

Nov. 15, 1938.

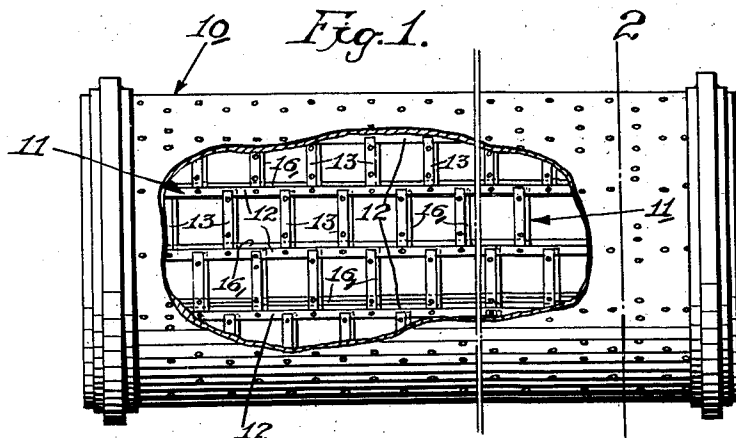
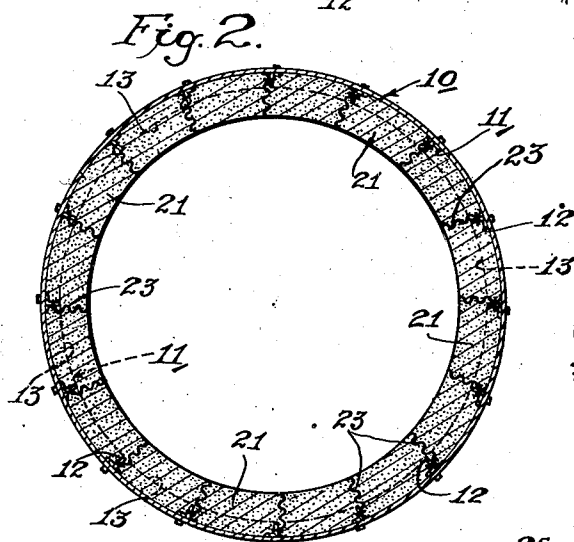
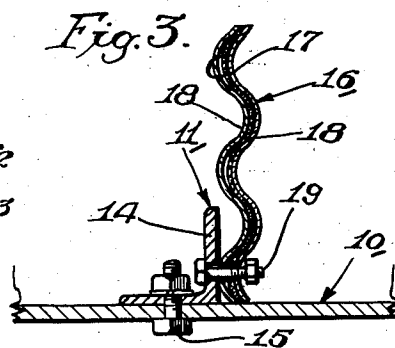
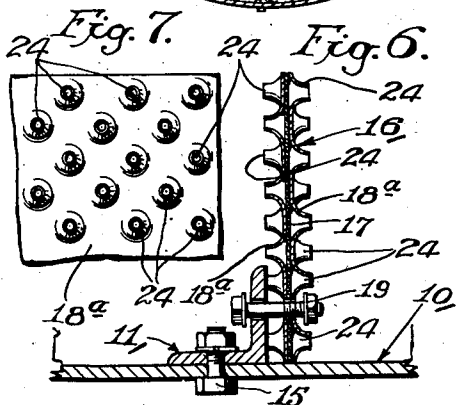
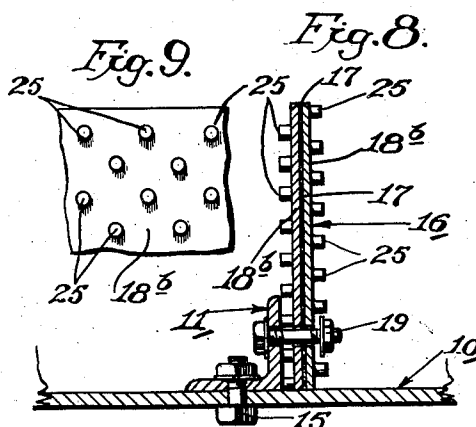
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2,137,184

METHOD OF LINING KILNS AND LINING PRODUCED THEREBY

Filed Feb. 28, 1933

2 Sheets-Sheet 1



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METHOD OF LINING KILNS AND LINING PRODUCED THEREBY

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2 Sheets-Sheet 2

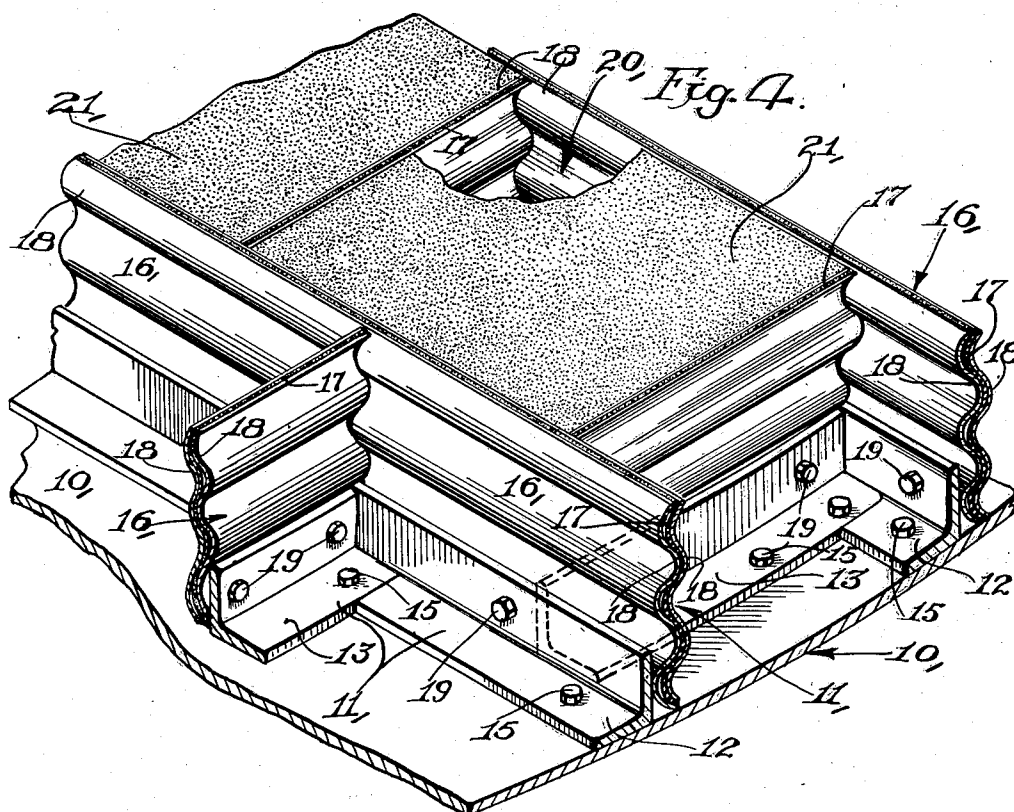
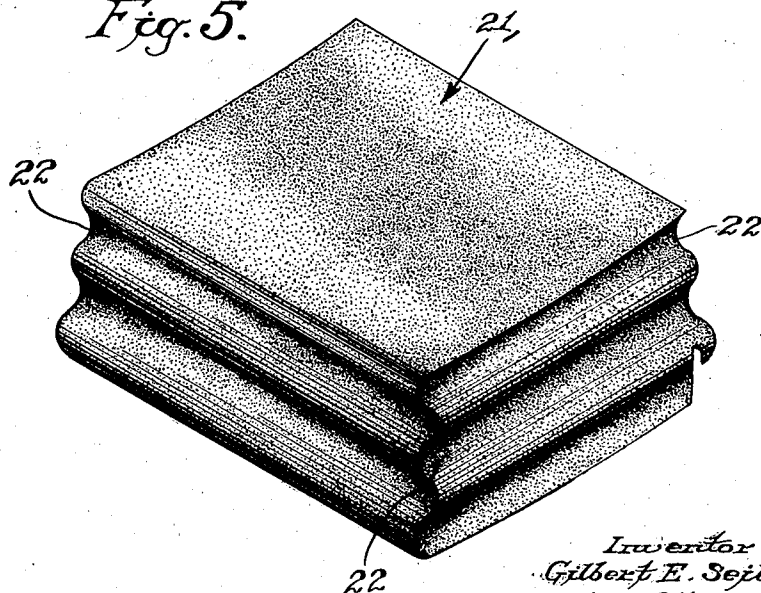


Fig. 5.



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UNITED STATES PATENT OFFICE

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METHOD OF LINING KILNS AND LINING
PRODUCED THEREBY

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14 Claims. (Cl. 263—33)

This invention relates to a method of lining kilns and the lining produced thereby, and has for an important object thereof elimination of the difficulties usually arising in the use of precast refractory blocks for this purpose.

Use of precast blocks in the lining of a kiln, while possibly permitting interlocking of the blocks at two sides thereof, precludes the possibility of an interlock extending entirely around the block. Furthermore, in using precast blocks it is often difficult to correctly proportion the blocks so that they will accurately fit the kiln wall, particularly in view of the fact that such walls are often wholly irregular or have irregularities at intervals which increase the difficulty of applying the lining. If the lining is too tightly installed, when the kiln is heated the bricks will chip, particularly at the inner edges thereof which have, by far, the greater expansion, and difficulties in installation attend formation of the lining from bricks which are sufficiently spaced to adequately compensate for this expansion. These difficulties may be, to some extent, eliminated by utilizing spacers which are burned away when the kiln is heated.

An important object of the present invention is the provision of a method of kiln lining which will provide a structure wherein, if desired, the bricks may interlock at all side faces thereof; in which adequate space is provided to compensate for expansion, and in which the bricks are securely connected to the kiln wall or outer frame.

These and other objects I attain by the construction shown in the accompanying drawings wherein, for the purpose of illustration, I have shown a preferred embodiment of my invention and wherein:

Fig. 1 is a fragmentary side elevation of a rotary kiln having a lining constructed in accordance with my invention, the wall being broken away to show the mounting employed;

Fig. 2 is a section on line 2—2 of Fig. 1;

Fig. 3 is a detailed sectional view through one form of separator means employed in my invention;

Fig. 4 is a fragmentary perspective view showing a partially formed kiln lining utilizing the form of separator illustrated in Fig. 3;

Fig. 5 is a perspective view of one of the bricks produced by use of the construction illustrated in Figs. 2, 3 and 4;

Fig. 6 is a sectional view showing a modified form of separator;

Fig. 7 is a fragmentary side elevation of one of the plates of Fig. 6;

Fig. 8 is a sectional view through a further form of separator; and

Fig. 9 is a fragmentary side elevation of one of the plates employed in Fig. 8.

Referring now more particularly to the drawings, the numeral 10 generally designates a kiln wall or frame; to this wall I secure a reticulated supporting framework 11 including longitudinal members 12 and transverse members 13 at present illustrated as comprising angle irons 14 bolted or otherwise secured to the wall 10 at 15. In this framework, as at present illustrated, the longitudinal members are shown as continuous, while the transverse members are in the form of short strips connecting these longitudinal members, although, of course, this order might readily be reversed. In any event, the shorter members are preferably staggered with relation to one another; that is to say, those of one row between continuous longitudinal or transverse members are staggered with relation to those between the next row.

Secured to the members 12 and 13 are separators 16, each of a depth corresponding to the thickness of the desired lining and each comprising a pair of plates and an intermediate combustible separator of thick paper, or the like, indicated at 17. The plates of the separator are preferably of the type illustrated in Fig. 3, wherein they are illustrated as corrugated sheets 18 and the separator is loosely connected to that portion of the support 11 with which it is associated, bolts 19 passing loosely through both the support and the separator being at present illustrated for this purpose.

It will be obvious, as more clearly shown in Fig. 4, that the separators combine to produce a series of pockets 20 at the inner face of the kiln wall and into these pockets the plastic refractory material is rammed, cast, or poured. In the form now under discussion, since the separators produce in the faces of the blocks 21 thus formed a series of grooves 22, the grooves of one block being complementary to those of the adjacent block, it follows that all of the blocks will have interlocking engagement on all side faces thereof. Furthermore, the spaces between adjacent blocks will, in the completed structure, be defined by curvilinear paths 23 even though the separators 16 are completely burned away, with the result that the flame can never reach the kiln wall proper. The combustible separators 17 are, of course, destroyed providing the necessary space for expansion and contraction.

Since the separators 16 are seldom completely

burned away, it is possible to employ variations of the specific structure just described. In Figures 6 and 7, I have shown the separator as comprising plates 18a from which bosses 24 have been struck out by punching; while in Figures 8 and 9 plates 18b are provided having integrally secured thereto projecting lugs 25. In each of these forms the projections for the faces of the plates engaging in the blocks securely hold them in position in the lining. In each instance the combustible separator 17 is provided to insure proper space for expansion.

While I have at present illustrated my invention as applied to a rotary kiln, it is obvious that the method can be readily applied to lining any type of kiln, and for this reason I do not wish to be understood as limiting myself to the illustrations employed except as hereinafter claimed.

I claim:

1. In a kiln, a kiln wall, a plurality of plates substantially perpendicularly related to the wall and having their outer ends secured to the wall, said plates defining a wall-covering series of pockets, and plastic refractory lining material filling said pockets and having its outer face flush with the outer edges of said plates, said plates consisting of material burned away at operating kiln temperatures whereby after a short period of operation an interiorly smooth surface of plastic material is provided.

2. In a kiln, a kiln wall, a plurality of plates substantially perpendicularly related to the wall and having their outer ends secured to the wall, said plates defining a wall-covering series of pockets, and plastic refractory lining material filling said pockets and having its outer face flush with the outer edges of said plates, said plates consisting of material burned away at operating kiln temperatures whereby after a short period of operation an interiorly smooth surface of plastic material is provided, said plates having irregular faces interlocking with the plastic material after hardening thereof.

3. In a kiln, a kiln wall, a plurality of plates substantially perpendicularly related to the wall and having their outer ends secured to the wall, said plates defining a wall-covering series of pockets, and plastic refractory lining material filling said pockets and having its outer face flush with the outer edges of said plates, said plates consisting of material burned away at operating kiln temperatures whereby after a short period of operation an interiorly smooth surface of plastic material is provided, said plates having corrugations substantially paralleling the kiln wall.

4. In a kiln, a kiln wall, a plurality of plates substantially perpendicularly related to the wall and having their outer ends secured to the wall, said plates defining a wall-covering series of pockets, and plastic refractory lining material

filling said pockets and having its outer face flush with the outer edges of said plates, said plates consisting of material burned away at operating kiln temperatures whereby after a short period of operation an interiorly smooth surface of plastic material is provided, said plates having bosses punched out from their faces and adapted to engage in the plastic material.

5. In a kiln, a kiln wall, a plurality of plates substantially perpendicularly related to the wall and having their outer ends secured to the wall, said plates defining a wall-covering series of pockets, and plastic refractory lining material filling said pockets and having its outer face flush with the outer edges of said plates, said plates consisting of material burned away at operating kiln temperatures whereby after a short period of operation an interiorly smooth surface of plastic material is provided, said plates having integrally formed studs at their pocket-defining faces adapted to engage in the plastic material.

6. A device as set forth in claim 1 wherein the plates are arranged in pairs and have separators disposed therebetween.

7. A device as set forth in claim 2 wherein the plates are arranged in pairs and have separators disposed therebetween.

8. A device as set forth in claim 3 wherein the plates are arranged in pairs and have separators disposed therebetween.

9. A device as set forth in claim 4 wherein the plates are arranged in pairs and have separators disposed therebetween.

10. A device as set forth in claim 5 wherein the plates are arranged in pairs and have separators disposed therebetween.

11. The method of lining kilns comprising defining at the face of the kiln wall a series of pockets in which adjacent faces of adjacent pockets are complementally deformed and filling said pockets with a plastic refractory material.

12. A lining for kiln walls comprising blocks of refractory material loosely anchored to said wall, said blocks having complementally deformed walls at all side faces thereof, the deformation being such as to prevent relative movement of the blocks in a direction perpendicular to the kiln wall.

13. The method of lining kilns comprising forming refractory blocks in position against the kiln wall in a mold at least partially destroyed upon firing of the kiln.

14. A lining for kiln walls comprising individual units having outer faces conforming exactly to the kiln wall and said faces, all of which have interlocking engagement with the opposed faces of adjacent units in a direction perpendicular to the kiln wall and separators between adjacent units and conforming to the shaping of the walls thereof.

GILBERT E. SEIL.