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(54) **Kiln for the firing of tiles**

(57) The present invention refers to a kiln for the firing of tiles, of the type substantially composed of a longitudinal chamber of considerable size, inside of which the carts are introduced containing the products to be fired, where the firing action of the material is achieved by means of a series of burners, arranged inside mouths present on the two side walls and on the flat arch of the

firing chamber. These burners heat an air flow, in slight overpressure, which runs for the entire length of the kiln. Said kiln is characterised in that it has an air chamber (10) made outside the walls and the arch of the kiln, in which an air flow (K) runs in overpressure condition, the value of such pressure being equal to or greater than the pressure value of the air flow (F) which circulates inside the firing chamber (1) (fig. 2).

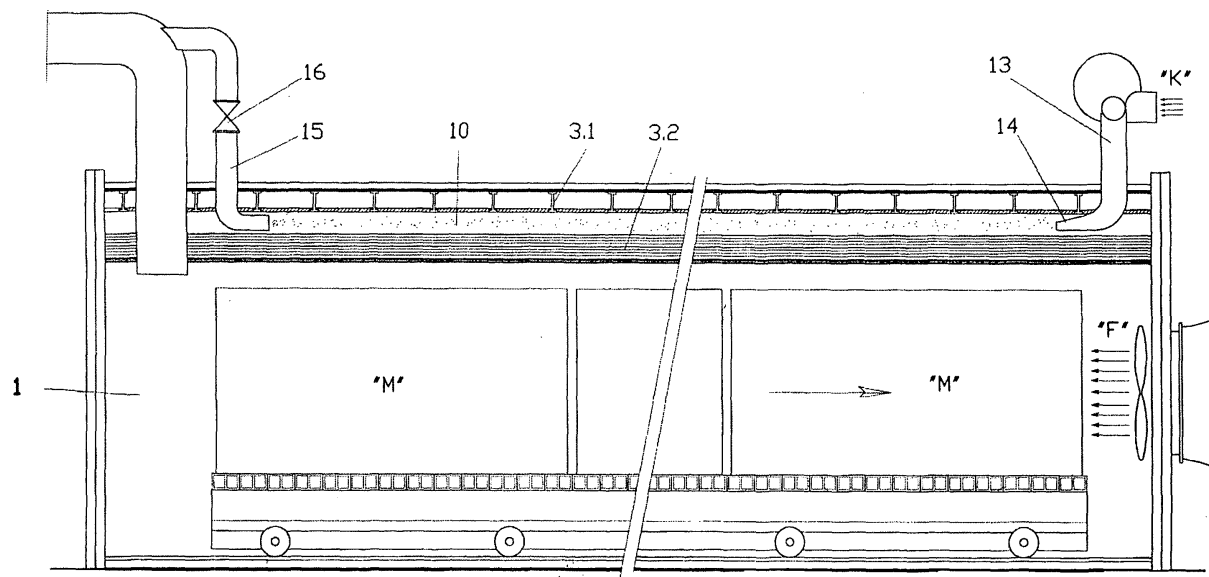


FIG.2

Description

[0001] The present finding regards a kiln for the firing of tiles, according to the general part of claim 1.

[0002] A kiln for the firing of tiles is substantially composed of a longitudinal chamber, of considerable size, inside of which carts are introduced containing the products to be fired.

[0003] The firing action of the material is achieved by means of a series of burners arranged inside the mouths present on the two side walls and on the flat arch of the firing chamber, which heat an air flow which flows through the entire length of the kiln.

[0004] The chamber is made with refractory walls, while panels of mineral wool, kaolin wool or other material suitable for the purpose, applied on the outside the walls and on the ceiling, thermally insulate the kiln.

[0005] As is well known, to obtain a homogenous firing of the material it is necessary that the hot air which circulates inside the kiln is kept, for the entire volume, not only at constant temperature but also in slight overpressure condition. Such optimal situation, however, is difficult to achieve for the entire firing chamber, since microcracks are formed both on the walls and on the arch, due to the typical composition of the insulating material (refractory, kaolin wool, mineral wool and other similar products suitable for the purpose), which no longer ensure the airtight seal of the chamber itself.

[0006] In practice, due to the microcracks which are formed on the walls and on the arch of the chamber, inside-to-outside microflows of hot air are generated, which, considering the considerable size of the kiln (for example there are kilns wherein only the firing zone occupies a volume of about 500 m³) involve overall a consistent laminar flow of hot air which leaks from the chamber itself, thus lowering the operative temperature and the pressure in the kiln and therefore making a new injection of new hot air necessary, with very clear economical disadvantages.

[0007] At the current state of the art, in order to limit the consequences of the hot air loss through the microcracks present in the walls and in the arch of the firing chamber, the use is foreseen of metal plates, which are applied on the outside of the walls and ceiling, forming thus an airtight cover outside the kiln.

[0008] Such solution, in addition to being costly in its achievement, has a limited effectiveness over time, since due to the microcracks which form at the plates' welding zones, a lowering of the pressure is generated in said zones which favours the leakage of the air highly mixed with gas; consequently, in addition to the heat loss, a process of corrosion of the metal material is also triggered, and thus microholes are formed even on the external metal plates. Hence, to ensure a correct functioning of the kiln, it is necessary to carry out periodic, very costly maintenance operations, and over time it is also necessary to substitute the damaged metal plates.

[0009] Object of the present finding is to make a kiln

for the firing of tiles in which the possible leakage of the air circulating inside the firing chamber, through the walls and the arch of the ceiling, is totally prevented.

[0010] Further object of the finding is to make a kiln for the firing of tiles which requires maintenance interventions on the walls and on the arch which are simple, rapid and limited over time.

[0011] Further object of the finding is to make a kiln for the firing of tiles which permits a considerable energy savings.

[0012] Such objects are obtained with the making of a kiln for the firing of tiles which is characterised in that it has an air chamber made outside the walls and arch of the kiln, in which an air flow in overpressure condition runs, the value of such pressure being at least equal to the pressure value of the air which circulates inside the firing chamber.

[0013] In such a manner, over the entire external surface of the kiln, a counter-pressure zone is generated, with respect to the hot air circulating inside the firing chamber, so that a balancing action is generated between the two air flows which prevents their possible mixing in the presence of microcracks which can form on the walls and/or on the arch of the chamber.

[0014] The finding will be better defined with the description of one of its possible embodiments, given only as a nonlimiting example, with the aid of the attached drawing tables, where:

- Fig. 1 (Table 1) represents a front and sectioned elevation view of the tile firing kiln according to the finding;
- Fig. 2 (Table 2) represents a side and sectioned elevation view of the kiln according to Fig. 1.

[0015] As is visible in the figures, the tile firing kiln according to the finding is substantially composed of a firing chamber 1, defined by the side walls 2, made with a refractory wall layer 2.1 and a thermal insulating material 2.2, and by a flat arch 3 which comprises the bearing beams 3.1 and the layer of insulating material 3.2.

[0016] The firing of the material "M", loaded on the carts 4 which cross the entire firing chamber 1 on rails 5, occurs by means of a flow "F" of air, inserted from the kiln exit side and therefore flowing in the opposite direction as that of the advancing carts, and heated by means of burners 6, with "fire points" placed at mouths 7 made on the side walls and on the arch, all according to known structural modes.

[0017] The new characteristic of the finding consists in the definition of a chamber 10 placed outside the firing chamber 1, which extends for the entire surface of the arch 3 and for nearly the entire surface of the side walls 2, inside of which an air flow "K" runs in overpressure conditions, with a pressure value at least equal to the pressure of the air flow "F".

[0018] Structurally, the air chamber 10 is composed of

an upper portion 10.1, defined between the bearing beams 3.1 and the insulating layer 3.2 of the arch 3 and by two side portions 10.2, defined between the layer in insulating material 2.2 and a more external wall 11, all being contained within an insulating shell 12.

[0019] Operatively, the secondary air flow "K" is inserted in the chamber 10, with preferably the same direction as that of the main air flow "F", by means of the delivery tubes 13, equipped with nozzles 14; the air flow "K" is sucked, on the opposite side, by means of an extraction tube 15 equipped with a valve 16, where said valve serves to regulate the value of the pressure, so that the aforesaid flow "K" always operates in overpressure conditions with respect to the pressure value of the aforesaid main flow "F".

[0020] Finally, it is foreseen that the side portions 10.2 of the air chamber 10 are, rather than empty, filled with a low density insulating material, so that one obtains both the passage of the air flow "K" and a simultaneous thermal insulation of the kiln.

[0021] In practice, embodiments of the kiln according to the finding are of course possible which are even quite different from that described above, in relation to their diverse size and materials used, the following claims nevertheless remaining valid.

Claims

1. KILN FOR THE FIRING OF TILES, of the type substantially composed of a longitudinal chamber of considerable size, inside of which the carts are introduced containing the products to be fired, where the firing action of the material is achieved by means of a series of burners, arranged inside mouths present on the two side walls and on the flat arch of the firing chamber, which heat an air flow, in slight overpressure, which runs for the entire length of the kiln, the chamber being made with refractory walls, while the panels of mineral wool, kaolin wool or other material suitable for the purpose, applied on the outside of the walls and on the ceiling, thermally insulate the kiln,
said kiln **characterised in that**
it has an air chamber (10) made outside the walls and arch of the kiln, in which an air flow (K) runs in overpressure condition, the value of such pressure being equal to or greater than the pressure value of the air flow ("F") which circulates inside the firing chamber (1).
2. KILN, according to claim 1, with a firing chamber (1), defined by the side walls (2), made with a refractory wall layer (2.1) and a layer of thermal insulating material (2.2) and by a flat arch (3), which comprises the bearing walls (3.1) and the layer of insulating material (3.2), it being foreseen that the firing of the material (M), loaded on the carts (4), which cross the

entire firing chamber (1) on rails (5), occurs by means of an air flow (F), inserted on the kiln exit side, and therefore opposing the advancing direction of the carts, and heated by means of the burners (6), with the "fire points" placed at mouths (7) made on the side walls and on the arch, **characterised in that** it foresees an air chamber (10) composed of an upper portion (10.1), defined between the bearing beams (3.1) and the insulating layer (3.2) of the arch (3) and by two side portions (10.2), defined between the insulating material layer (2.2) and a more external wall (11), all being contained within an insulating shell (12).

3. KILN, according to claim 2, **characterised in that** the secondary air flow (K) runs through the chamber (10) in the same direction as the main air flow (F) and is inserted in the kiln by means of delivery tubes (13), equipped with nozzles (14), and is sucked, on the opposite end, by means of an extraction tube (15), equipped with a valve (16) which serves to regulate the pressure value so that the aforesaid flow (K) always operates in "overpressure" conditions with respect to the pressure value of the aforesaid main flow (F).
4. KILN, according to one or more of the preceding claims, **characterised in that** the side portions (10.2) of the air chamber (10) are filled with a low density insulating material, so to obtain both the regular passage of the air flow (K) and the simultaneous thermal insulation of the kiln.

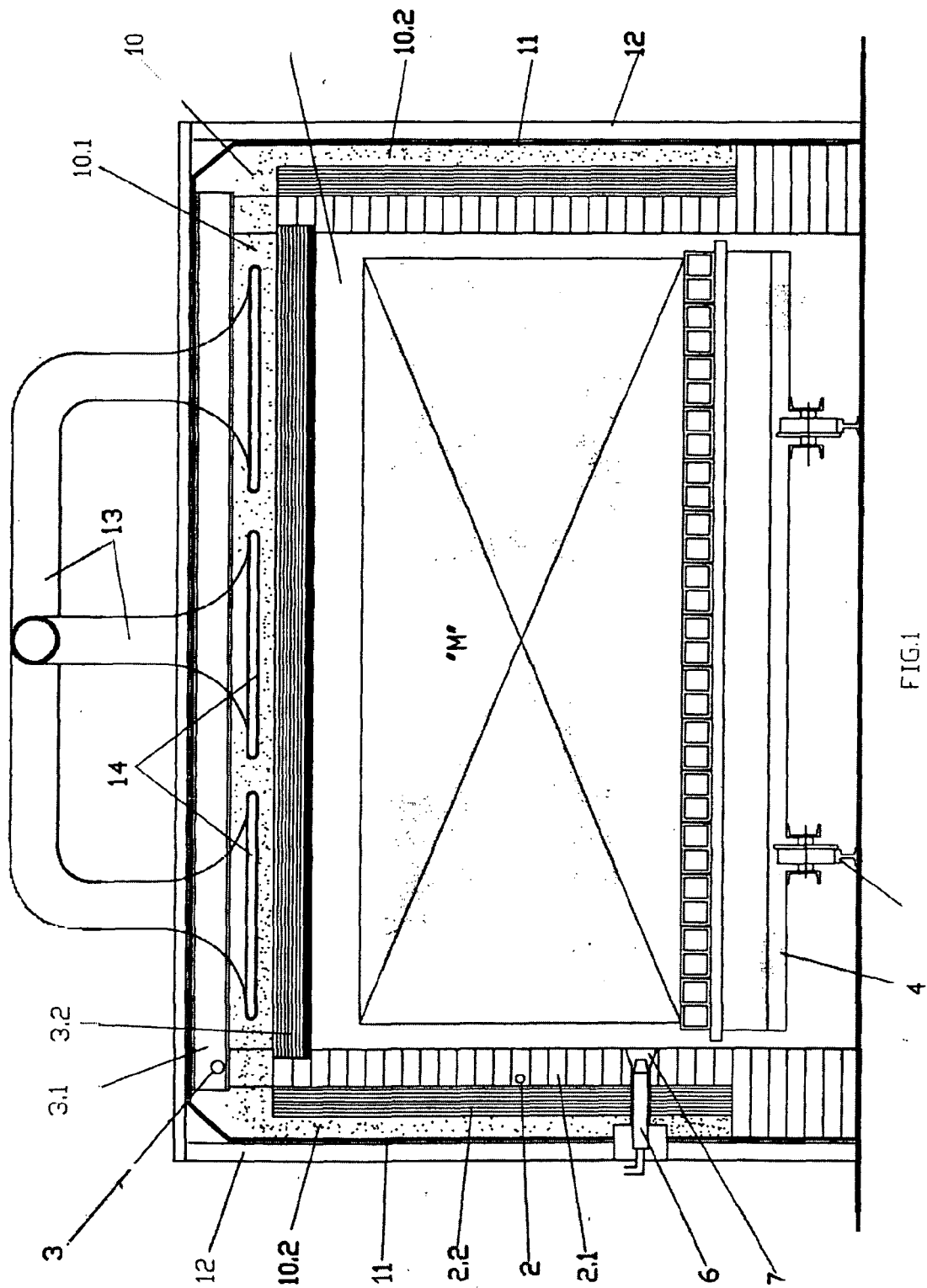


FIG. 1

