May 14, 1963 W. OSTBERG 3,089,653

HOT CLINKER CONVEYING AND COOLING APPARATUS

Filed Sept. 20, 1961 2 Sheets-Sheet 1

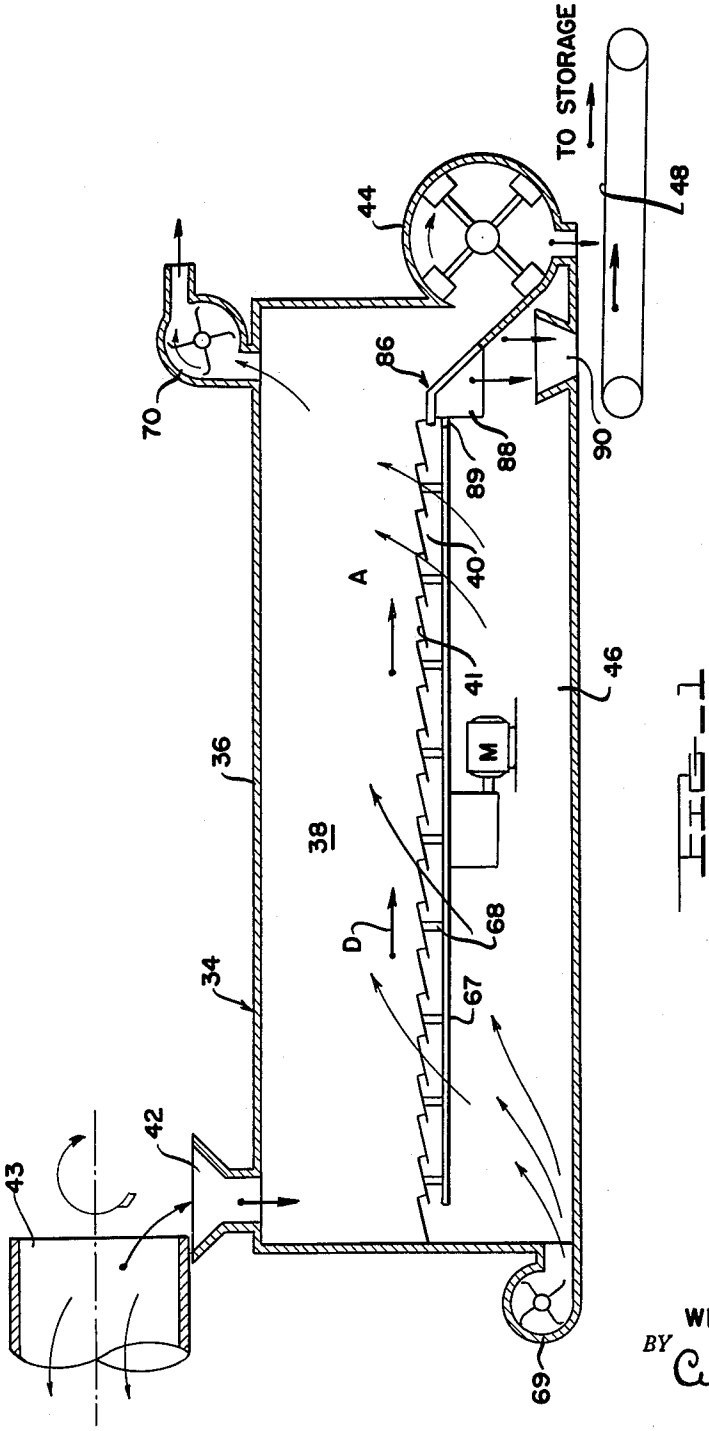


FIG. 1

INVENTOR.
WERNER OSTBERG
BY Cullen & Canton
ATTORNEYS

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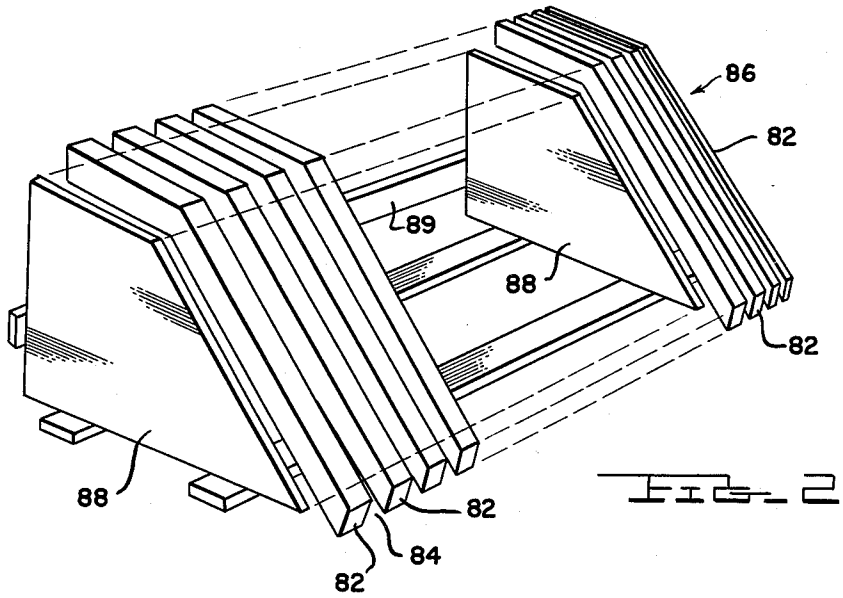


FIG. 2

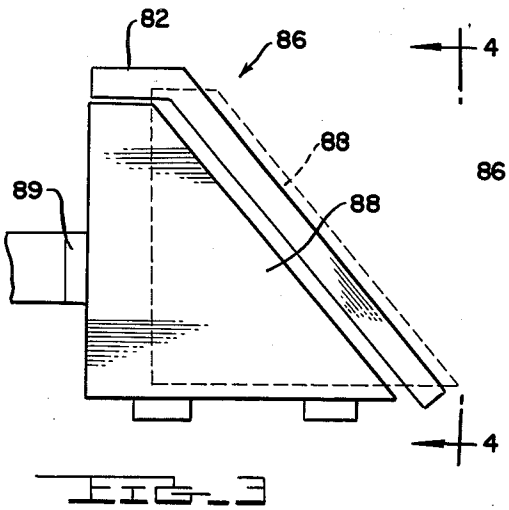


FIG. 3

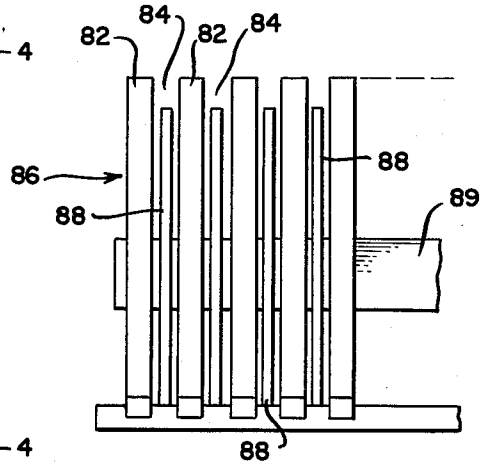


FIG. 4

INVENTOR.

WERNER OSTBERG

BY

Cullen & Canton

ATTORNEYS

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HOT CLINKER CONVEYING AND COOLING APPARATUS

Werner Ostberg, Milan, Mich., assignor to Dundee Cement Company, Dundee, Mich.

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2 Claims. (Cl. 241—81)

In certain industrial processes, such as in the manufacture of cement, products are heated in a slightly inclined kiln to produce kiln discharge of high temperature, around 2700° F. In the trade such discharge is generally called "clinker," but in this application, it will sometimes also be referred to as kiln discharge. It is known to drop hot kiln discharge into the input end of a horizontal cooler of conventional design having a long and wide horizontal pusher or shaker-type conveyor with air under pressure and in great volume being blown into the cooler, from which the discharge is moved by a second conveyor. It is also known to provide at the discharge end of the cooler a mill for crushing coarse discharge. Ultimately, the kiln discharge which drops from the kiln into the cooler cools and is moved away from the discharge end of the kiln.

For purposes of illustration only, we have shown here, a basic type cooler to which the improvements of this application relate, a cooler well known to and identified in the trade as a Fuller horizontal air quencher cooler of standard design, as shown in Douglass Patent No. 2,137,158 of November 15, 1938.

The invention deals with the provision of a clinker slicing means at the cool or discharge end of the cooler where such clinker discharges to a crushing mill whose discharge is conveyed ultimately to the storage pile. The specific problem here is to prevent coarse discharge or lumps which have found their way to the cool end of the cooler from clogging the crushing mill into which such cooler discharges and thus seriously impeding effective operation. The means here comprises a grizzly, i.e., a grating made up of a large number of vertical plates whose edges form an inclined shelf, these plates being of thick durable metal and separated to provide vertical slots communicating the chamber below the grizzly with the inclined shelf formed by the edges of these plates which lead to the mill below the horizontal inclined shelf formed by such edges. Within the slots and between the plates are vertical slicing blades which move generally horizontally in such slots about five inches per stroke, and slowly, about 12 strokes per minute, for pushing and forcing oversize discharge on the grating into the mill.

Still further objects of the present invention will best be understood upon reading the appended detailed description of a preferred embodiment shown in the attached drawings:

FIG. 1 is a schematic longitudinal view of a grate cooler equipped with a slicing blade grizzly of the invention.

FIG. 2 shows parts at the cooler discharge end of the cooler.

FIG. 3 is a side view of such parts.

FIG. 4 is a section view on line 4—4 of FIG. 3.

The Conventional Grate Cooler

The conventional grate cooler **34**, as shown in FIG. 1, comprises essentially a tunnel type housing having a top wall **36**, side walls **38**, and a long and wide grate **40** made up of overlapping perforated plates **41**, alternate ones of which are moved approximately horizontally for proper cooling action and for moving kiln discharge from a kiln discharge hopper **43** at the discharge end of a kiln **43** to a crushing mill **44**. Below the grate is a

pressure compartment **46** through which air under pressure is blown so that cooling air blows upwardly through the grate **40** and cools the kiln discharge which moves to mill **44** and then onto a conveyor **48** below the crushing mill **44** which conveyor ultimately moves cooled kiln discharge away from mill **44**.

Large volumes of cooling air are blown in a variety of directions and turbulently in the cooling chambers above and below and through the cooling grates **40**, conventional fans **69** in pressure chambers below the cooling grate and also fans **70** above grate **40**. Since such are well-known to those skilled in the art, no special showing of such fans will here be made.

The grate cooler is completely enclosed and forms a large housing or tunnel through which the kiln discharge moves on grate **40** to conveyor **48** with such housing being suitably refractory lined, and such housing containing the necessary equipment herein shown, including the necessary mechanism, fans, etc., all as known to the trade.

Motor M and oscillating frame **67** having vertical members **68** continuously move grate plates **41** approximately horizontally in advance and retraction movements.

The Output End of the Grate Cooler

At the output end of the grate cooler where the kiln discharge has been cooled down to around 100° F. or so, and where there is conventionally located a crushing mill **44**, there is provided the means comprising the present invention, namely a grizzly or grating formed of vertical metal plates **82** standing on edge and separated by vertical slots **84** with the plates being so formed that together they provide a horizontal inclined shelf **86** or grating onto which cooler discharge is deposited by the cooler grate **40** and from which coarse cooler discharge moves to the crushing mill **44**.

For agitating the cooler discharge on such shelf, and for breaking up lumps or coarses which find their way to shelf **86**, and for agitating such coarses as they approach mill **44**, there are provided in the vertical slots **84** vertical slicing blades **88** which advance and retreat generally horizontally through the slots **84**.

The slicing blades **88** hereof move very substantially, about five inches per stroke, in a range of four to six inches, and slowly, at a variable speed, about twelve strokes per minute. This contrasts with vibrator devices moving one-half to one and one-half inches per stroke and at about 150–300 strokes per minute.

Bars **89** form means for connecting the blades **88** to the already provided means (M—**67**) for moving the grate **40** whereby the same mechanism that moves the grate **40** also moves the slicing blades **88**.

Plain arrows A indicate air movements.

Tailed arrows D indicate kiln discharge movement.

This apparatus is a continuation in part of my prior application Serial No. 93,762 of March 6, 1961.

Now having described the embodiment here shown, reference is had to the claims which follow.

I claim:

1. In a hot clinker conveying and cooling apparatus, a slow moving, long stroke moving grate type cooling conveyor having a discharge end and having movable grate members and means for reciprocally moving said movable grate members towards and away from said discharge end; an inclined output grizzly at the discharge end of the cooling conveyor grate; and a hammer mill at the lower end of the grizzly; said grizzly comprising parallel, vertical plates separated by parallel vertical slots, with the rear edges of the plates forming the inclined surface of the grizzly; vertical slicing blades in said slots, the blades having slicing edges sloped to correspond to the slope of the inclined surface of said grizzly for slicing conveyor

discharge on said grizzly; and means for moving the slicing blades horizontally, continuously and automatically through the grizzly and the clinkers thereon at an amplitude of about five inches, and at a variable speed of about twelve strokes per minute to throw oversized clinkers off said grizzly a substantial distance horizontally towards the upper part of the mill, rather than merely chipping clinkers and dislodging small fragments thereof from the grizzly, so that they slide down the grizzly into the lower part of the mill; said slicing blade moving means comprising bars connecting the movable grate members and the blades together, whereby the grate and the blades move in synchronism.

2. In a hot clinker conveying and cooling apparatus, a slow moving, long stroke moving grate type cooling conveyor having a discharge end and having movable grate members and means for reciprocally moving said movable grate members towards and away from said discharge end for moving hot clinkers to said discharge end; an inclined grizzly at said discharge end, said grizzly comprising parallel plates spaced apart by parallel vertical slots and said plates sloping downwardly from said discharge end of the conveyor to form the inclined surface of said grizzly; a hammer mill at the lower end of said grizzly for receiving and milling oversized clinkers; a vertically arranged slicing blade in each of said slots, the blades each having an upper slicing edge sloped to correspond to the slope of the grizzly for slicing conveyor discharge on said grizzly; blade moving means for simultaneously and regularly reciprocating the slicing blades in a horizontal direction through the grizzly and the clinkers thereon to throw oversized clinkers off said grizzly a substantial distance horizontally towards and into the upper part of said hammer mill; the blade moving means being interconnected with the grate moving means for synchronizing the speed, amplitude, and direction of movement of the blades to that of the movable grate members.

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