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P. O. KROTTNAURER.
ROTARY KILN.

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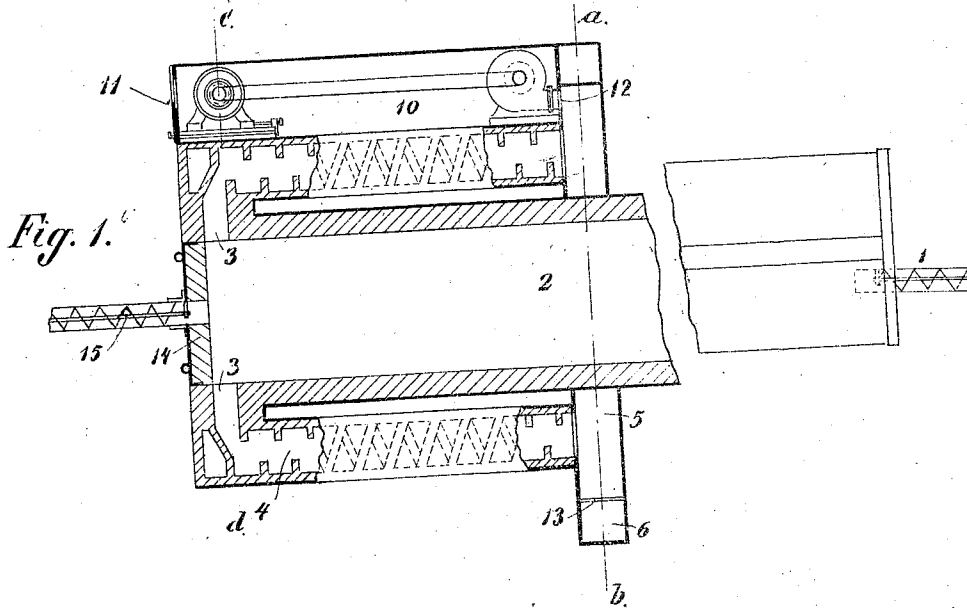


Fig. 2.

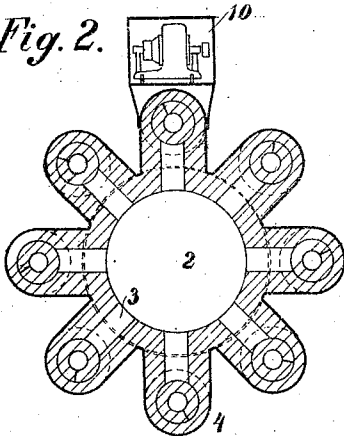
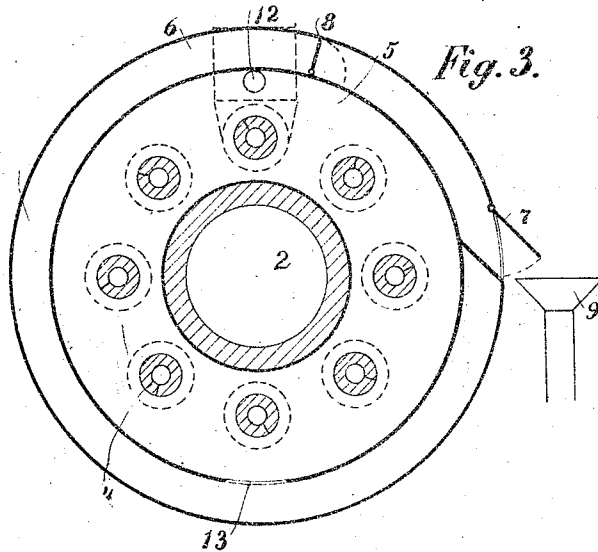


Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

PAUL O. KROTTNAURER, OF CHICAGO, ILLINOIS.

ROTARY KILN.

No. 828,555.

Specification of Letters Patent.

Patented Aug. 14, 1906.

Application filed December 23, 1904. Serial No. 238,145.

To all whom it may concern:

Be it known that I, PAUL O. KROTTNAURER, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Rotary Kilns, of which the following is a specification.

My invention relates to that class of rotary kilns used more particularly in the manufacture of cement, in which the present form of kiln is surrounded with a series of channels or ducts communicating with the kiln proper and partaking a spiral or screw form adapted by the rotary motion of the kiln to convey the clinker, the product of the kiln, rearward or in the direction of feed-supply and delivered at a higher elevation than the present form of kiln deliveries, and I also through said channels introduce cold air which, advancing over the moving clinker in the opposite direction, cools it, and as the air reaches the combustion portion of the kiln is superheated, readily unites with fuel-gases and intensifies the heat, increasing the efficiency of the fuel. To accomplish this, I close the head of the combustion end of the kiln and introduce a fuel-supply pipe through the head of the kiln and provide a means for delivering the fuel into the kiln.

My device is illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section of my improved rotary kiln. Fig. 2 is a cross-section on line C *d*, Fig. 1. Fig. 3 is a cross-section on line A *b*, Fig. 1.

In the construction of my improved kiln I use substantially the present form of kiln now well known in the industry and insert a removable head 14 in the combustion end. Through the head 14 a fuel-supply pipe 15 is introduced, in which is a conveyer to carry into the kiln the fuel-supply and limiting as much as possible the inflow of cold air with the fuel.

Surrounding the combustion end of the kiln and mounted thereon is a series of channels 4 of spiral form lying parallel with each other and with a line longitudinally through the center of the kiln. It will be noted that in the cross-section Fig. 2 I show eight of these channels 4. Whether there are more or less is a matter of discretion or of expediency. The channels 4 are provided with an inlet 3, communicating with the combustion end of the kiln 2, into which the clinker or product of the kiln is discharged. The rotary motion

of the kiln will move the clinker in a direction directly opposite to which it took in moving toward the combustion-chamber and delivers it into a drum 5, located at a point between the combustion end and feed end of the kiln 2, into which the channels 4 discharge. This drum has the kiln 2 as its axis and is provided with an inner and an outer chamber. The clinker is discharged into the inner chamber, and thence is let into the outer chamber 6 through the outlet 13 and from which it passes outward through the door 7 into the hopper 9. Mounted exterior of the channels 4 and moving with the drum is an air-chamber 10, provided with an inlet 11 and at the opposite end an outlet 12. The latter leads into the inner chamber of the drum 5. The movement of the cold air may be accelerated by a motor-driven fan in the air-chamber, the air forced into the inner chamber of the drum 5, and thence over the advancing clinker to the combustion-chamber through the channels 4. The passage of the cold air over the calcined material has the twofold effect of first cooling the calcined matter on its way to the drum 5 and of heating the passing air to a very high temperature when it reaches the combustion-chamber, where it at once unites with the fuel-gases and increases the efficiency of the fuel. In the drum's outer chamber 6 is an automatically-acting valve 8, which closes when the drum discharges to prevent the escape of the confined air.

It is evident that my invention can be readily applied to any rotary kiln in service, as well as in the construction of new kilns.

Having thus described my invention, what I claim is new, and desire to protect by Letters Patent, is—

1. A rotary kiln, a spirally-formed channel mounted on said kiln parallel with a line longitudinally through the center of said kiln; a means of communication from the combustion end of said kiln to said channel, said channel adapted by the rotary motion of said kiln to convey the product of said kiln from the combustion-chamber rearward and discharge it.

2. A rotary kiln, a series of spirally-formed channels mounted on said kiln and having a means of communication with the combustion-chamber of said kiln and adapted to move the product of said kiln toward the source of supply and discharge it.

3. A rotary kiln, a series of spirally-formed

channels mounted on the outer shell of said kiln, an inlet for each of said channels from the combustion end of said kiln, adapted to receive the products of said kiln and cool it
5 and convey it rearward toward the source of supply and discharge it.

4. A rotary kiln, a drum mounted on said kiln having said kiln for its axis, screw-formed channels extending from said drum to the
10 head of said kiln; a means of communication between said drum and the head of said kiln through said channels, said channels adapted to take the product from the head of said kiln and deliver it to said drum and a means of
15 discharge from said drum.

5. A rotary kiln, a series of spirally-formed channels surmounting said kiln parallel with its axis, a drum mounted on said kiln of which said kiln is its axis, communication between
20 said drum and the head of said kiln by means of said channels; a means for driving air from said drum and through said channel to the head of said kiln, and means for rotating said kiln.

25 6. A rotary kiln, a series of conveyers sur-

mounting said rotary kiln, inlets to said conveyers from the combustion-chamber of said kiln and outlets for the same, a means for introducing cold air into the discharge-orifices of said conveyers and adapted to deliver said
30 air at a high temperature into the combustion-chamber of said kiln substantially as specified.

7. A rotary kiln, a closed head for said kiln a series of channel conveyers surmounting
35 said kiln, a feed-opening for said channel conveyers from the head of said kiln, a discharge-outlet for said channel conveyers, a drum having said rotary kiln as its axis to serve as the terminal of said channel conveyers, and
40 a means for discharging from said drum, a means for introducing a cold-air supply into said drum and channel conveyers substantially as specified.

In testimony whereof I affix my signature 45 in presence of two witnesses.

PAUL O. KROTTNAURER.

Witnesses:

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