April 26, 1927. 1,625,853

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CEMENT AND LIME BURNING

Filed March 4, 1926

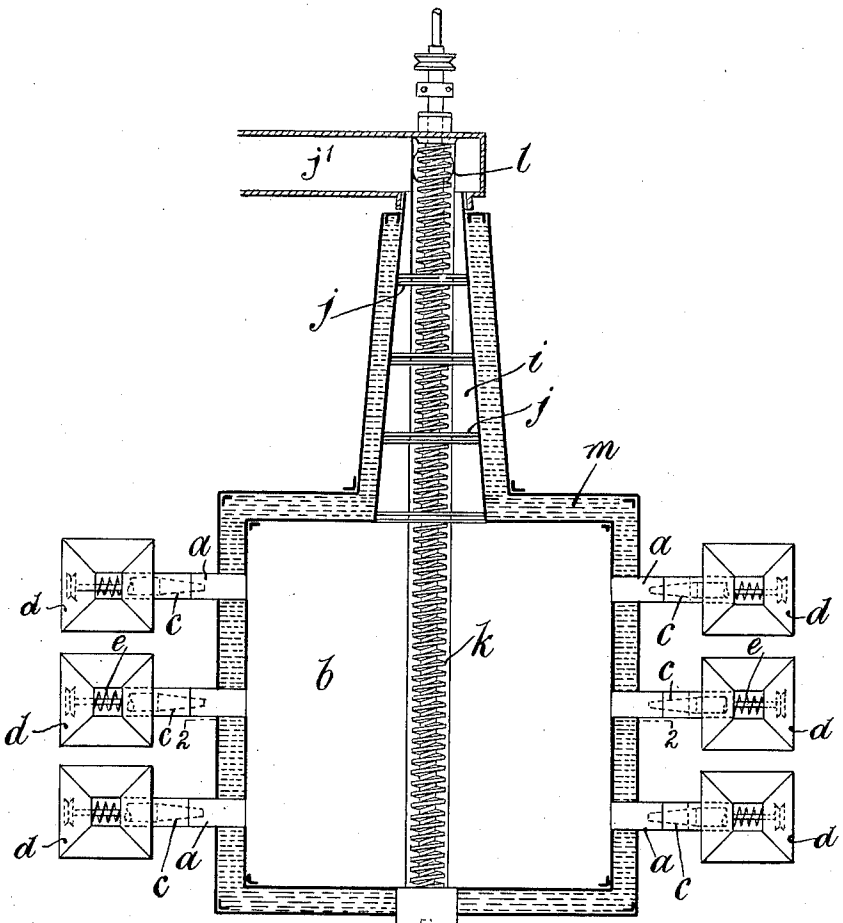


Fig. 1.

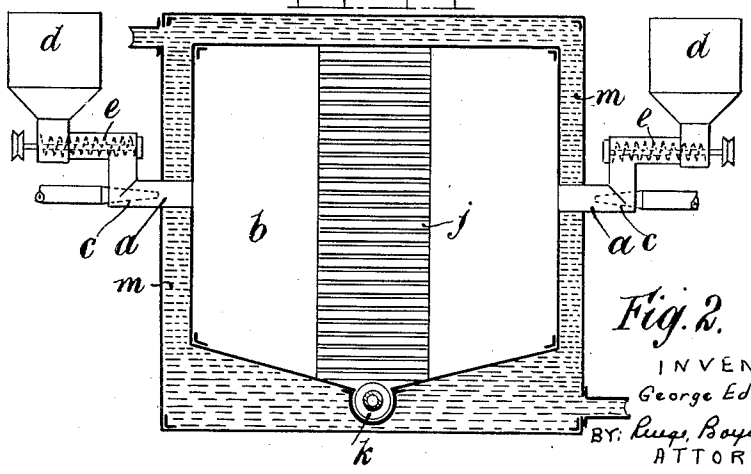


Fig. 2.

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Patented Apr. 26, 1927. 1,625,853

UNITED STATES PATENT OFFICE.

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CEMENT AND LIME BURNING.

Application filed March 4, 1926, Serial No. 92,271, and in Canada March 5, 1926.

This invention relates to cement burning and is also applicable to lime burning.

Various proposals have already been made for avoiding the use of expensive rotary kilns for cement burning, by blowing the powdered Portland cement-forming mixture mixed with a powdered fuel into a chamber wherein the powdered fuel blast burns as a flaming jet maintaining a vitrifying temperature. It has also been proposed to insufflate sufficient lime with a blast of powdered coal (mixed or not with the coal) into a kiln in which a cement forming mixture is being calcined by the flaming coal blast, for the purpose of providing additional lime to combine with the calcareous ash from the coal to form cement similar to and thus not contaminating the cement which is being burnt in the kiln.

Now if cement-forming material is blown into a vitrifying chamber mixed with a powdered fuel, the particles of cement-forming ingredients are separated by fuel particles, whereas for promoting the combination of the ingredients mutual contact thereof should be intimate. Also, if as has been proposed, the cement-forming material is blown concentrically with a surrounding blast flame, the exposure of the cement-forming material to the flame is incomplete.

Hence, according to the invention, a mixture of Portland cement-forming materials in dry finely powdered form, blown as a jet in a combustion chamber into a region wherein a vitrifying or calcining temperature is maintained by a flaming jet of combustible separate from the jet of Portland cement-forming mixture, is caused to encounter the flaming jet.

The flaming jet which the powdered cement-forming material to be vitrified, blown by a jet of compressed air from a nozzle into the chamber, encounters, may be a flaming blast of combustible gas, oil or even powdered solid combustible conveyed by a jet of compressed air from another nozzle.

The vitrifying temperature is as usual about 1500–1600° C.

The above described method is also applicable to lime burning, chalk or limestone vastly in excess of the ash-content, if any, of the fuel, being blown into the high temperature region instead of cement-forming material.

A plant for carrying out the invention is diagrammatically illustrated on the accompanying drawing, in which:—

Fig. 1 is a sectional plan, and

Fig. 2 is a transverse section on the line 2—2 of Fig. 1.

a are burner nozzles through which flaming blasts of powdered solid fuel, for instance coal dust, are blown into a chamber *b* by jets of compressed air issuing from nozzles *c*. The powdered fuel is fed to each burner *a* from a hopper *d* by a screw conveyor *e*.

The burners *a* are arranged at opposite sides of the chamber *b*, the burners on the one side being opposite those on the other side so that their blast flames mutually encounter.

Similarly at one end of the chamber *b*, a jet of powdered cement-forming material, is blown into the chamber *b* from a nozzle *f* by an air jet from a nozzle *g*, the powdered material being fed from a hopper *h*.

The jet of cement-forming material projected from the nozzle *f* transversely encounters and penetrates into the flaming blasts of fuel, from the burner nozzle *a*, and, the temperature of the flames being appropriately adjusted, is vitrified therein.

When the plant is used for burning lime, obviously limestone or chalk is substituted for powdered cement-forming material in the hopper *h*, and the blast flames from the nobble *a* are adjusted to give a flame of a suitable temperature for reducing the limestone or chalk to lime.

Part of the cloud of cement or lime, as the case may be, settles in the combustion chamber *b*, but some tends to be carried by the products of combustion out of the chamber. To give the powdered material opportunity to settle and to promote such settlement, a lateral flue *i* is branched off from the chamber *b* opposite the nozzle *f*. This flue *i* is divided by baffles *j* at intervals into a series of chambers in which the powdered material is encouraged to settle by the checks imposed by the baffles to the flow of the combustion gases and also by reason of the extended path thereby provided for such gases.

The settling flue *i* conveniently progressively converges transversely in order to maintain the rate of flow of the flue gases despite the progressive deposit of material and the reduction of volume due to cooling. The settling chamber may however be other-

wise arranged to provide by the reduction of volume of the gases or positively by an enlargement of the section of the flue encouragement to settling of the material by a reduction in the velocity of flow of the gases.

The material which settles on the floor of the subdivided flue *i* and on the floor of the combustion chamber *b* adjacent to the inlet of this flue, is removed by a screw conveyor *k*, and delivered at an outlet *l* in the floor at the end of the flue *i*.

The spindle of the screw conveyor *k* is hollow and traversed by cooling water.

From the flue *i* the combustion gases pass to an uptake or other outlet by a lateral flue j^1.

The walls, floor and roof of the chamber *b* and of the flue *i* are hollow and are traversed by water, to cool the deposited material. The water jacket *m* thus constituted acts as a boiler for the recovery and utilization of heat. The baffles *j* may likewise be hollow and traversed by water for the cooling purposes. The heat thus abstracted from the material may be utilized for heating and to supply hot air to the nozzles, for pre-drying material to be treated and for supplying steam or hot water for other purposes.

When solid combustibles are employed they are so selected that the ash-content is such as not materialy to alter the adjustment of the mixture.

Claims:

1. A method of burning calcareous material consisting in blowing in a plurality of successive planes opposing jets of combustible flaming at a vitrifying temperature, and blowing a separate jet of powdered calcareous material transversely, successively to encounter said flaming jets.

2. A method of burning calcareous material, consisting in blowing in a plurality of successive planes opposing jets of powdered solid combustible flaming at a vitrifying temperature, and blowing a separate jet of powdered calcareous material transversely successively to encounter said flaming jets.

3. A method of burning cement, consisting in blowing in a plurality of successive planes opposing jets of combustible flaming at a vitrifying temperature, and blowing a separate jet of a mixture of dry powdered Portland cement-forming materials transversely successively to encounter said flaming jets.

4. A method of burning cement, consisting in blowing in a plurality of successive planes opposing jets of powdered solid combustible flaming at a vitrifying temperature, and blowing a separate jet of a mixture of dry powdered Portland cement-forming materials transversely successively to encounter said flaming jets.

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

GEORGE EDWARD HEYL.