Feb. 4, 1941. B. H. PUERNER ET AL 2,230,601

ROTARY KILN

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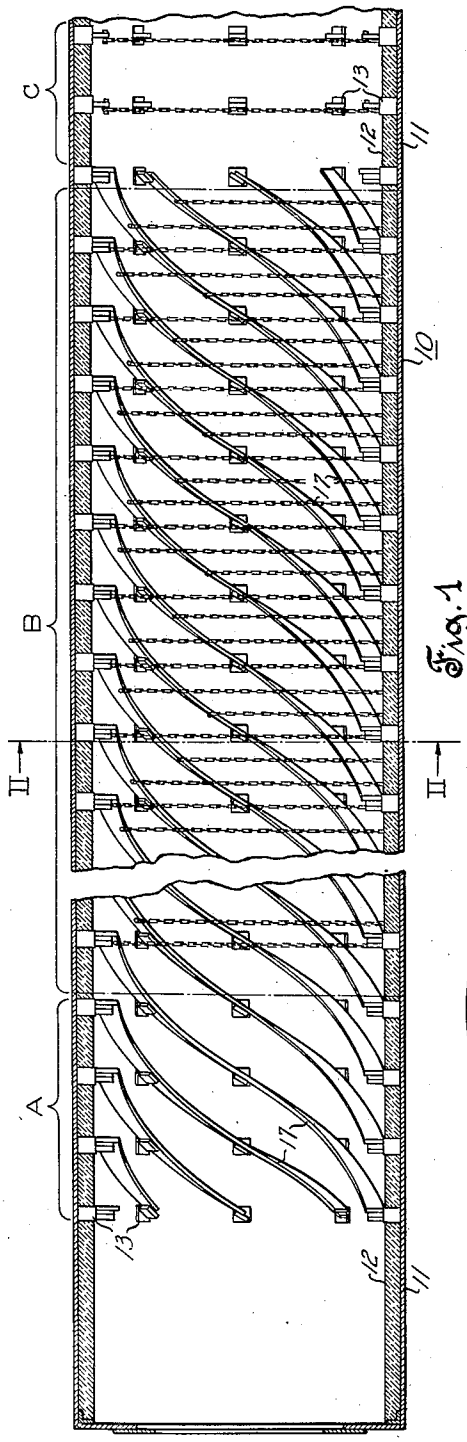


Fig. 1

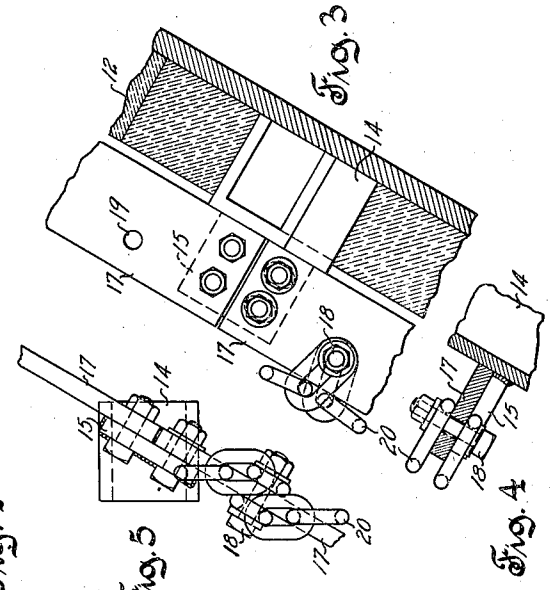


Fig. 3

Fig. 5

Fig. 4

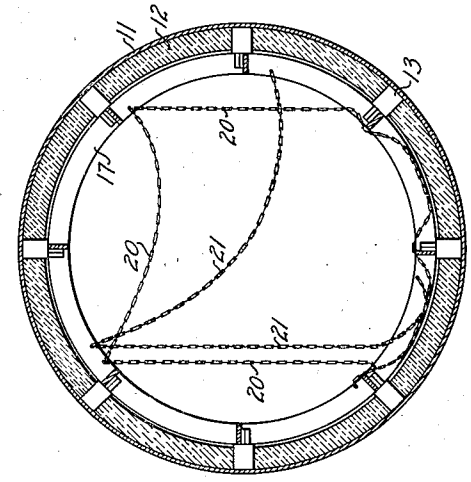


Fig. 2

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ROTARY KILN

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6 Claims. (Cl. 263—32)

This invention relates to rotary kilns of the type utilized for burning cement clinker. The raw material is usually in the form of a slurry which is passed through a rotary kiln slightly inclined with the horizontal from the feed end to the discharge end thereof. In order to dry this slurry, a portion of the kiln near the feed end thereof is usually provided with heat transmitting elements such as chains which, during the rotation of the kiln, dip into the slurry, transmitting heat thereto, and are then drawn out of the slurry to expose the slurry adhering to the chain to the hot gases passing through the kiln.

It has been found that these chains interfere with the flow of material through the kiln, greatly limiting the capacity of the kiln, resulting in lowered efficiency. This invention overcomes this disadvantage by providing material feeding means within the kiln at the chain zone, thereby expediting the passage of material therethrough.

It is an object of this invention to provide a rotary kiln provided with material feeding means within the chain zone thereof to expedite the progress of material therethrough.

It is an object of this invention to provide a kiln having, adjacent the feed end thereof, a material feeding zone, a combined chain and material feeding zone, and a chain zone, in sequence.

It is another object of this invention to provide a kiln having connecting means carried by the shell of the kiln and extending inwardly through the refractory lining of the kiln, conveying means supported by said connecting means adjacent the kiln lining, and chains carried by the conveying means.

Other objects of this invention will become apparent from the following detailed description, taken in connection with the drawing, wherein:

Fig. 1 is a vertical elevation sectional view of a kiln constructed in accordance with this invention;

Fig. 2 is a vertical section taken at right angles to the view of Fig. 1, on the line II—II thereof;

Fig. 3 is an enlarged detail view of a kiln section showing the means for attaching feeding means and chains to the kiln;

Fig. 4 is a view similar to Fig. 3 but taken at right angles thereto; and

Fig. 5 is a plan view of the detail shown in Figs. 3 and 4.

Referring to the drawing in detail, Fig. 1 shows a section of the kiln adjacent to the feed end thereof which is assumed to be at the left of Fig. 1. Near the feed end of the kiln zone A is shown as being provided with feeding means which may consist of helical ribs, zone B is shown as being provided with feeding means and chains, while zone C is provided with chains only.

The kiln consists of a generally cylindrical shell 11 provided with refractory lining 12. Attached to the shell are connecting blocks 13, which may consist of U-shaped blocks 14 suitably supported by the shell 11 and being provided with extension plates 15 which may be welded to blocks 14. The feeding means may consist of a plurality of helical flights 17 which may be bolted to plate 15 by means of bolts 18. Helical flights 17 are provided with apertures 19 to facilitate connection of chains 20, 21 thereto. These chains may consist of relatively short lengths 20 and longer lengths 21, and may be arranged in the manner disclosed in the patent to R. C. Newhouse, 2,059,176, October 27, 1936.

It will be understood that as material is fed into the feed end of the kiln, progress of material through the kiln is expedited in zone A by means of feeding means 17. This greatly increases the capacity of the kiln. The material, usually in the condition of a wet slurry, then passes through the combined chain and feeding means zone B in which the chains assist in drying the wet material while the feeding means 17 aids in advancing the material axially of the kiln. By the time the material has passed through the zone designated by the letter B, it is relatively dry and auxiliary feeding means are no longer required. Therefore section C consists of chains alone.

The helical ribs or flights 17 serve not only to advance the material within the kiln but also serve as heat transmitting media. In actual installations it has been estimated that as much as 20 per cent of the heat transmitting effect is due to the helical ribs 17.

While the chains may be connected in any desired manner, it has been found desirable to connect the chains so that they will be suspended in planes at right angles to the axis of the kiln, as described in more detail in said Newhouse Patent, 2,059,176. In order to avoid unnecessary wear between the chains and the refractory kiln lining, the length of individual chains is made substantially equal to the distance between the points of attachment of the ends of the chains, as measured along the inner surface of the kiln. For example, a 90° chain—that is, a chain 20 having its ends connected to points in the kiln spaced by 90°—has a length substantially equal to one-fourth of the circumference of the interior of the kiln.

While the disclosure herein refers to a specific

construction, it is to be understood that numerous modifications which will occur to those skilled in the art are included within the spirit of this invention and in the scope of the claims appended hereto.

It is claimed and desired to secure by Letters Patent:

1. A rotary kiln comprising treating zones arranged in the following sequence: feed end; a zone provided with helical ribs; a zone provided with helical ribs and chain sections; and a zone provided with chains only.

2. In a rotary kiln, a kiln shell, a refractory lining within said shell, a chain section comprising connecting means carried by the kiln shell and passing through said refractory lining, helical ribs carried by said connecting means interiorly of said kiln lining, and a plurality of chains supported by means including said connecting means.

3. In a rotary kiln, a kiln shell, a refractory lining within said kiln shell, connecting means carried interiorly of said kiln shell and passing through said lining, helical material conveying ribs supported on the inner surface of said lining by said connecting means, and a plurality of chains carried by said helical ribs.

4. A rotary kiln comprising a shell lined with refractory material interiorly thereof, individual connection blocks carried by said shell and extending inwardly beyond the surface of said refractory lining, a plurality of helical flights, and means for connecting said helical flights in position adjacent to the inner surface of said lining on said extending blocks, whereby said helical flights are attached to said casing independently of said refractory lining.

5. A rotary kiln comprising a generally cylindrical shell, provided with a refractory lining interiorly thereof, a plurality of connecting blocks located within said shell and extending inwardly beyond the inner surface of said lining, a plurality of helical flights adjacent the inner surface of said inner lining, each of said flights being attached at its ends to at least two connecting blocks which are axially and circumferentially spaced from each other, and a plurality of chains within said kiln, each of said chains being fastened at its end to two flights at points circumferentially spaced from each other.

6. A rotary kiln as defined in claim 5 wherein said chains are mounted in planes normal to the axis of rotation of said kiln.

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