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SELF-CLEANING GRIZZLY FOR CLINKER COOLER

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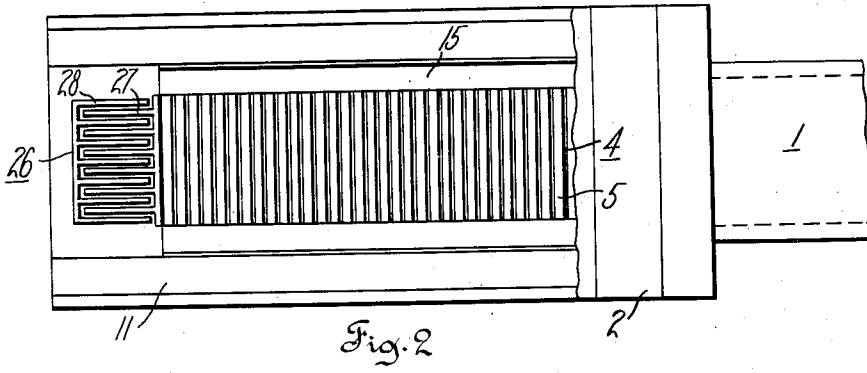


Fig. 2

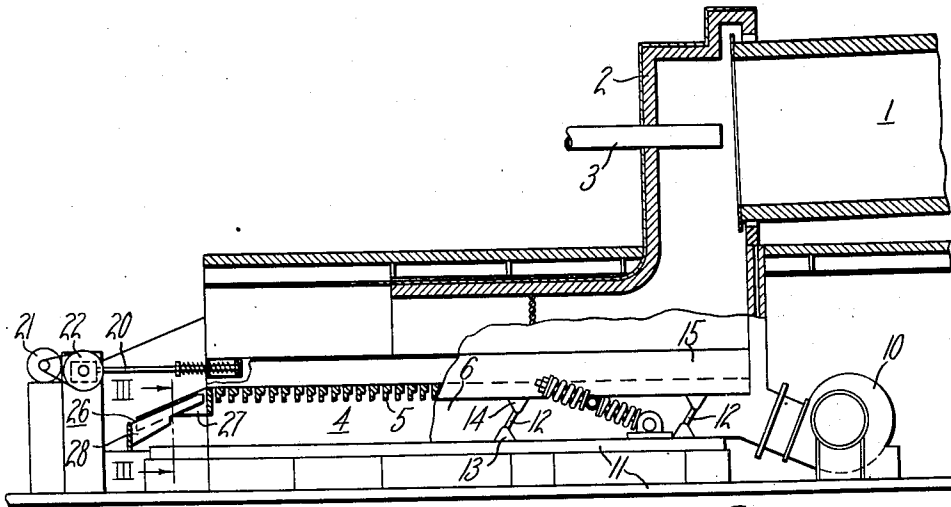


Fig. 1

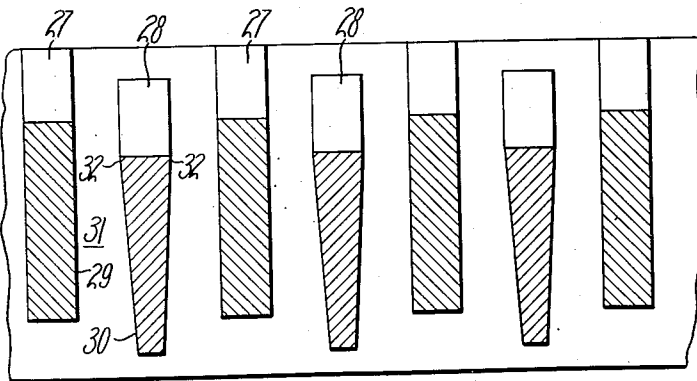


Fig. 3

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SELF-CLEANING GRIZZLY FOR CLINKER COOLER

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4 Claims. (Cl. 34—164)

This invention relates to grizzlies for screening bulk material to separate pieces of the material that are larger and smaller than predetermined sizes. In particular this invention relates to a grizzly for use with a clinker cooler that receives material such as cement clinker from a rotary kiln, and in which the clinker is cooled and then is to be screened of oversize material.

Clinker coolers are usually provided with grizzlies in which a number of grizzly bars form a deck over which the material discharged from the cooler is made to pass. The smaller pieces of material drop downwardly between the grizzly bars and the oversize pieces move along the top of the grizzly deck to means for breaking up these oversize particles and/or returning them to the cooler for further cooling. In the past the grizzlies were provided with bars having rectangular cross sections. It was found however that the grizzly decks provided with such bars often became clogged so that material that was small enough to drop between the grizzly bars nevertheless failed to do so. In an effort to provide grizzlies that would be self-cleaning, grizzly bars were provided having downwardly pointed wedge shaped cross sections. With all the bars of a grizzly having such a cross section, the space between adjacent grizzly bars defined in part by the two sloping sides of the adjacent bars provided a space having a wider opening at the bottom of the space than at the top. With such a construction pieces that were small enough to pass the top surfaces of adjacent grizzly bars were found to be more likely to drop all the way through because the space between the bars became progressively wider as the pieces dropped downwardly. Such a construction was not an entirely satisfactory solution to the problem however because often irregularly shaped pieces have portions small enough to pass between the top surfaces of the grizzly bars but also other portions not small enough to pass through. In such cases the adjacent edges of adjacent grizzly bars often tended to pinch the piece and the piece not only could not drop through but it also could not travel along the top of the grizzly deck.

The nature of the present invention relates to improvements to the self-cleaning type of grizzly. According to a preferred embodiment incorporating all of the features of the present invention, the grizzly bars are arranged to form a deck in which spaces between adjacent bars are defined in part by one vertical wall and one wall sloping away from the vertical wall to provide a wider opening at the bottom of the space than at the top of the space. Such spaces can be defined for example by providing a first group of alternate bars with rectangular cross sections and a second group of bars, comprising the remaining bars that are located between the rectangular shaped bars of the first group, with downwardly pointed wedge shaped cross sections. Other features of a preferred embodiment of the present invention include connecting alternate rods to the vibrating deck of the cooler while the remaining rods are supported in a sta-

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tionary position and provide vertical walls that project a predetermined distance above the adjacent sloping walls. With the relatively sharp edge of the top of a sloping wall being next to the smooth surface of a higher vertical wall, a piece can roll in a vertical plane relative to the top edge of the sloping wall as alternate bars vibrate in a vertical plane. If the piece has no portions that are too big to pass through the top of the opening of the piece, no matter how irregular its shape, can roll around the upper edge of the sloping wall and drop through. If on the other hand the piece has portions that are too big to pass through the space, the vibrating bar can roll the piece up and over the top edge of the adjacent bar so that the piece will not be pinched and held between the two bars, and the deck will therefore be kept clear. Thus, according to this invention, the space between adjacent bars is defined by one vertical wall and one sloping wall to provide the self-cleaning action of a space that becomes wider toward the bottom of the space and yet avoids the difficulty associated with having a pair of adjacent edges that can pinch and hold a piece between them without permitting the piece to fall through or pass over the top of the deck.

It is a principal object of the present invention to provide a new and improved self-cleaning grizzly having bars that define spaces between adjacent bars that have wider openings at the bottom than at the top so that any piece that is able to pass between the top surfaces of adjacent grizzly bars has a progressively better chance of passing all the way through the space the farther it does pass through the space.

Another object of the present invention is to provide a new and improved grizzly of the self-cleaning type in which adjacent grizzly bars define a space between them that is wider at the bottom than at the top but without having adjacent edges that can pinch a piece between them and hold the piece so that it cannot drop downwardly or move upwardly to pass over and off of the deck.

Another object of the present invention is to provide a new and improved grizzly having a deck made up of bars with a vertical wall facing a wall sloping away from the vertical wall, to define a space that is wider at the bottom than at the top and in which the vertical walls project above the walls sloping away from them, so that as alternate bars are vibrated in a vertical plane a piece between the vertical surface of one bar and the upper edge of a sloping surface of an adjacent bar can either roll downwardly around the edge and pass through the deck or the piece can roll upwardly over the edge to pass over the top of the deck, but in either case without being pinched and held so as to clog the deck.

And another object of an embodiment of the present invention, hereinafter specifically illustrated, is to provide a new and improved grizzly having a deck made up of alternate stationary bars having a downwardly pointed wedge shaped cross section and vibrating bars having a rectangular cross section, and in which the bars having rectangular cross sections project above the bars having wedge shaped cross sections. As the rectangular bars are vibrated in a vertical plane, a piece between the vertical surface of the vibrating bar and the upper edge of the adjacent wedge shaped bar can either roll downwardly around the edge and pass through the deck or the piece can roll upwardly over the edge to pass over the top of the deck. But whether the piece moves up or down, in neither case will it be pinched and held to clog the deck.

Objects and advantages other than those above set forth will be apparent as the description of the invention proceeds.

The novel features of the invention and how the objects

may be attained will appear from the specification and the accompanying drawings showing one embodiment of the invention. All of the novel features are intended to be pointed out in the claims.

In the drawings:

Fig. 1 is a foreshortened fragmentary side view of a rotary kiln and cooler installation of the type utilized to produce Portland cement clinker and with part of the covering structure cut away to more clearly disclose various mechanism included in such machinery;

Fig. 2 is a top view of the machinery shown in Fig. 1 with portions of the top covering structure removed; and

Fig. 3 is an enlarged fragmentary view of the grizzly deck as seen in section along line III—III in Fig. 2.

Referring to the drawing, the reference numeral 1 indicates the discharge end of a conventional rotary kiln for burning cement clinker. The kiln 1 is equipped with a firing hood 2 which is placed over the discharge end of the kiln and which has a large bottom opening through which clinker discharged from the kiln may pass. A burner 3 projects inwardly through the firing hood 2 for delivering fuel and primary combustion air to the kiln 1 to create in the kiln the temperatures necessary to burn material such as cement clinker. Hot clinker discharged from the kiln 1 and falling through the bottom opening of the firing hood 2 falls upon a conveyer mechanism 4 arranged on a level below the level of the bottom opening on the firing hood 2. The conveyer mechanism 4 comprises a grate 5 vertically spaced above a boxlike shell 6. Cooling air is forced by a fan 10 into the shell 6 and upwardly through the grate 5 to cool clinker deposited on the grate. The cooling air after having passed through the grate 5 and clinker on the grate passes on into the kiln 1 to provide additional air for the combustion of fuel in the kiln.

To advance clinker along the grate 5 from the kiln 1 means are provided to shake the grate 5 relative to the bottom of the shell 6. The shell 6 is rigidly mounted on foundation members 11. The grate 5 is swingably supported on a plurality of leaf springs 12 standing on end. Each leaf spring 12 is connected to the foundation structure 11 by a bracket 13 and extends upwardly therefrom in a somewhat inclined position. The upper ends of the leaf springs are pivotally connected to depending brackets 14 secured to side wall members 15 of the grate 5.

In order to shake the grate 5 and advance clinker along the grate from the kiln end to the discharge end, a vibrating mechanism is provided having a reciprocating rod 20 connected on one end to the side wall member 15 of the grate. The end of rod 20 remote from the side wall member 15 is driven by an electric motor 21 through a suitable power transmitting mechanism indicated at 22. In operation the grate 5 has a short backward and forward motion with a slight rise on the forward stroke which conveys the clinker in a smooth flowing stream in the direction away from the kiln and toward the discharge end of the conveying mechanism 4. The grate 5 may have a travel of approximately one inch in each direction at a rate of from 300 to 400 strokes per minute.

Pieces of clinker larger than a predetermined size may not cool sufficiently during their passage along the grate 5. A grizzly 26 is provided to separate those pieces for breaking up such pieces and/or returning them to the cooler for further cooling. The grizzly 26 comprises a deck made up of two groups of bars 27 and 28. The first group of bars 27 are connected to the grate 5 of the conveying mechanism 4 so as to vibrate with the grate. The second group of bars 28 which are arranged between bars of the group 27 are connected to a portion of the stationary foundation structure 11.

With particular reference to Fig. 3, it may be seen that the grizzly bars 27 and 28 are provided with both vertical side walls 29 and walls 30 sloping downwardly and away from the vertical walls 29 to define a space 31 between

adjacent bars. The upper portion of the sloping walls 30 terminates in an edge 32. The space between adjacent bars is defined by one of the vertical walls 29 and one of the sloping walls 30 to provide a wider opening at the bottom of the space 31 than at the level of the edge 32. The arrangement is further such that the vertical side walls 29 project a distance above edge 32 of the sloping side walls. In the embodiment of the invention shown in the drawings this is accomplished by providing bars for group 27 that have a rectangular cross section while the rods of group 28 have a downwardly pointed wedge shaped cross section. The rods or bars of group 27 are secured to the grate 5 and aligned in such a manner that the bars 27 project vertically above the bars 28 along their entire length.

In operation, clinker deposited on the deck of the grate 5 from the kiln 1 will be moved along the grate as a result of a shaking or reciprocating motion imparted to the grate by the motor 21 acting through the power transmission mechanism 22 and the reciprocating rod 20. As the clinker advances along the grate 5 from the kiln to the discharge end of the conveyer 4, air blown upwardly through the grate 5 by the fan 10 will cool the clinker. Pieces too large to be adequately cooled as they advance along the grate 5 are separated from smaller sized clinker by the grizzly 26. Pieces that pass between the bars 27 and 28 of the grizzly deck 26 may be considered sufficiently cooled. Those pieces that do not pass between the bars of the grizzly deck may be broken into smaller pieces by means of the clinker breaker (not shown) and/or returned to the cooler by means not herein shown but which may be as described and claimed in U. S. Patent 2,375,487 to R. C. Newhouse, May 8, 1945. If a piece of clinker has no portions that are too big to pass through the top of the space between grizzly bars, no matter how irregular in shape, the piece can roll around the edge 32 of bar 28 and drop through without being pinched and held. If, on the other hand, a piece has portions that are too big to pass between the grizzly bars, the vibrating bar 27 which is secured to the grate mechanism 5 can roll the piece upwardly over the top of the edge of the adjacent bar 28 without pinching the piece and holding it to clog the deck. Thus, according to the present invention the space between adjacent bars of a grizzly deck is defined by one vertical wall and one wall sloping downwardly and away from the vertical wall with the vertical wall projecting above the upper edge of the downwardly sloping wall to provide the self-cleaning action of a space that becomes wider toward the bottom of the space and in addition provides a smooth vertical surface horizontally opposite the upper edge of the downwardly sloping surfaces to reduce the possibility of a piece being pinched in a manner that will prevent its moving downward through the deck or upward to pass along the top of the deck of the grizzly.

From the foregoing it will be apparent to those skilled in the art that the illustrated embodiment of the invention provides a new and improved self-cleaning grizzly for a clinker cooler and accordingly accomplishes the objects of the invention.

On the other hand, it will also be obvious to those skilled in this art that the illustrated embodiment of the invention may be variously changed and modified without departing from the spirit of the invention or sacrificing all the advantages thereof. Accordingly the disclosure herein is illustrative only and the invention is not limited thereto.

What is claimed is:

1. In combination with a clinker cooler having a deck and means to vibrate the deck in order to advance material through the cooler, a grizzly deck arranged adjacent the discharge edge of said cooler deck for screening material discharged from the cooler, said grizzly deck comprising a plurality of grizzly bars, a first group of alternate of said bars being connected to said vibrating deck, a second

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group of bars comprising the remainder of said bars that are between bars of said first group, and stationary support structure connected to said second group of bars for supporting said second group in fixed positions relative to said stationary support structure, the bars of said first group having a rectangular cross section and the bars of said second group having a downwardly pointed wedge shaped cross section.

2. In combination with a clinker cooler having a deck and means to vibrate the deck in order to advance material through the cooler, a grizzly deck arranged adjacent the discharge edge of said cooler deck for screening material discharged from the cooler, said grizzly deck comprising a plurality of grizzly bars, a first group of alternate of said bars being connected to said vibrating deck, a second group of bars comprising the remainder of said bars that are between bars of said first group, and stationary support structure connected to said second group of bars for supporting said second group in fixed positions relative to said stationary support structure, the bars of said first group having a rectangular cross section and the bars of said second group having a downwardly pointed wedge shaped cross section, and the bars of said first group being arranged to project a predetermined distance above the bars of said second group.

3. In combination with a clinker cooler having a deck and means to vibrate the deck in order to advance material through the cooler, a grizzly deck arranged adjacent the discharge edge of said cooler deck for screening material discharged from the cooler, said grizzly deck comprising a plurality of grizzly bars, a first group of alternate of said bars being connected to said vibrating deck, a second group of bars comprising the remainder of said bars that are located between bars of said first group, and stationary support structure connected to said second group of bars for supporting said second group in fixed positions relative

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to said support structure, said grizzly bars having vertical and sloping side walls, said bars being arranged to define a space between adjacent bars to screen pieces of material of less than a predetermined size, and said space being defined in part by one vertical wall and one wall sloping to provide a wider opening at the bottom of said space than at the top of said space.

4. In combination with a clinker cooler having a deck and means to vibrate the deck in order to advance material through the cooler, a grizzly deck arranged adjacent the discharge edge of said cooler deck for screening material discharged from the cooler, said grizzly deck comprising a plurality of grizzly bars, a first group of alternate of said bars being connected to said vibrating deck, a second group of bars comprising the remainder of said bars that are located between bars of said first group, and stationary support structure connected to said second group of bars for supporting said second group in fixed positions relative to said support structure, said grizzly bars having vertical and sloping side walls, said bars being arranged to define a space between adjacent bars to screen pieces of material of less than a predetermined size, said space being defined in part by one vertical wall and one wall sloping to provide a wider opening at the bottom of said space than at the top of said space, and the bars of said first group being arranged to project a predetermined distance above the bars of said second group.

References Cited in the file of this patent

UNITED STATES PATENTS

810,922	Dickey	Jan. 30, 1906
2,312,034	Gaffney	Feb. 23, 1943

FOREIGN PATENTS

608,093	Germany	Jan. 15, 1935
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