J. S. FASTING.

ROTARY KILN.

APPLICATION FILED JULY 18, 1918.

1,313,281. Patented Aug. 19, 1919.

Fig. 1.

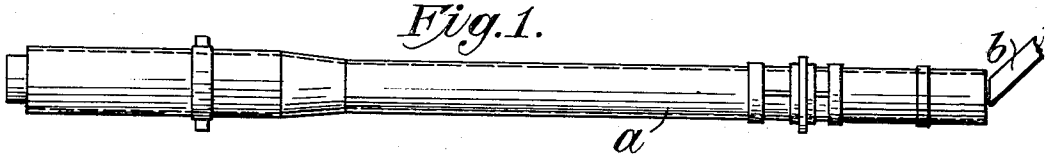


Fig. 2.

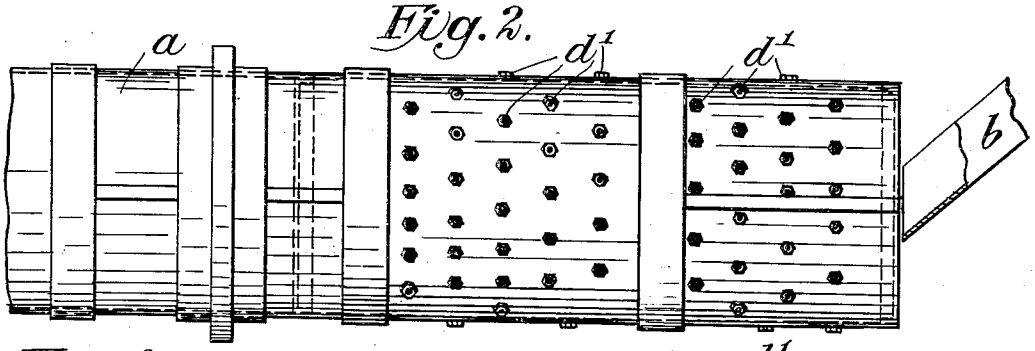


Fig. 6.

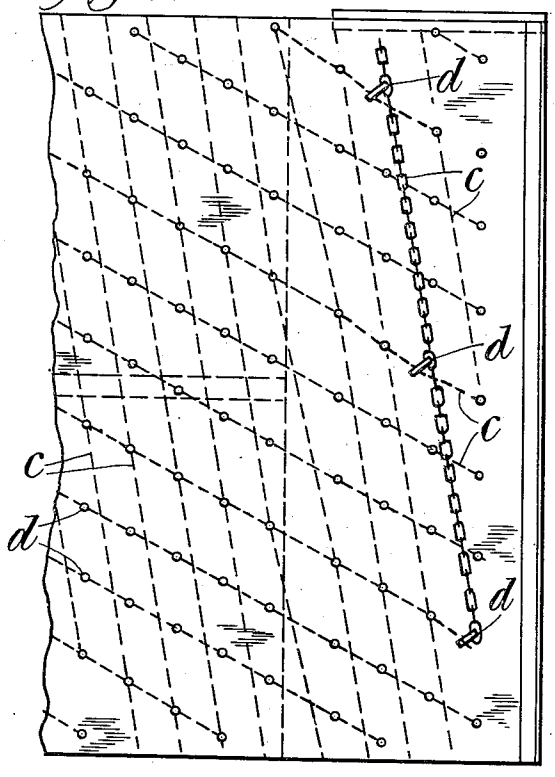


Fig. 3.

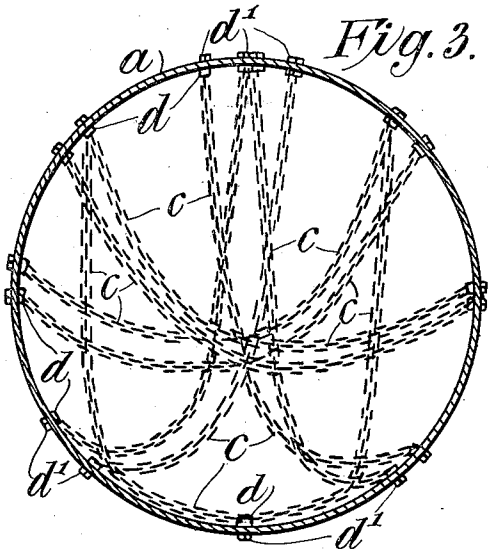


Fig. 4.

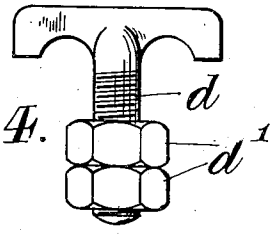
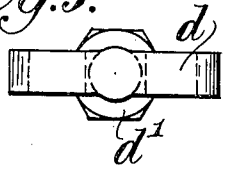


Fig. 5.



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ROTARY KILN.

1,313,281. Specification of Letters Patent. Patented Aug. 19, 1919.

Application filed July 18, 1918. Serial No. 245,522.

To all whom it may concern:

Be it known that I, JOHAN S. FASTING, a subject of the King of Denmark, residing in Frederiksberg, near Copenhagen, Denmark, have invented certain new and useful Improvements in Rotary Kilns, of which the following is a specification, reference being had to the accompanying drawing, forming a part hereof.

This invention has for its object to increase the efficiency of rotary kilns in which the material to be burned, such as the raw materials of Portland cement, is introduced at the feeding end of the kiln in the form of slurry. In accordance with the invention the feeding end of the kiln is provided with a series of helically arranged chains which are secured to the inner wall of the kiln, with the inner end of each in advance, circumferentially and in the direction of rotation of the kiln, of the outer end and, as the kiln rotates, are alternately plunged into the slurry and lifted out of the same, whereby some of the slurry is taken up by the chains and is caused to traverse the cross sectional area of the kiln and the entire volume of the products of combustion and at the same time is caused to move inwardly in the kiln, that is, toward the discharge end. Thereby the surface of the slurry exposed for evaporation is greatly increased, the absorption of heat by the slurry is promoted, the unconsumed particles of fuel are caught and returned with the slurry to a point in the kiln where their combustion may be completed, and dust particles which would otherwise have to be caught in a dust chamber or would escape into the air, are caught by the slurry and are combined with it. The invention will be more fully described hereinafter with reference to the accompanying drawing in which it is illustrated, and in which—

Figure 1 is a view in elevation of the rotary kiln to which the invention may be applied.

Fig. 2 is a view in elevation of the inlet end of the kiln on a larger scale.

Fig. 3 is a detail view in cross section on a still larger scale looking toward the left in Fig. 2.

Figs. 4 and 5 are detail views of one of the bolts which may be used for securing the chains.

Fig. 6 is a diagrammatic view of a development of the inner wall of the kiln indicating the disposition of the cross chains.

As represented in Fig. 1, the kiln *a* may be of ordinary construction, being provided at its inlet end with a suitable supply chute *b* through which the slurry is fed to the kiln, and at its other end with a suitable combustion chamber. In such a kiln as this, which is rotated slowly, more or less of the slurry, adhering to the inner wall of the kiln, is carried upward with the wall of the kiln, in the direction of rotation, and is continuously falling or slipping back toward the lowest part of the kiln. The surface of the slurry which is thus exposed to the hot products of combustion is not, however, very great as compared with the surface which would be exposed by the slurry flowing through a stationary cylinder. It is the object of this invention to increase greatly the surface of slurry exposed to the hot products of combustion and therefore to permit the rapid heating of the slurry and the rapid driving off of the contained water, as well as to cause the dust and the particles of unconsumed fuel carried by the hot products of combustion to be caught by the wet slurry and returned toward the outlet end of the kiln and at the same time cause the slurry to move inward, that is, toward the discharge end of the kiln. In accordance with the present invention it has been found that the desired result can be most effectively attained by placing within the kiln a series of chains *c* which are helically arranged in the kiln. These chains are dipped into the wet slurry at every revolution and considerable slurry adheres to them and is carried upward and across the flowing stream of the hot products of combustion. Preferably the chains are slack, as represented, so that at any rate the greater part of the length of each chain, at each revolution, is dipped into the slurry in the lowest part of the kiln and is made to traverse the entire cross sectional area of the kiln. Many chains are used and whether they are arranged in a single helical series or grouped in different series, they constitute a series of lattices which compel the products of combustion to depart from a straight line of flow through the kiln and to be brought into contact with the wet slurry which clings to the chains, whereby not only is the slurry quickly deprived of its water,

but the unconsumed particles of fuel and of dust which are carried along by the products of combustion are caught and incorporated with the slurry, the dust particles remaining incorporated therewith, while the unconsumed particles of fuel are returned with the slurry to a point where their combustion is completed. If the chains are slack, as preferred, not only does the greater part of the length of each chain become coated with the wet slurry but, by reason of the continuous flexing of the chain, after it has become coated with the slurry, the slurry as it dries is broken away from the chain and falls into the wet slurry below. Again, if the chains are slack, as preferred, they will rest upon the inner wall of the kiln at its lowest part and will thereby prevent the incrustation of the slurry on the wall of the kiln.

The chains are connected to the inner wall of the kiln in any convenient manner. As shown in Figs. 5 and 6, a T-headed bolt *d* may be employed for the purpose, being adapted to engage the ends of two chain sections and to have the stem pass outwardly through the shell of the kiln to receive the nuts *d'*. In Fig. 3 two ends of each chain section are shown as connected to the drum about 120° apart, but it will be obvious that the distance apart of the two points at which the chain is connected to the drum and the length of the chain between two points will be determined by the conditions of operation.

If the chains were disposed in planes at right angles to the axis of the kiln they would hinder rather than promote the inward or forward movement of the slurry through the kiln. In order to promote the inward or forward movement of the slurry they must be arranged helically and with the inner end of each chain, that is, the end nearest the discharge end of the kiln, circumferentially and in the direction of rotation of the kiln in advance of the outer end.

I claim as my invention:

1. The combination with a rotary kiln for burning slurry, of cross chains secured to the interior of the kiln in planes oblique to the axis near the feeding end of the kiln and adapted, in the rotation of the kiln, to be dipped into the wet slurry, to become coated thereby, and to lift the slurry into the path of the hot products of combustion, each of such cross chains being helically placed with its inner end in advance, circumferentially and in the direction of rotation, of the outer end.

2. The combination with a rotary kiln for burning slurry, of slack cross chains secured to the interior of the kiln in planes oblique to the axis near the feeding end of the kiln and adapted, in the rotation of the kiln, to be dipped into the wet slurry, to become coated thereby, and to lift the slurry into the path of the hot products of combustion, each of such cross chains being helically placed with its inner end in advance, circumferentially and in the direction of rotation, of the outer end.

This specification signed this 24th day of May, A. D. 1918.

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Witnesses:

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