June 23, 1942. M. A. EIBEN 2,287,300

CLINKER COOLER

Filed Aug. 26, 1938

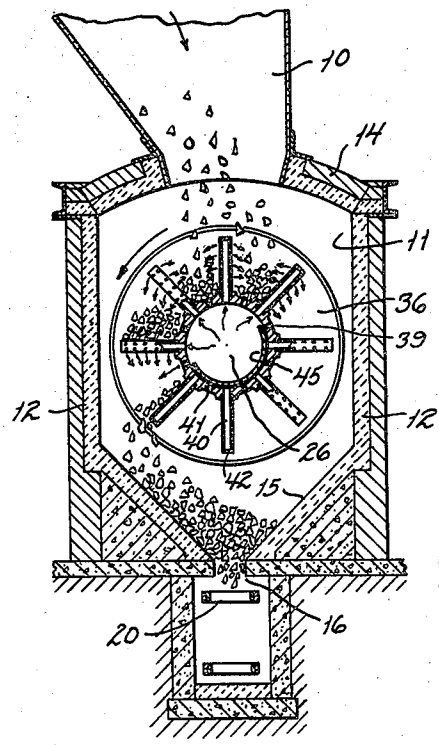


FIG. 1

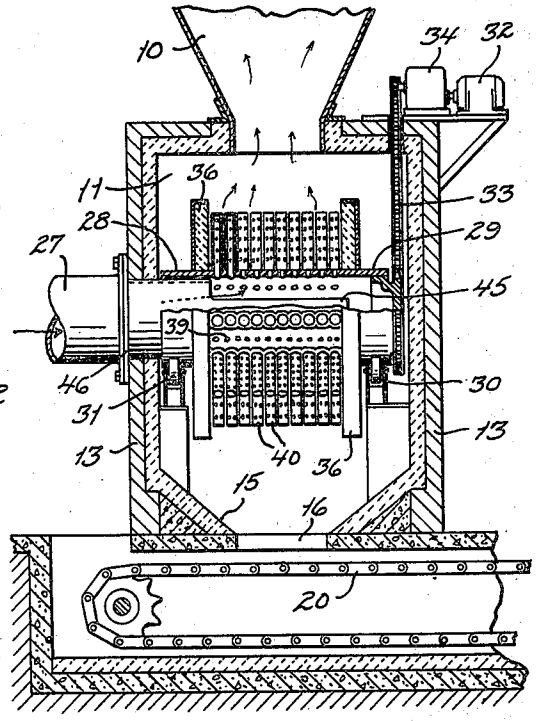


FIG. 2

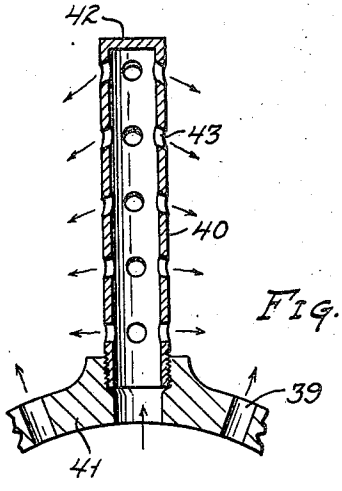


FIG. 3

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Patented June 23, 1942

2,287,300

UNITED STATES PATENT OFFICE

2,287,300

CLINKER COOLER

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Application August 26, 1938, Serial No. 226,937

9 Claims. (Cl. 34—109)

This invention relates to clinker coolers and particularly to those which are adapted for use in cement kilns or furnaces, where the hot clinker must be transported immediately from the furnace to a delivery point. Heretofore, one method of cooling clinker has been to project a stream of air against it while it is dropping out of a furnace. I have found however, that the clinker does not remain sufficiently long in contact with the air to obtain the desired reduction of temperature, and that if cooled at all, is only cooled superficially and not sufficient for the intended purposes.

An object of the present invention is to make a cooling device which can be readily installed in any kiln and which can be operated for successfully cooling the clinker to any desired degree. Additionally the device is simple in construction and is capable of withstanding the degree of heat that is incident to contact with the hot clinker.

Referring now to the drawing, Fig. 1 is a vertical section through a cooling device made in accordance with my invention; Fig. 2 is a section taken through the device at a right angle to that of Fig. 1, and Fig. 3 is an enlarged sectional view of part of the cooling mechanism.

My device preferably utilizes air as a cooling medium, together with means for retaining the clinker for a predetermined length of time in contact with the moving current of air. The air so applied can then be utilized to support combustion within the furnace from which the clinker is obtained. Accordingly, in the various drawings the conduit through which the clinker is conveyed from a furnace or kiln is indicated at 10. The bottom of the conduit opens into a chamber 11 which is formed by a structure having side walls 12, end walls 13, a top 14, and a bottom 15. The top wall is apertured to receive the clinker that passes through the conduit 10 while the bottom wall is apertured at 16 for discharging the cooled clinker. Additionally, the walls of the bottom slope toward the aperture so as to direct the clinker onto a conveyor 20 that is disposed beneath the chamber 11. The conveyor may conduct the cooled clinker to any desirable delivery point.

To support the clinker during the cooling operation I provide a slowly rotating member having clinker receiving pockets in the periphery thereof. The clinker is held by the action of gravity until the member is rotated sufficiently far that the clinker drops into the bottom of the chamber. During the time that the clinker is held in contact with the rotating member, air is caused to flow into the pockets and through and around and down onto the clinker.

The preferred construction of the clinker receiver embodies a drum having a central passageway 26 into which air may be conducted from the exterior part of the chamber, through the conduit 27 from any suitable source of supply. The receiver may be provided with hubs 28 and 29 which are supported on bearings, such as rollers 30 and 31, respectively, for enabling it to be rotated within the chamber. The source of power for producing the rotation is shown as a motor 32, which may be operatively connected to the receiver by a sprocket chain 33 through a reduction gearing indicated in general at 34. The chain may pass through openings in the top wall of the chamber which are maintained as small as possible in order to minimize the volume of heated air that escapes from the chamber during the operation of the device.

The pockets on the clinker receiving drum are preferably formed by radially extending partitions between the end walls 36. Each partition may comprise a row of tubular members 40, each of which is attached at its inner end to the peripheral wall 41 of the drum, and is in communication with the passageway 26. Each tube is preferably closed at its outer end 42 and is provided with spaced openings 43 for the emission of air that flows into the tubes through the passageway 26. The openings direct the flow of air into the clinker from all directions, so as to cool it quickly on all sides. Additional openings 39 may be made in the drum between the partitions.

To cause the air to flow into the pockets that are occupied with clinker, I utilize a baffle 45, which extends into the passageway 26 and is held therein against rotation. This may be accomplished by fastening the outer end of the baffle, as at 46, to one of the endwalls 13. Without the baffle, the air would follow the path of least resistance and flow only through the unoccupied pockets.

The moving current of air flowing through the clinker supporting drum keeps the parts thereof sufficiently cool to avoid distortion or disintegration. Additionally, the end walls 36 of the drum, as well as the walls of the chamber, may be protected by a lining of refractory material in any suitable manner. In practice, the drum is made sufficiently large that it will readily hold, until cooled, the maximum amount of clinker which can be delivered by the furnace. Moreover, the

rate of rotation of the drum may be controlled as desired by the motor 32.

A clinker cooler made in accordance with our invention is advantageous because it maintains the clinker in contact with the moving current of air for a sufficient length of time to lower the temperature of it to the desired degree. Moreover, the device may be readily installed adjacent any existing furnace or kiln in an economical and expeditious manner.

We claim:

1. A device of the character described, comprising a drum having a fluid passageway therein, partitions extending radially therefrom and providing pockets, the partitions comprising individual tubular members, each of which is in communication with said passageway, and each of which has openings providing communication between the interior thereof and the pockets.

2. A clinker cooling device, comprising a rotatable member having an axially extending passageway therein, means extending radially of said member and providing pockets for receiving and holding clinker, said means having passageways therein disposed at positions radially of the drum providing conduits for air between said passageway and the pockets and means for restricting the flow of air to those pockets that are occupied by the clinker.

3. A clinker cooling device, comprising a drum having a fluid passageway therein and having partitions providing pockets in the outer surface thereof, the partitions having openings disposed at positions radially of the drum in communication with the passageway and the drum having openings between the partitions for conducting fluid from the passageway into the pockets.

4. A clinker cooling device, comprising in combination a casing, a rotating hollow member therein having hollow partitions communicating therewith and extending along the member and providing outwardly open clinker receiving pockets therein for segregating individual quantities of the material, there being openings from the interior of the partitions into the pockets, and means for conducting a moving current of fluid through the member and into the partitions, and thence through said openings in the partitions onto the clinker within the pockets, while the clinker is so disposed and the member is rotating.

5. In a device of the character described, the combination of a housing having a clinker admitting opening in the top thereof, a hollow rotary member disposed beneath the opening and having outwardly directed radial partitions extending along it for segregating and holding individual quantities of the clinker, means for conducting a moving current of air from the interior of said member outwardly thereof into contact with the clinker as it is so held, means for rotating the member, and said housing having a discharge opening adjacent the bottom thereof, through which the clinker may fall as it drops from the member.

6. A clinker cooler comprising a casing, a conduit extending into the casing, a rotary member surrounding the conduit and having hollow projecting partitions extending along the member and providing separated open compartments for the clinker, said partitions communicating with the upper portion of the conduit and having orifices communicating with the pockets, and means for sealing the lower portion of the conduit from the lower partitions.

7. A clinker cooler, comprising a casing, means for discharging clinkers into the top portion thereof, means for receiving the clinkers from the lower portion thereof, a rotary member within the casing having projecting hollow partitions extending along the member to provide a series of outwardly open segmental pockets, said partitions having orifices communicating with the pockets, means for supporting said member and for rotating it so that the pockets between the partitions may receive clinkers from the entrance to the casing and eventually deposit them in the lower portion of the casing, and means for conveying cooling fluid to the partitions when they project upwardly while preventing such fluid passing to downwardly projecting partitions.

8. A clinker cooler comprising a casing, means for discharging clinkers into the upper portion thereof, means for receiving clinkers from the lower portion thereof, a rotary member located intermediately in the casing and comprising a hollow sleeve suitably supported for rotation and hollow partitions projecting outwardly from the sleeve and extending along it to provide a series of outwardly open segmental pockets, each partition communicating at its inner end with the space within the sleeve and having orifices communicating with the segmental pockets provided between the partitions, a conduit extending into the interior of the sleeve and open toward the top while closed toward the bottom, whereby air supplied to the interior of the conduit may pass through partitions which extend upwardly while being sealed from partitions which extend downwardly, and means for rotating the sleeve with its partitions.

9. A clinker cooler comprising a casing, means for discharging clinkers into the upper portion thereof, means for receiving clinkers from the lower portion thereof, a rotary member located intermediately in the casing and comprising a hollow sleeve suitably supported for rotation and having radial partitions projecting outwardly from the sleeve and extending along it to provide a series of outwardly open segmental pockets, each partition being made up of a row of tubes side-by-side, communicating at their inner ends with the space within the sleeve and having orifices through their sides communicating with the segmental pockets provided between the partitions, a conduit extending into the interior of the sleeve and adapted to supply air to the partitions, and means to rotate said sleeve.

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