

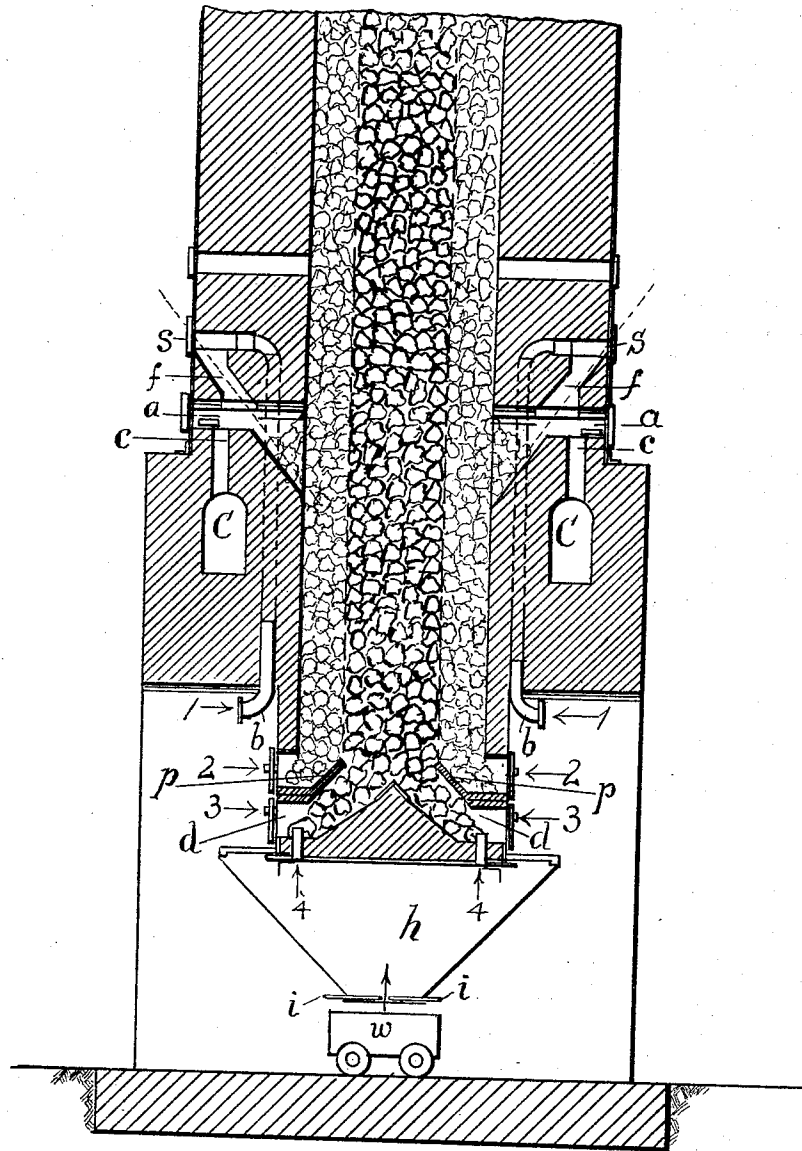
E. SCHMATOLLA.

SHAFT KILN.

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1,304,514.

Patented May 20, 1919.



WITNESSES:

F. L. Hough
J. Carlin

Ernst Schmatolla
INVENTOR.

UNITED STATES PATENT OFFICE.

ERNST SCHMATOLLA, OF NEW YORK, N. Y.

SHAFT-KILN.

1,304,514.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ERNST SCHMATOLLA, citizen of Germany, and resident of 150 Nassau street, New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Shaft-Kilns, of which the following is a specification.

This invention relates to improvements in shaft kilns for burning lime, magnesite or other rock products, preferably with producer gas or other gaseous fuel, and the object of the improvement is to prevent the overburning of the product near the lining and gas inlets of the kiln and the underburning of the product near the center or the down-rolling of unburnt rock through the center of the shaft.

The effects of the improvements are a thoroughly but moderately and evenly burnt product, a better wear of the lining and a substantial saving in fuel, and these effects are attained by a new arrangement in the cooler and draw-pit.

The drawing shows a vertical section through the shaft-kiln which is equipped with the improvements forming the object of this invention.

The kiln may be in the horizontal cross-section of the shaft round, oval, square or rectangular, and a vertical section crossing the section shown in the drawing at a right angle, may look like the drawing.

The flues C may be connected to a gas producer or other source of gaseous fuel, and the gas is introduced into the kiln through short, vertical flues c. The gas inlets a, of which two are shown in the design, but more are arranged around the shaft of the kiln, are accessible from the out-side, have a bottom slanting toward the interior of the kiln and in the arch opposite and air inlets s, f, through which also a punch bar may be inserted for the purpose of cleaning the slanting bottom of the gas-inlets or punching sticking lime down. The flues f communicate with air pipes b the intakes of which are marked with arrows 1.

The lining of the shaft runs vertically down from the fire-arches to the draw openings and to the bottom of the shaft without projecting toward the center of the shaft, so that the burnt product can slide down smoothly at the lining of the shaft. Partitions p which project from a horizontal line near the center of the draw openings

toward the center of the shaft, and which form a partly sloping bottom, are arranged in the hole of the draw openings d. These partitions carry the product which is burnt near the wall, and when some of the burnt product is withdrawn from the slanting bottom p through the upper door-sections, the burnt product which is near the lining will follow. The product which is near the center of the shaft is drawn separately below the partition p and can be kept longer in the fire than the product which is near the fire-arches and lining and which, when heated longer than necessary, gets overburnt and fluxes the lining. By drawing the product near the lining more frequently the overburning and spoiling of the lime and of the lining can be practically avoided; by burning the product in the center of the kiln for a longer time, drawing it less frequently or in smaller quantities below the partition p, the down-rolling of unburnt rock through the center can be avoided.

To make this more clear in the drawing, the interior column of the kiln contents is darker shaded than the lime or other material which is drawn down near the wall. It is obvious that the lime burnt near the center of the kiln will be of better quality.

Both, the upper and the lower part of the draw-openings are equipped with practically air-tight doors, having exactly controllable air-intake openings which are marked by arrows 2 for the upper door-sections, and 3 for the lower door-sections.

Under the bottom of the kiln-shaft is a hopper h arranged into which a certain quantity of the burnt product is drawn quickly, the hopper containing about one or two draws, serves as measure and also as means for preventing overdrawing. The hopper may have covers on top and sliding gates or drop-doors i at the bottom, and it may be connected with the kiln by controllable air-flues which are indicated in the design by arrows 4, and through which warm air may be admitted into the center of the kiln.

For many kinds of rock, which are easily overburnt, it is advantageous to build the portion of the shaft, which is below the fire-arches, shorter than shown in the drawing, and the additional, separate cooler h is then still more important, as it makes it possible to draw heated air to the center of the kiln, and as the heat of the cooling lime can be

almost completely utilized. Cold air admitted into the center of the kiln disturbs the burning process, but a limited quantity of highly heated air completes the combustion even of very dilute combustible gas. If, therefore, only a limited quantity of cold air, not sufficient for completing combustion, is drawn into the kiln through the intakes 1 and 2, and the balance of air which is necessary to complete combustion is admitted at high temperature through the intakes 4, intakes 3 being kept closed, a moderate temperature, but high enough for the burning process will prevail near the gas inlets and the lining of the burning chamber, while the combustion will be finished near the center of the kiln and the temperature there also will be raised to a degree which is sufficient for the burning process, but not sufficient for overburning.

If certain chemical actions of the gas upon the material which is to be burned, do not forbid it, it is the most economical method of burning, to concentrate the combustion process near the center of the shaft in such a case most of the product will be drawn through the lower sections of the draw openings, but frequently drawing through the upper sections will always be advantageous and will save the lining from being fluxed.

Near the walls the burnt material should be moved about every hour, or even more frequently, in order to prevent sticking. The discharged product is kept for about one hour in the hopper *h* into which air may be admitted through the bottom, and the cooled lime or other product may be discharged through the opened gates *i* into a wagon *w*, on a belt-conveyer or the like.

It is evident that changes can be made in the design and in the details of carrying out the invention which is covered by the following claims.

45 Claims:

1. In a shaft-kiln the combination of a short cooling shaft or draw-pit, with vertical walls from the fire-arches to the draw openings, with partitions projecting from a horizontal line near the center of the draw-openings of the shaft beyond the lining of the burning-shaft toward the center of the shaft, leaving a wide opening in the center.

2. In a shaft-kiln the combination of a short cooling shaft or draw-pit, with vertical walls from the fire-arches to the draw-openings, with a partition dividing the draw-openings in upper and lower sections

and forming a bottom the inner portion of which is slanting, and which extends from the draw openings toward the center of the shaft, leaving a wide opening in the center for discharging the material, which is burned in the center of the kiln, separately.

3. In a shaft-kiln the combination of a short cooling shaft or draw-pit, with vertical walls from the fire-arches to the draw openings, with partitions dividing the draw openings into upper and lower sections and extending beyond the lining of the burning shaft for such a distance that the material burned near the lining of the kiln may be drawn separately through the upper discharging openings.

4. In a shaft-kiln the combination of a short cooling shaft with partitions dividing the draw-openings into upper and lower sections and extending toward the shaft of the kiln, and means for admitting the air to the upper and lower sections of the draw-openings separately.

5. In a shaft-kiln the combination of a short cooling shaft with partitions projecting toward the center and dividing the draw-openings into upper and lower sections, and a closed cooling hopper, arranged under the bottom of the kiln.

6. In a shaft-kiln the combination of a short cooling shaft with partitions projecting toward the center and dividing the draw-openings into upper and lower sections, and a closed cooling hopper arranged under the bottom of the kiln and connected by air-flues with the kiln.

7. In a shaft-kiln the combination of a short cooling shaft with partitions projecting toward the center and dividing the draw-openings into upper and lower sections, and a closed cooling hopper arranged under the bottom of the kiln and connected with the lower sections of the draw-openings by air-flues.

8. In a shaft-kiln the combination of a short cooling shaft with partitions projecting toward the center and dividing the draw-openings into upper and lower sections, and a closed cooling hopper arranged under the bottom of the kiln, having an opening with gate at the bottom for discharging the product and admitting air.

Signed at Chicago in the State of Illinois this 11th day of July A. D. 1914.

ERNST SCHMATOLLA.

Witnesses:

F. L. HAIGHT,

I. CASE.