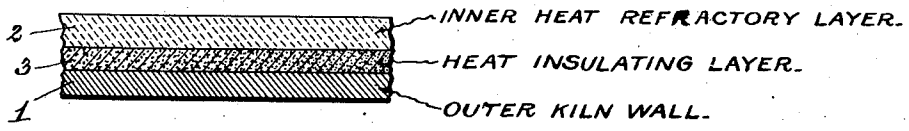
A. F. MEYERHOFER.

LINING FOR KILNS.

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1,378,710. Patented May 17, 1921.



Inventor

Albert Fritz Meyerhofer,

By

his Attorney

UNITED STATES PATENT OFFICE.

ALBERT FRITZ MEYERHOFER, OF MANNHEIM, GERMANY, ASSIGNOR TO DYNAMIDON G. M. B. H., OF MANNHEIM-WALDHOF, GERMANY, A FIRM.

LINING FOR KILNS.

1,378,710. Specification of Letters Patent. Patented May 17, 1921.

Application filed June 16, 1914, Serial No. 845,389. Renewed October 23, 1920. Serial No. 419,070.

To all whom it may concern:

Be it known that I, ALBERT FRITZ MEYERHOFER, citizen of the Republic of Switzerland, residing at 30 Friedrichsring, Mannheim, in the Grand Duchy of Baden, Empire of Germany, have invented certain new and useful Improvements in Linings for Kilns: and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to kiln or furnace linings, and in particular to the linings of rotary tubular, or cylindrical, kilns, such as are used especially in the manufacture of cements.

The object of the invention is to increase the thermic efficiency of such kilns, or furnaces, by providing them with linings in such a way as to materially reduce, or substantially eliminate, the radiation and conduction of heat therefrom. In the kilns, or furnaces, of this character heretofore employed it has been found that a considerable amount of heat is lost and goes to waste by the radiation which occurs, particularly at that portion of the furnace known as the "sintering zone." To obviate this loss of heat, it has been proposed heretofore to provide the fire-brick lining of the kiln at the sintering zone with a backing layer of a second heat-refractory heat-insulating material. That arrangement of materials, however, did not result in any practical advantage for the reason that it facilitates the attack on, and destruction of, the fire-refractory lining to a much greater extent than if such heat-insulating material were not employed in connection with the lining heretofore used. As is known, in the operation of such kilns as heretofore constructed the chemical action of the clinkers on the fire-refractory lining in the zone of highest temperature leads to the formation of a flux, which, however, solidifies at a certain depth of the lining in consequence of the lower temperature there prevailing, due to heat radiation and conduction, and thus forms a protecting layer against further attacks. This automatic protective action is, however, absent when the usual kiln lining is backed with a heat-insulating material as above proposed. In this case the lining is heated to the same high temperature to its entire depth, and hence the flux formed by the action of the clinkers is not solidified at any depth, and the corrosive and destructive action of the clinker on the lining continues throughout the entire thickness of the same.

I have found that these objectionable results, due to the introduction of a heat-insulating backing at the sintering zone, may be avoided by lining the kiln with refractory bricks made from a mixture of corundum and a binder such as clay, and containing a high percentage (over 60 per cent.) of alumina, (aluminium oxid Al_2O_3). Such a material is prepared, or example, according to U. S. Patent No. 100673, that is to say, by mixing corundum, either the natural mineral or the artificial material obtained by previously fusing alumina, in suitable granular form, with a binder of clay to form a plastic mass, the lining bricks, or blocks, being then formed and burnt in the usual or any suitable way. Lining bricks made from such material exhibit the surprising property of not being attacked by the clinkers at the high temperatures prevailing in the rotary cement kilns, or furnaces, even when they are backed with heat-insulating layer for preventing the outward radiation of heat as above described. This newly discovered property of fire-refractory linings made of such material was not at all to be expected from the existing prior knowledge in this art, and it furnishes a very convenient means of providing kilns of this character with a heat-insulating means, while eliminating the disadvantages which heretofore resulted therefrom.

In carrying out my invention I arrange between the lining composed of bricks made from a mixture of corundum and clay and the walls of the kiln, a heat-insulating layer of suitable material, such as asbestos, porous stones, or the like, in such thickness that when the kiln is in operation the outer surface of the kiln is, at the highest, only as warm as the human hand.

To give an example of what I consider the best manner of carrying out my invention, I would state that a very effective and serviceable kiln or furnace lining, made under my said invention, is made of material comprising four parts of previously fused Al_2O_3 (corundum) and one part of a binder of clay or aluminiferous material, and is of a thickness of about 12 centimeters, said lining being combined with a backing

layer having a thickness of 8 centimeters, and made from porous insulating stone, such, for example, as is employed for blast-heaters or cowpers. As is known, such porous Cowper bricks or stones are prepared from a mixture of clay with a comminuted combustible substance, such as sawdust, and then fired in a kiln, under which treatment the combustible substance is consumed, leaving the burnt brick in a porous condition.

As a modification there may be employed a layer of 15 centimeters in thickness of the said fused material comprising four parts of corundum combined with one part of a binder of clay in connection with a heat-insulating backing layer of a thickness of 5 centimeters and composed of asbestos.

Instead of the clay or aluminiferous binder employed as above indicated in the manufacture of my new kiln lining, other binders may be employed such as lime or a hydraulic binder containing considerable quantities of lime, an important point being, that the lining material contains a high percentage of previously fused alumina.

It will be noted from the above examples that the two layers combined attain only the thickness of the kiln linings now in use, and hence, under this invention, the capacity of the interior of the kiln is not reduced, notwithstanding the additional layer employed.

Wherever the term "corundum" is used in the following claims it is hereby designed to cover both the natural mineral and the artificial material obtained by previously fusing aluminum oxid.

In the accompanying drawing I have represented a sectional view of a part of a kiln wall 1 furnished with a heat refractory layer 2 and heat insulating layer 3 interposed between the two.

What I claim, and desire to secure by Letters Patent, is:—

1. A lining for the purposes set forth, which consists of an inner layer containing a high percentage of corundum, combined with an insultaing outer layer.

2. A lining for the purposes set forth, which consists of an inner layer of a material formed from corundum combined with a binder, in combination with an outer heat-insulating layer.

3. A lining for the purposes set forth, which consists of an inner layer of a material formed from corundum combined with clay, in combination with an outer heat-insulating layer.

4. A lining for the purposes set forth, which consists of an inner layer containing a high percentage of the artificial substance consisting of previously fused alumina, combined with an insulating outer layer.

5. A lining for the purposes set forth, which consists of an inner layer of a material formed from the artificial substance consisting of previously fused alumina combined with a binder, in combination with an outer heat-insulating layer.

6. A lining for the purposes set forth, which consists of an inner layer of a material formed from the artificial substance consisting of previously fused alumina combined with clay, in combination with an outer heat-insulating layer.

7. In a kiln, an outer tubular wall, in combination with an inner heat-refractory layer containing a high percentage of corundum; and an insulating layer interposed between the outer wall and the inner layer.

8. In a kiln, an outer tubular wall, in combination with an inner heat-refractory lining layer of a material comprising corundum combined with a binder; and an insulating layer arranged between the outer wall and the inner layer.

9. In a kiln, an outer tubular wall, in combination with an inner heat-refractory lining layer of a material comprising corundum combined with clay; and an insulating layer arranged between the outer wall and the inner layer.

10. In a kiln, an outer tubular wall, in combination with an inner heat-refractory layer containing a high percentage of the artificial substance consisting of previously fused alumina; and an insulating layer interposed between the outer wall and the inner layer.

11. In a kiln, an outer tubular wall, in combination with an inner heat-refractory lining layer of a material comprising the artificial substance consisting of previously fused alumina combined with a binder; and an insulating layer arranged between the outer wall and the inner layer.

12. In a kiln, an outer tubular wall, in combination with an inner heat-refractory lining layer of a material comprising the artificial substance consisting of previously fused alumina combined with clay; and an insulating layer arranged between the outer wall and the inner layer.

13. A lining for the purposes set forth which consists of an inner layer containing a high percentage of corundum combined with an insulating layer of porous brick.

14. A lining for the purposes set forth which consists of an inner layer containing a high percentage of corundum combined with an insulating layer of porous Cowper brick.

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

ALBERT FRITZ MEYERHOFER.

Witnesses:

FRITZ MOELLER,

HANS WINKLER.