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E. T. REED

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LIME KILN

Filed Dec. 4, 1929

Fig. 1

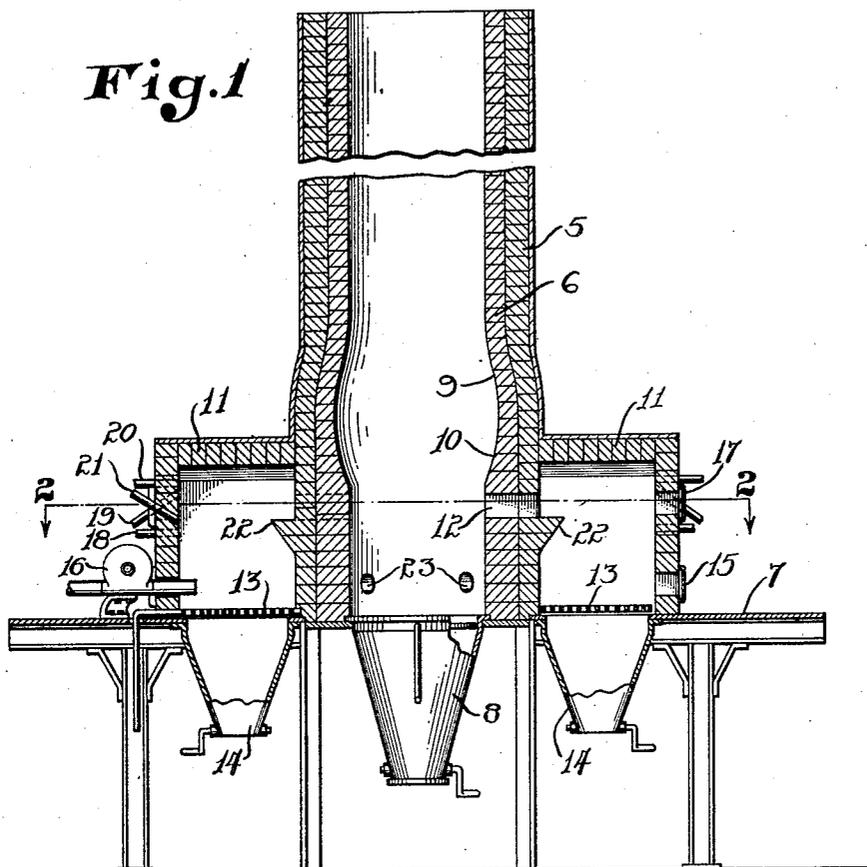


Fig. 2

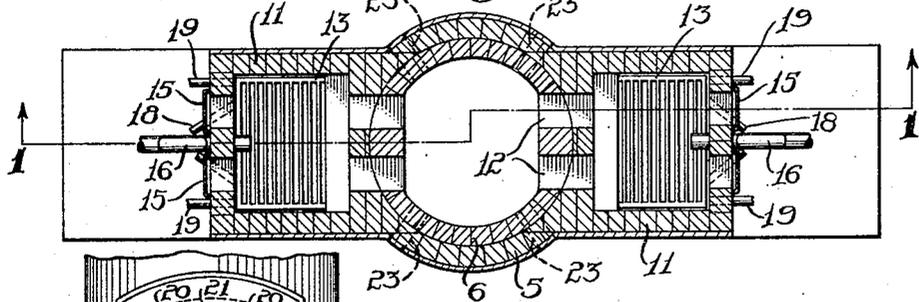
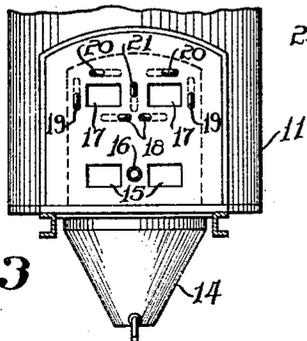


Fig. 3



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LIME KILN

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This invention relates to lime kilns, with special reference to the construction and arrangement of the fire chambers in so far as they affect the distribution of the fuel as it is burned and the manner in which its combustion and the burning of the lime are controlled.

Hitherto, in attempting to use soft coal for burning lime, unburned fuel in the form of coal dust or smoke has been carried into the stack so that it blackens the lime with the consequence that the product is of very inferior grade. It has also been necessary, on account of the intense heat in the fire chamber, to allow the fire to die down before the fire door is opened to poke down the lime.

It is the object of the present invention to provide a lime kiln in which soft coal may be advantageously used, and which not only produces a high grade of lime, but makes it possible to speed up the burning process and to conserve fuel.

The specific construction of the invention in its present embodiment, together with its mode of operation, will be more particularly described with reference to the accompanying drawings, in which,

Figure 1 is a central vertical section taken substantially on the line 1—1 of Figure 2.

Figure 2 is a horizontal section taken substantially on the line 2—2 of Figure 1.

Figure 3 is a front elevation of one of the fire chambers or furnaces.

In accordance with the invention, there is provided a stack 5 for receiving the limestone. This stack is lined with fire brick 6 and rests upon a base which is substantially on a level with the firing floor 7. An outlet 8 is provided in the base of the stack for discharging the lime. The interior of the stack bulges outwardly toward its lower end as shown at 9 to facilitate the downward movement of the limestone as the lime is withdrawn from the outlet 8. Below this bulge the interior surface of the stack is tapered inwardly as shown at 10 to provide a support against which the stone lodges while it is being burned.

Usually a row of stacks are used, each provided with a furnace or fire chamber 11 at

the front side and a similar chamber at the rear. Draft openings or fire eyes 12 are provided leading into the stack from the fire chambers 11 near the top thereof. Each fire chamber 11 is provided with a grate 13 at the bottom thereof, substantially at the level of the floor 7. Beneath this grate is a chute 14 for discharging the ashes. At the front side of each fire chamber 11, a few inches above the grate 13, fire doors 15 are provided, through which access may be had to the fire on the grate 13. The coal, which should be of small size, not larger than hickory nuts, may be fed into the fire chamber by any suitable means and steam and air may be supplied by means of a blower, as indicated at 16.

Doors 17 are provided about five feet above the level of the floor 7 and substantially on a level with the fire eyes 12, for poking down the lime. By locating the grate 13 at or near the floor level, ample space is provided in the fire chamber for completing the combustion of the gases and smoke or dust which rises from the burning fuel. Provision is also made for supplying steam and air for completing this combustion, and for effecting a circulation of the burning gases in such a manner that the intensely hot flame will be carried away from the doors 17 but will not pass into the stack until the combustion is practically completed. Thus a comparatively even fire and uniform heat may be maintained and it is not necessary to allow the fire to die down before opening the doors 17. For effecting this result, a number of pipes 85 for supplying steam and air to the fire chamber are arranged about the doors 17. In the present embodiment, these include pipes 18 entering the fire chamber below the doors 17 and inclined toward the side walls of the chamber, pipes 19 entering the chamber between the doors 17 and the side walls and inclined upwardly, pipes 20 entering the fire chamber above the doors 17 and inclined toward the center line of the chamber, and a pipe 21 entering the fire chamber between the doors 17 and inclined downwardly. These pipes induce a circulation of the burning gases about the doors 17 and toward the fire eyes 12, preventing the heat from being

discharged into the face of the operator when the doors 17 are opened. A shoulder 22 is formed below the eyes 12 to prevent a direct draft from the fire into the eyes 12, so that there is ample opportunity for the combustion to be completed before the gases enter the stack. The inclined surface of this shoulder becomes intensely hot and aids combustion, while its flat upper surface prevents the stone from dropping into the fire, so that the vertical dimensions of the eyes may be greater than has heretofore been practical. Since the fire eyes are about five feet above the base of the stack it is desirable also to provide poke holes at the sides of the fire chambers near the bottom of the stack, as shown at 23, through which to poke the lime into the outlet 8.

By the arrangement above described, the ordinary grades of bituminous coal may be used in burning the lime, since ample provision is made for burning the smoke or dust before it can enter the stack, and blacken the lime. This has been impossible with the kilns heretofore used. Also by arranging the draft and the steam jets in the manner described, it is not necessary to allow the fire to die down before poking the lime. Consequently, a steady fire is maintained at all times. It is possible to burn the lime with a lighter fire than has generally been used heretofore and this results in a product which is burned more evenly and the process requires less fuel. As a result of the comparatively light fire, the brick work requires less repair work and the operation of the kiln is simple.

While I have shown and described in considerable detail one embodiment of the invention, it will be understood that the same may be considerably modified without departing materially from the scope of the invention as claimed.

What I claim is:

1. In a lime kiln, the combination of a stack, a fire chamber adjacent the base of the stack and provided with fire eyes leading from the upper part thereof into the stack, doors leading into the fire chamber in front of the fire eyes for poking the lime, a shoulder beneath the fire eyes and extending toward the front of the fire chamber to deflect the flow of gases away from the fire eyes and means for directing an oxidizing agent into contact with the gases thus deflected and in a direction to blow said gases away from said doors and toward the fire eyes.

2. In a lime kiln, the combination of a stack, a fire chamber adjacent the base of the stack and provided with fire eyes leading from the upper part thereof into the stack, doors leading into the fire chamber in front of the fire eyes for poking the lime, and pipes arranged about said doors and leading

into the fire chamber to supply an oxidizing agent for gases rising from the fire bed, said pipes being inclined tangentially to set up a spiral circulation of said gases away from the doors.

3. In a lime kiln, the combination of a stack, a fire chamber adjacent the base of the stack and provided with fire eyes leading from the upper part thereof into the stack, doors leading into the fire chamber in front of the fire eyes for poking the lime, a shoulder beneath the fire eyes and extending toward the center of the fire chamber to deflect the flow of gases from the fire bed away from the fire eyes, and pipes arranged about said doors and leading into the fire chamber to supply an oxidizing agent for said gases, said pipes being inclined tangentially to set up a spiral circulation of said gases away from the doors.

In testimony whereof I have hereunto signed my name to this specification.

EMBRA T. REED.

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