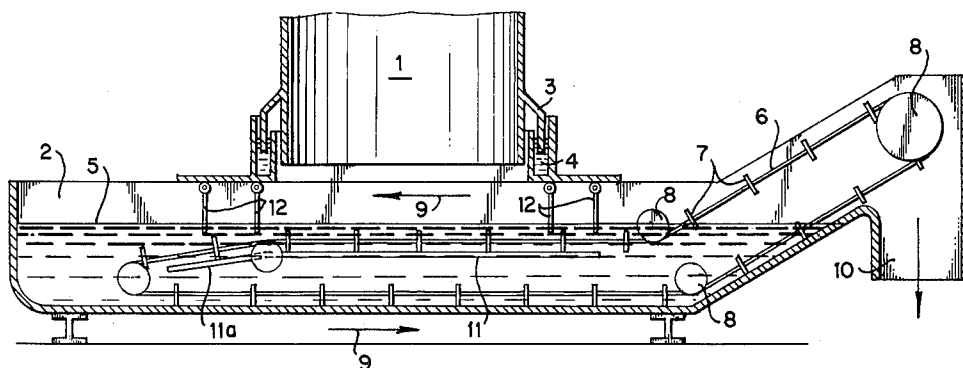
[58] Field of Search **110/8 R, 165 R, 171**

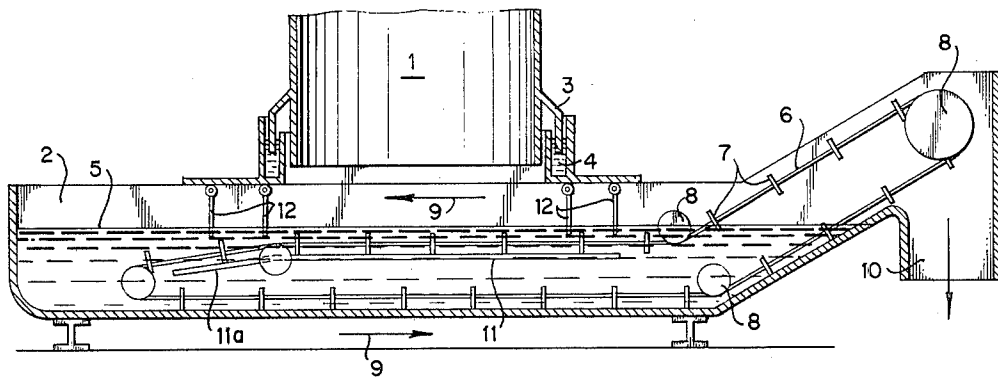
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UNITED STATES PATENTS

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6 Claims, 1 Drawing Figure





WET BIN FOR COLLECTION AND QUENCHING OF ASHES FROM A PULVERIZED COAL COMBUSTION CHAMBER

BACKGROUND OF THE INVENTION

This invention relates to a wet bin for collecting and quenching hot ashes discharged from an ash hopper of a pulverized coal combustion chamber. In these wet bins, ashes which are still hot inside are quenched by discharge into water in the bin. When large lumps of such ashes are introduced into the quenching water and suddenly quenched, there frequently occur explosion-like detonations.

In German Pat. application No. P 20 02 670.8-13, there is disclosed a wet bin having a water-filled collecting box in which is located a supporting table positioned beneath the ash hopper outlet. This table has a grate-like structure provided with slots running in the direction of the movement of an endless scraper which moves over the upper surface of the table and removes hot ashes discharged there by scraping into the collecting box. Such a wet bin has reduced the possibility of explosion-like detonations from sudden quenching of large lumps of still hot ashes by providing a structure which shatters the ashes into small pieces. These small pieces either drop through the slots in the table grate or cool off slowly in water which extends over the top of the supporting table from which they are removed by the scraper into deeper water in the collecting box.

When the water level is only slightly above the supporting table and below the bottom of the ash hopper, the wet bin is desirably sealed off from the ash hopper. This is essential to prevent the entry of unfiltered air into the ash hopper, which is generally under a reduced pressure, which could undesirably have internal effects on the firing in the combustion chamber. In the aforementioned German Pat. application No. P 20 02 674.8-13, there is disclosed a wet bin which is sealed off from the ash hopper by means of a sealing body which floats on the surface of the quenching water within the collecting box.

SUMMARY OF THE INVENTION

The present invention is a further improvement on the above described wet bin and provides a wet bin which more effectively minimizes the possibility and hazard of explosion-like detonations due to sudden quenching of large hot ash lumps. In addition, the present invention also provides an effective means of sealing the wet bin from the ash hopper in order to assure that no air enters the ash hopper. The foregoing is accomplished according to this invention by providing a supporting table which is inclined downward to the horizontal surface of the water within the collecting box in the direction of the movement of the scraper, so that hot ashes discharged onto the table surface are gradually submerged in the quenching water as they are removed therefrom. Thus, the supporting table slants downward in the direction of the movement of the scraper moving along the upper surface of the supporting table which is desirably positioned horizontally in the area below the outlet of the ash hopper. The table extends generally longitudinally and horizontally in the direction of the movement of the scraper while being inclined in a portion only, in the region of its end from

which the ashes are scraped into the deeper quenching water.

Thus, the larger ash lumps which are not sufficiently broken up on the supporting table are slowly transported into the deep water on the inclined slope of the supporting table by the scraper means. The upper stringer of the endless scraper means passes along the upper surface of the supporting table to accomplish this. It has been found that this slow but steadily increasing immersion of the large lumps results in them being finally cooled off to the extent that after they have completely entered the quenching water in the collecting box, no explosions or detonations occur. In this manner, damage to the wet bin structure and frame is avoided.

Therefore, it is an object of this invention to provide an improved wet bin that has a structure which quenches large hot ashes in a manner that minimizes explosions or detonations and thus avoids damage to the framework.

The wet bin according to this invention also effectively seals off the ash hopper from the wet bin collecting box to assure that no air can enter it. This sealing is accomplished according to this invention by a pair of flaps lying one behind the other in the direction of the movement of the scraper along the upper surface of the supporting table. These flaps may be situated on both sides of the ash hopper discharge outlet if necessary. The sealing flaps are pivotally separately hung on the frame of the ash hopper on the corner of the wet bin so that the lower edge of each extends below the surface of the quenching water within the collecting box. When the scraper passes through this barrier, the scraping element will lift one of the flaps at a time so that the other flap remains dipped into the water to effect the sealing off by itself.

Thus, it is a further object of this invention to provide a wet bin which is effectively sealed from the ash hopper so as to prevent any air entering into the ash hopper during the operation of collecting and quenching the ashes discharged therefrom.

The above and further objects and advantages of this invention will be apparent from the drawing and the following description of an embodiment of a wet bin according to this invention.

BRIEF DESCRIPTION OF THE DRAWING

The drawing diagrammatically illustrates, in cross-sectional side view, an embodiment of a wet bin according to this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing, there is shown a wet bin utilized to collect and quench hot ashes from pulverized coal combustion chambers of the type used in steam generating boiler installations. In pulverized coal combustion chambers, the ashes appear dry and may be in powder, dust-like, granulated or sintered form. The ashes are discharged through the drop shaft of an ash hopper, indicated generally at 1, and enter a collecting box 2 through the discharge outlet of the ash hopper.

The collecting box 2 is essentially a trough open at the top which inclines upward at one side. The collecting box 2 is filled with quenching water, up to the level indicated generally at 5, which is used to cool the hot ashes. A scraper chain 6, to which the scrapers 7 are

attached at a distance from each other along an endless stringer, runs traverse through the collecting box 2 in a direction of movement, of the upper stringer, indicated by the arrow 9. The scraper chain 6 is of the endless stringer type and is led around the rollers 8 to pass over the upper surface of a grate-like supporting table 11 and thence along the bottom of the collecting box 2. The ashes falling to the bottom of the collecting box 2 are transported by the scrapers 7 of the lower stringer of the scraper chain 6 to the slag outlet 10 and there dumped.

The lower end of the ash hopper 1 is moveably sealed off from the collecting box 2 by means of an apron 3 which fits into a water container 4 on the housing of the collecting box 2. Thus, the ash hopper 1 is moveably sealed off from the collecting box 2 through an effective water seal.

A supporting table 11 is provided below the outlet area of the ash hopper 1 at a slight distance below the surface of the quenching water. This table may be constructed as a plane surface grate having slots between the bars of the grate which run in the direction of the movement of the scraper chain 6. In the embodiment shown, the supporting table 11 is horizontal, and extends longitudinally in the direction of the movement of the upper stringer of the scraper chain 6, in the region below the ash hopper outlet. A portion of the supporting table 11 beyond or downstream of the area of the ash hopper outlet (the direction shown by the arrow 9 being taken as progressing from upstream to downstream) is inclined downwardly to the horizontal surface of the water, indicated at 5, within the collection box 2. This inclination is shown generally at 11a.

The wet bin acts to quench the hot ashes as follows. Fine ash particles discharged from the ash hopper 1 arrive directly at the bottom of the collecting box 2 by passing through the slots of the supporting table 11. Larger lumps of ash break up on the bars of the supporting table 11 and according to their size, either go through the table slots or are carried along the upper surface of the supporting table by the scrapers 7 of the scraper chain 6 which passes thereover. As the larger lumps of ash pass over the upper surface of the supporting table 11, those still hot are cooled off slowly before they are discharged into the deeper water within the collection box 2. This slow cooling is promoted by the fact that a portion of the supporting table is inclined, shown at 11a, downward from the horizontal line of the water level. Thus, larger ash lumps are slowly but steadily dipped deeper and deeper into the water as they pass along this downward incline. When the ashes fall on the bottom of the collecting box 2, they have been sufficiently cooled with gradually increasing contact with water so that the danger of explosion-like phenomenon occurring as a result of sudden contact of hot ashes with water is greatly minimized.

Since the ash hopper 1 is under reduced pressure and because the water level in the collecting box 2 is below the discharge outlet of the ash hopper, further special sealing is required. Thus, referring to the drawing, two flaps 12 are provided one behind the other, in front or upstream of the ash hopper 1, in the direction of movement of the scraper chain 6 as shown by the arrow 9. These flaps 12 are mounted along the upper trough cover or on the ash hopper in such a way that they can pivot. As shown here, the trough cover is connected with the housing of the ash hopper 1. The lower edges

of the flaps 12 dip into the quenching water beneath the surface, shown at 5, to effect a seal. The flaps are mounted at right angles to the direction of movement of the scraper chain 6 and extend across the width of the collection box 2 to provide the appropriate seal. Each flap 12 may consist of several sections. When the scraper chain 6 passes through the flaps 12, the scraper 7 will lift one of the flaps 12, mounted one after the other, while not lifting the other. Thus, the flaps are mounted sufficiently apart so that only one at a time can be lifted while one maintains a seal by extending beneath the water surface at all times. Thus, the distance between the two flaps has a definite lowest value, which depends on the angle of deflection of the foremost flap and the distance between the scraper of the scraper chain, which should not be exceeded. As shown, a second pair of flaps 12 may also be located behind the ash hopper 1 in the event that the collecting box 2 is not closed at the top at this point.

Hence, there has been provided, according to this invention, an improved wet bin for collecting and quenching hot ashes which minimizes the hazards of explosion and detonation associated with rapid quenching of large lumps of hot ashes and which provides an effective and improved sealing means for maintaining the ash hopper sealed off from the wet bin collecting box.

I claim:

1. A wet bin for collecting and quenching hot ashes discharged from an ash hopper of a pulverized coal combustion chamber comprising a collecting box situated beneath the ash hopper, the collecting box being capable of holding water, a supporting table means located within the collecting box and beneath the ash hopper outlet to receive the hot ashes discharged therefrom, an endless scraper means arranged to move over the supporting table means and remove ashes from the upper surface thereof into the collecting box, the supporting table means upper surface being inclined downward to the horizontal surface of water within the collection box, in the direction of movement of the scraper means along the upper surface, so that ashes removed from the supporting table upper surface are gradually increasingly quenched by water within the collecting box.

2. A wet bin as claimed in claim 1, wherein the supporting table means upper surface is horizontal in the area beneath the ash hopper discharge outlet and inclined downward only in portion, the inclined portion being that from which the ashes are removed into the collecting box from the supporting table means upper surface.

3. A wet bin as claimed in claim 1, wherein the supporting table means is grate-like with slots running in the direction of movement of the scraper means along the upper surface.

4. A wet bin as claimed in claim 1 wherein the collecting box is sealed from the ash hopper, with the exception of the ash hopper discharge outlet communicating with the area above the supporting table means which receives the hot ashes, further comprising at least a pair of sealing flaps pivotally supported on both sides of the ash hopper discharge outlet, the sealing flaps being mounted one behind the other in the direction of movement of the scraper means along the upper surface and extending beneath the surface of the water in the collecting box, the sealing flaps extending across

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the width of the collecting box so that a vapor seal between the collecting box and the ash hopper is obtained.

5. A wet bin as claimed in claim 4 wherein the sealing flaps are mounted so that the distance between each of a pair, taken in the direction of movement of the scraper means along the upper surface, is such that

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when the scraper means passes a flap and pivots it only one flap of a pair is lifted at one time in order to retain the seal.

6. A wet bin as claimed in claim 5 wherein the sealing flaps are comprised of several sections.

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