

No. 688,345.

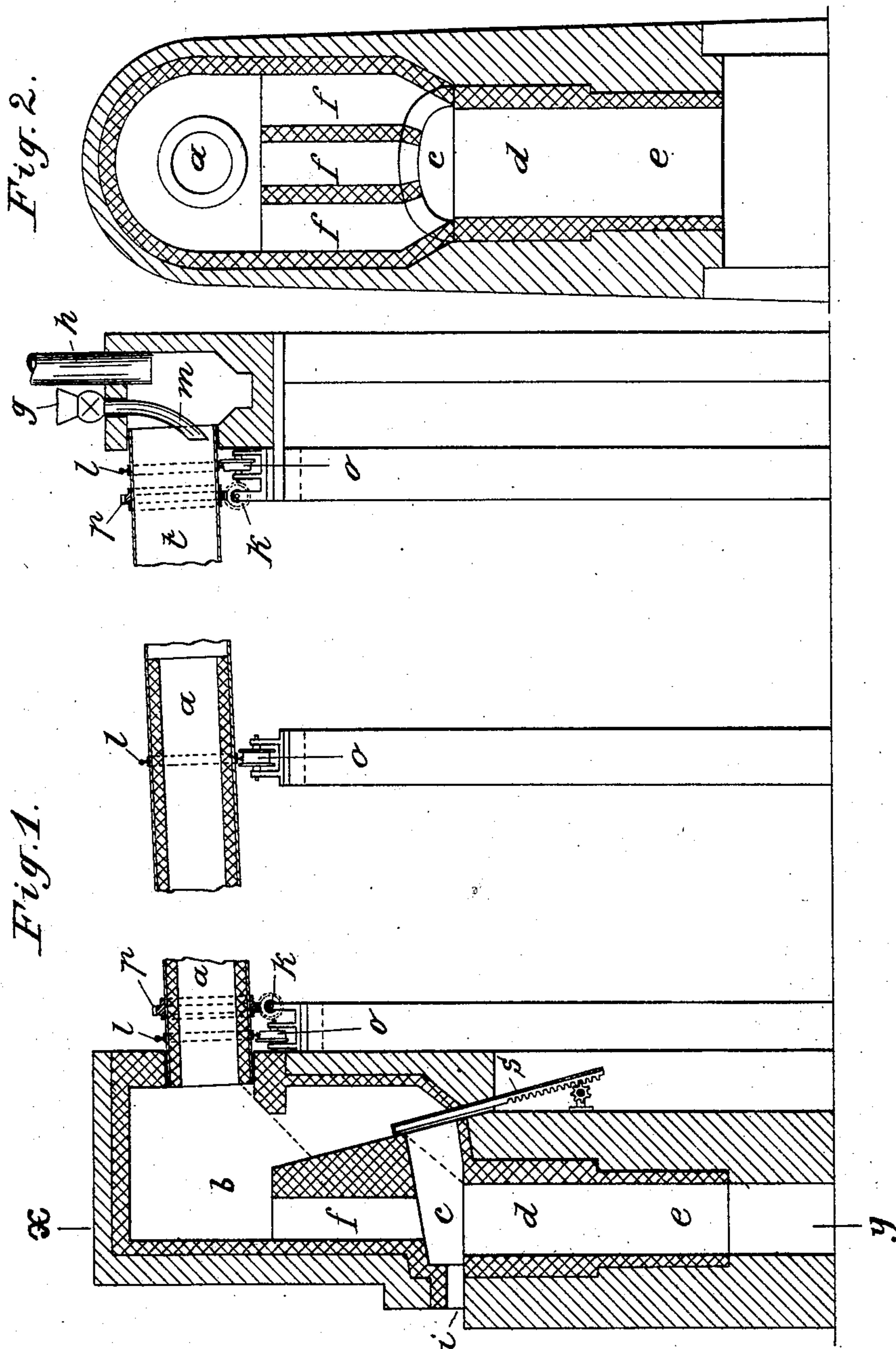
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H. SCHMIDT.

KILN FOR BURNING CEMENT, LIME, &c.

(Application filed Aug. 2, 1900.)

(No Model.)



Witnesses:
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UNITED STATES PATENT OFFICE.

HERMANN SCHMIDT, OF BONN, GERMANY.

KILN FOR BURNING CEMENT, LIME, &c.

SPECIFICATION forming part of Letters Patent No. 688,345, dated December 10, 1901.

Application filed August 2, 1900. Serial No. 25,615. (No model.)

To all whom it may concern:

Be it known that I, HERMANN SCHMIDT, a citizen of Germany, and a resident of Bonn-on-the-Rhine, Germany, have invented certain new and useful Improvements in Kilns for Burning Cement, Lime, and the Like Substances, of which the following is a specification.

Modern cement-kilns are constructed with the object of avoiding the lengthy drying process to which the slurry-bricks must be subjected before they are charged into the kiln, and efforts are continually made to simplify the manufacture by means of kilns in which the slurry may be burned directly as it comes from the mills. The so-called "rotary" kilns realize this object to a certain degree in that they burn the slurry without a preliminary drying. Nevertheless the burned cement from these kilns leaves much to be desired in quality and physical properties. The raw material in such kilns is always in a rotatory and progressive movement and being tossed about never comes to rest. In consequence of this it is not uniformly and simultaneously sintered and opened up. On account of this continuous movement it is impossible to obtain an absolutely uniform well-burned product, as the fire-gases passing through the kiln do not come in contact with every particle. Thus it happens that, besides a small proportion of good cement clinker and a portion overburned, the bulk of the product from these kilns is underburned clinker—that is to say, clinker not burned through—because owing to the continuous movement of the mass only the surface of the material is sintered, leaving an insufficiently-sintered core. Such incompletely-burned cement is ill-fitted for use. In order that the mass may be systematically and uniformly sintered, a certain amount of rest and a constant even heating—such as obtained in stage, shaft, or ring kilns—are necessary.

By the present invention the processes of drying and burning are effected separately, whereby a well-burned cement clinker is obtained. The slurry is dried and heated while it is in motion, whereas the burning and cooling are carried out while the material is at rest. The furnace is also devised so that the

slurry may be charged into the kiln directly from the mills.

In the accompanying drawings, Figure 1 is a longitudinal vertical section of a kiln constructed in accordance with this invention, and Fig. 2 is a section on the line *xy* of Fig. 1.

The kiln consists of a cooling-chamber *e*, a burning-chamber *d*, flues *f*, and a side or receiving chamber *b* over the burning-chamber, in which the dried slurry collects before it is burned, being fed thereto through a rotary cylindrical heating-chamber *a*. Into the chamber *b* project laterally a number of flues *f*, that are arranged above and in alinement with the burning-chamber *d*, with which they communicate by means of an intervening tapering neck *c*. This neck merges at its wider upper end into the lower contracted end of a hopper formed at the lower end of chamber *b* by the inwardly-projecting slanting wall of flues *f*. Communication between the hopper and the neck *c* is controlled by a slide *s*. The upper ends of the flues *f* extend into chamber *b* above the level of the ground material within the same, so that the heating-gases are conveyed from the burning-chamber through the flues into the receiving-chamber and thence through the cylinder *a* to the stack.

The kiln is worked as follows: The ground material is mixed with water in the conveyer *g* and charged in lumps through the pipe *m* into the far end of the drying-cylinder *t*, where it is dried. It then passes to the part *a* of the cylinder, which is lined with fire-brick, and where a preliminary heating and burning of the material occurs. The cylinder being inclined downward toward the kiln and being in constant rotation, the material which it contains is kept moving toward the kiln. The cylinder is provided with rails *l*, which enable it to revolve on the rollers *o* when it is driven by the toothed gearing *k p*. This rotation may be always in the same direction; but it is advantageous that it should alternate in direction, which may be effected by any known form of mangle motion. From the preheating-cylinder the mass falls into the chamber *b*, where it remains until the material already in the burning-chamber *d* is completely burned and has sunk into the cham-

ber *e*, owing to the withdrawal of clinker from the latter. The slide *s* is then opened, and the contents of the chamber *b* are discharged into the burning-chamber *d*. The capacity
5 of chamber *b* is such that it is filled during the time occupied in the thorough burning of the clinker in the burning-chamber. The products of combustion and hot gases from the burning-chamber *d* pass up the flues *f*, and
10 with or without the aid of a blast, through the receiving-chamber *b* and the heating-cylinder *a*, to the place where the slurry is charged, whence they escape through the flue *h* to the chimney. The hot gases thus come in con-
15 tact with the material to be burned and dry and heat it before it arrives at the chamber *b*, whence it is discharged, as already stated, into the burning-chamber *d*. The opening *i*, through which the fuel is introduced, admits
20 a rake for facilitating this discharge. The kiln may be provided with an artificial draft. The slide *s* is not essential; but even when it is omitted the gases pass through the flues *f*.
It is specially to be noted that the slurry
25 is charged into the drying-cylinder without any binding material, thus making it up into

briquets, and previous drying is not necessary.

When the kiln is to be used for burning material already in the form of dry lumps, 30 such as limestone, these may be charged directly into the chamber *b*.

What I claim, and desire to secure by Letters Patent of the United States, is—

A kiln composed of a receiving-chamber, 35 flues lying against the side of said chamber, within the lower portion thereof, to form a hopper, a burning-chamber communicating with said hopper, a fuel-opening intermediate the burning-chamber and the flues, a cooling- 40 chamber below the burning-chamber, and a rotatable cylinder entering the upper portion of the receiving-chamber above the hopper, substantially as specified.

In witness whereof I have hereunto signed 45 my name in the presence of two subscribing witnesses.

HERMANN SCHMIDT.

Witnesses:

L. BARNES,
KARL SCHMITT.