Sept. 14, 1965 HIDEO SASAKI 3,206,070

METHOD OF DISCHARGING MATERIAL FROM ROTARY KILN

Filed June 6, 1963

Fig.1

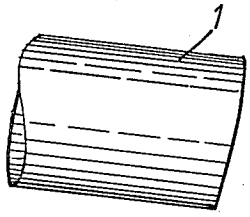


Fig.3

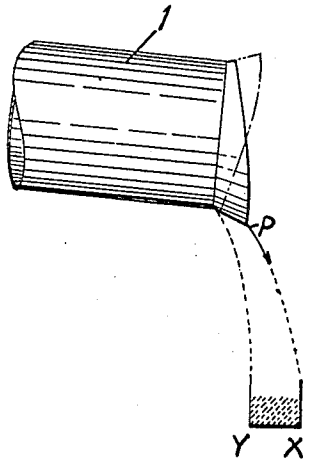
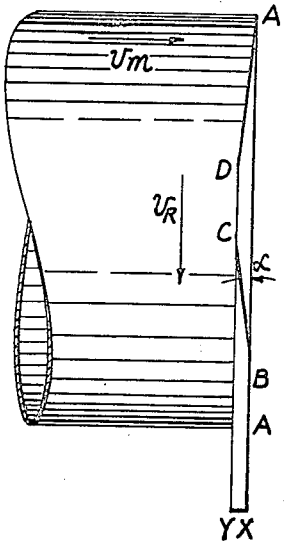


Fig.2



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METHOD OF DISCHARGING MATERIAL FROM ROTARY KILN

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5 Claims. (Cl. 222—1)

The present invention relates to the method of distributing the product from a rotary kiln uniformly within a certain width.

When the product to be discharged from a rotary kiln is delivered onto, for example, a pan conveyor having a certain width and conveyed to a next stage, the ununiform distribution of the product on the pan conveyor does not result in a uniform treatment, that is, a uniformly finished product. Therefore, it is required to distribute the product from the rotary kiln on the pan conveyor. In addition the product is of a considerable high temperature and therefore means for distributing such product uniformly must be simple and durable.

In accordance with the present invention, there can be provided a novel method to resolve such problem. It is a principal object of the invention to provide the method of distributing the product to be discharged from a rotary kiln by giving an incline in the longitudinal direction to the outlet end or cut end of the rotary kiln or by expanding the outlet end of the rotary kiln in a conical form having an incline in the longitudinal direction.

The present invention relates particularly to the method of distributing the product discharged from a rotary kiln, which comprises employing a rotary kiln having a discharge end wherein the edge thereof recedes diagonally, whereby the point from which the product falls in continuously changing axially of the kiln. Thus, as the kiln rotates the product falling from the end thereof is distributed within the range of a certain width.

The invention is further illustrated in the accompanying drawing wherein FIG. 1 shows a side-view of one form of apparatus suitable for carrying out the invention, FIG. 2 shows the developed figure of FIG. 1, and FIG. 3 shows a side-view of another form.

With particular reference to FIG. 1 and FIG. 2, the outlet end of the rotary kiln is formed by a line ABCDA as shown in FIG. 2. Lines AB and CD are at right angles to the longitudinal axial line of the rotary kiln 1, a line BC recedes diagonally with the axial line and a line DA advances diagonally.

If the angle which the developed diagonal line AD or CB makes with the developed normal portion CD or AB, respectively, is proportioned so that the tangent of said angle is given by the ratio of the moving velocity of the product to the peripheral velocity of the rotary kiln, so that

$$\text{tangent of angle} = \frac{V_m}{V_R}$$

(where V_m is the moving velocity of the product in the inclined rotary kiln and V_R is the peripheral velocity of the rotary kiln) the operation of the device will be as follows:

2

(a) with the line AB disposed lowermost, rotation of the kiln causes the product to fall initially from B on the kiln to X on the conveyor; then as points from B to C are disposed lowermost, the kiln edge regresses gradually axially causing the product to be distributed uniformly along the conveyor width between X and Y;

(b) with the line CD disposed lowermost, the product is deposited on the conveyor along the edge Y of the conveyor as the kiln rotates; and

(c) with the line DA disposed lowermost, rotation of the kiln causes no fall of product from the kiln to the conveyor since the edge DA of the kiln advances from D to A at a velocity that equals the moving velocity of the product, i.e., the relative velocity between the moving material and the advancing edge is zero.

It will be clearly understood from the foregoing illustration that the product falls on the position X and Y as much as the amount corresponding to the length of the lines AB and CD and is distributed uniformly between X and Y for the length BC of the kiln edge and with no fall of product for the length DA of the kiln edge.

In the example shown in FIG. 1 and FIG. 2 the range between X and Y is relatively limited, but when the outlet end of the rotary kiln 1 is expanded into a conical form and at least a part of the end is provided with a spiral edge, as shown in FIG. 3, the product slides down on the conical part and the distributing range thereof can be enlarged as compared with the case in FIG. 1, because the discharging velocity depends on the length of sliding, that is, the longer the length, the higher the initial velocity.

I claim:

1. The method of distributing over a predetermined width the product to be discharged from an inclined rotary kiln which comprises employing a rotary kiln having at least a portion of the edge of the discharge end thereof lying in a plane extending diagonally to the axis of the kiln wherein as the kiln rotates a part of the edge recedes diagonally with the longitudinal direction and a part of the edge advances diagonally whereby the product discharged from the kiln is distributed within the range of a certain width since the falling point of the product is continually changing.

2. The method of distributing over a predetermined width the product discharged from an inclined rotary kiln which comprises employing a rotary kiln having at least half of the peripheral edge at the discharge end thereof lying in a plane normal to the axis of the kiln and the remainder of the peripheral edge cut back with portions lying in a plane extending diagonally of said axis wherein as the kiln rotates a part of the edge recedes diagonally from said plane and another part advances diagonally whereby the falling point of the product is continually changed and the discharge from said kiln is distributed within the range of a certain width.

3. The method of distributing over a predetermined width the product discharged from an inclined rotary kiln which comprises employing a rotary kiln having at least half of the peripheral edge at the discharge end thereof lying in a plane normal to the axis of the kiln and the remainder of the peripheral edge cut back with portions lying in a plane extending diagonally of said axis and a connecting portion lying in a plane normal to said axis wherein as the kiln rotates a part of the edge recedes diagonally from said plane and a part advances diagonally whereby the falling point of the product is continually

changed and the discharge from said kiln is distributed within the range of a certain width.

4. The method of claim 3 wherein the angle of the diagonal part of the edge and the normal part of the edge is in the relation

$$\tan = \frac{V_m}{V_R}$$

where V_m is a moving velocity of the product in the rotary kiln and V_R is a peripheral velocity of the rotary kiln.

5. The method of distributing over a predetermined width the product discharged from an inclined rotary kiln which comprises employing a rotary kiln having a flaring flange extending from the discharge end of the kiln, said flange extending from an edge that is normal to the axis of the kiln, said flange gradually increasing in width to a point diametrically opposite the narrowest portion of the flange whereby the falling point of the product is continually changed and the discharge from said kiln is distributed within the range of a certain width.

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