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DECORATIVE BRICKS, TILES OR THE LIKE AND METHODS OF MANUFACTURING THE SAME

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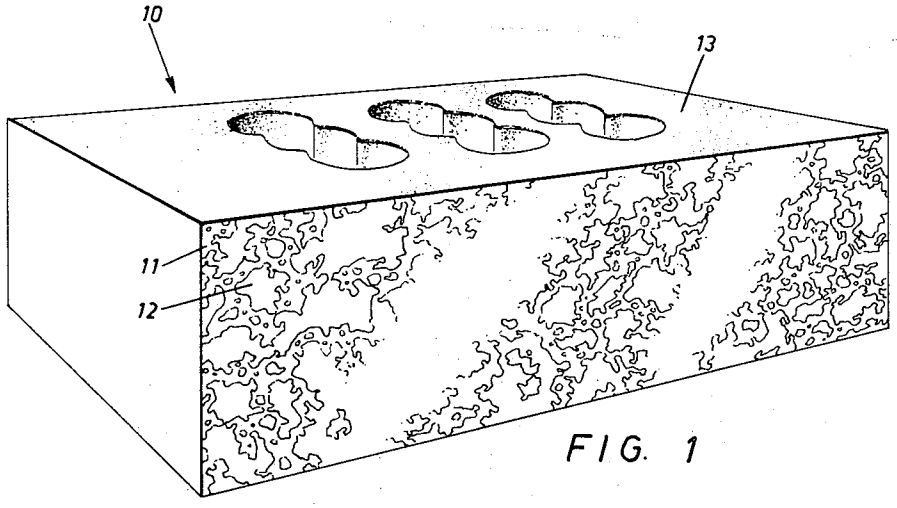


FIG. 1

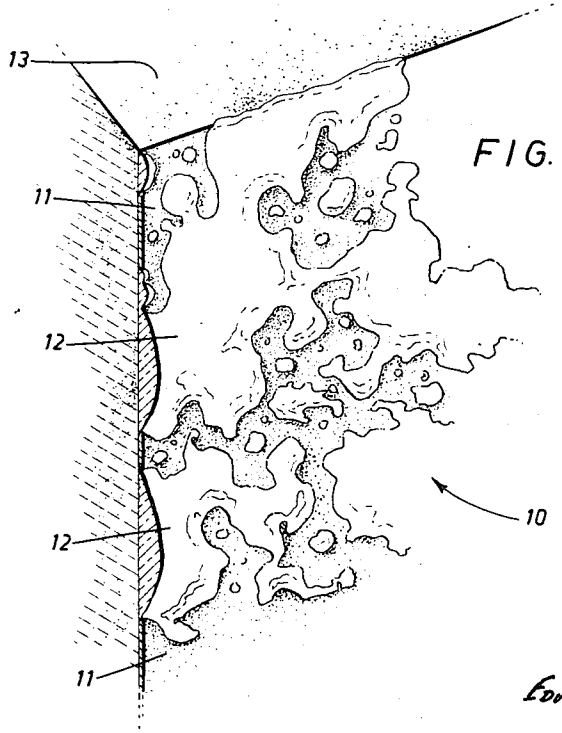


FIG. 2

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DECORATIVE BRICKS, TILES OR THE LIKE AND METHODS OF MANUFACTURING THE SAME

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ABSTRACT OF THE DISCLOSURE

A tile, brick or like decorative building element comprises a ceramic base member which is fired, clay-containing, and moisture and gas-permeable. The base member has two coatings the first of which is a fired, clay and flux-containing, moisture and gas-permeable ceramic material which is bonded to at least one face of the base member. The second coating is a moisture-impermeable, hard, glass-like material having spaced-apart portions which are raised above the surface of the first coating. The spaces between the spaced-apart portions of the second coating at the surface of the first coating and between the surface of the first coating and the face of the base member are occupied by the first coating

This invention relates to articles such as bricks, tiles, or the like, which are of a decorative type, and to methods for manufacturing the same.

Glazed bricks are known which have a continuous, hard, moisture-impermeable, glass-like coating on one or more surfaces thereof. Such glazed bricks are used to enhance the appearance of a building, and the glass-like coating can be self-washing. One advantage of these bricks is the uniform but varied colours which can be obtained in the glass-like coating. However, such bricks may be subjected to frost damage due to the fact that moisture in the base member of the brick may be unable to escape through the glass-like coating. In other words, such bricks may be unable to "breathe" through the glass-like coating.

Bricks are available which have a discontinuous, glass-like coating on the face thereof. Such bricks have the advantage of permitting "breathing" through the discontinuous coating, but with these bricks uniform colour only can be achieved if the coating is the same colour as the fired clay base member to which the coating is applied. If the base member, which usually is red, is not the same colour as the discontinuous coating, the colour of a wall or the like fabricated from such bricks will not be uniform. This problem could be overcome if it were possible to manufacture and stock bricks having base members of all different colours, but that is not a practical solution to the problem.

It is an object of this invention to provide a brick which has a face with self-washing characteristics, which is moisture-permeable, and which can have either a uniform or non-uniform appearance as far as colour in concerned, and yet which does not require the use of base members of different colours.

As article of manufacture embodying this invention may be brick, tile, or other constructional or decorative article, and comprises, a base member, a first coating and a second coating, all of the following types. The base member is a fired, clay-containing, moisture and gas-permeable, ceramic material. The first coating, which is bonded to the face of the base member, is a fired, clay, and flux-containing, moisture and gas-permeable, ceramic material. The second coating is a moisture-impermeable, hard, glass-like material which has spaced apart portions thereof raised above the surface of the first coating. The spaces between the spaced-apart portion of the second coating at the surface of the first coating and between the surface of the first coating and the face of the base member are occupied by the first coating. The second coating can be referred to as being in the form of "islands" in "lakes" of the first coating.

Another aspect of this invention provides a method of manufacturing a decorative brick, tile, or the like. A clay containing base member, which upon firing can form a moisture and gas permeable ceramic base member, is coated on at least one face with a continuous coating of a clay and flux-containing material adapted upon firing to form a moisture and gas-permeable ceramic coating bonded to said member. A second coating of a material adapted upon firing to form a moisture-impermeable, hard, glass-like surface is then applied to spaced apart areas of the continuous coating, and the coated article is then fired.

The invention will become more apparent from the following detailed description of preferred embodiments of the invention, taken in conjunction with the appended drawings, in which:

FIGURE 1 is a perspective view of a brick embodying this invention, and

FIGURE 2 illustrates the coated face of the base member of the brick of FIGURE 1 in greater detail.

Referring to the drawings, there is shown a brick **10** having coatings **11** and **12** on the front face of the base member **13** thereof. Normally coatings **11** and **12** will be provided only on the front face of the base member, since this generally is the only face which is visible when the brick is mortared in a wall or the like, but coatings **11** and **12** also may be applied to one side face of base member **13** to provide a brick for use as a corner brick.

Base member **13** is of a conventional type and may be any of the well-known fired, clay-containing, moisture and gas-permeable, ceramic materials. As exemplary only, base member **13** in its raw, i.e. unfired state, may be clays having the following compositions, all percentages being weight percentages:

(A) For firing temperature from 1800–2000° F.

	Percent
Silica	55–60
Alumina	13–16
Iron	5–7
Lime	3–10
Magnesia	2–3
Alkalies	2–4
Weight loss during firing	8–12

(B) For firing temperature from 2000–2400° F.

	Percent
Silica	50–60
Alumina	20–30
Iron	1–2
Lime	0.5–1
Magnesia	0.1–1
Alkalies	2–3
Weight loss during firing	6–10

Coating **11** is characterized by being a fired, clay and flux-containing, moisture and gas-permeable ceramic material. As exemplary only, the following composition is one of many compositions which will provide a coating

11 having the aforementioned characteristics after the composition has been fired:

Material:	Weight percent
Ball clay	50
Feldspar	25
Wollastonite	5
Silica	10
Flux	10

Fluxes such as lead oxide (litharge), boracic acid, zinc oxide, or lithium carbonate, for example, may be used.

Coating **11** must be moisture and gas-permeable, and, to this end, the amount of flux in the composition will vary depending upon firing temperature. Generally, in order to ensure satisfactory moisture and gas-permeability characteristics in coating **11**, from 0–15% flux by weight should be employed over the range of normal firing temperatures.

Coating **12** is characterized by being a moisture-impermeable, hard, glass-like material. As exemplary only, the following composition is one of many compositions which will provide a coating **12** having the aforementioned characteristics after the composition has been fired:

Material:	Weight percent
Na_2O	6.0
CaO	2.0
PbO	14.0
ZnO	2.0
MgO	2.0
BaO	2.0
B_2O_3	14.0
Al_2O_3	7.0
SiO_2	51.0

Base member **13** is formed in a conventional manner, and while it is in the raw state, the composition which subsequently forms coating **11** is applied over the whole of one or more faces thereof by spraying, dipping or brushing. Following this step, the composition which subsequently forms coating **12** is applied to the coated face or faces of base member **13** by a spray gun or a rotating splash wheel, for example.

The amount of material which is employed to form coating **11** preferably should be such that coating **11**, after firing, is not greater than 0.010 inch thick, a thickness of from 0.005–0.010 inch being most preferred.

The amount of material applied to subsequently form coating **12** preferably should be such that coating **12** covers from 50–90% of the coated face of the base member, an area of 70% to 90% covered by coating **12** being most preferred.

It should be noted that the spreading out of the raw material for coating **12** to completely cover the raw material for coating **11** is avoided by employing a composition for coating **12** which has a high surface tension, this characteristic being contributed by such constituents as MgO and Al_2O_3.

After base member **13** has had one or more faces so coated, it is fired, and brick **10** is thereby produced.

As an alternative to the foregoing method, base member **13** could be fired prior to the application of the coatings thereto, but this is not a preferred method, since the coatings must then be fired, and this is inefficient.

It will be seen from FIGURE 2 that coating **12** is in the nature of "islands" surrounded by "lakes" of coating **11**. Coating **12**, by virtue of its high percentage of flux, partially dissolves the composition for coating **11** to create an accelerated bonding reaction during firing, as a result of which, coating **12** is, in effect, directly bonded to the face of base member **13**, assuming that coating **11** is not more than about 0.010 inch thick. Coating **11** also is bonded to the face of base member **13** during firing.

In effect, after the coated base member has been fired, there is provided a brick **10** wherein the parts of coating **12** raised above the surface of coating **11** are hard and glass-like, the coating beneath these parts is somewhat less glass-like, due to dilution by coating **11**, and coating **11** is even less vitrified.

It has been found that a brick embodying this invention can readily "breathe" through the coated face thereof, since coating **11** is moisture and gas-permeable. However, the coated face of the brick also is self-washing because of the nature of coating **12**, and to a lesser degree, of coating **11**.

Coatings **11** and **12** may be coloured by the inclusion of suitable pigments for colouring ceramics. Thus, the following pigments in the indicated weight percentages may be employed:

	Percent
Blue-cobalt oxide	2–5
Yellow-iron oxide	1–5
Brown-manganese oxide	1–2
Green-nickel oxide	2–3
Green-chrome oxide	2–4
White-zirconium silicate	7–10

The full benefit of this invention is obtained when coatings **11** and **12** are of the same colour, but coatings **11** and **12** may be in contrasting colours, if desired.

While preferred embodiments of this invention have been disclosed herein, those skilled in the art will appreciate that changes and modifications may be made therein without departing from the spirit and scope of this invention as defined in the appended claims.

What I claim as my invention is:

1. An article of manufacture which comprises: a fired, clay-containing, moisture and gas-permeable, ceramic base member; a first coating of a fired, clay and flux-containing, moisture and gas-permeable ceramic material bonded to at least one face of said base member, the amount of said flux in said first coating being up to 15% by weight of said first coating; and a second coating of a moisture-impermeable, hard, glass-like material having spaced-apart portions thereof raised above the surface of said first coating, the spaces between said spaced-apart portions of said second coating at the surface of said first coating and between said surface of said first coating and said face of said base member being occupied by said first coating.

2. The invention according to claim **1** wherein said article of manufacture is a brick.

3. The invention according to claim **1** wherein said article of manufacture is a tile.

4. The invention according to claim **1** wherein said second coating covers from 50% to 90% of said face of said base member and said first coating covers from 50% to 10% of said face of said base member.

5. The invention according to claim **1** wherein said second coating covers from 70% to 90% of said face of said base member and said first coating covers from 30% to 10% of said face of said base member.

6. The invention according to claim **1** wherein said first and second coatings are colored in substantially the same color.

7. The invention according to claim **1** wherein said first and second coatings are colored differently.

8. The invention according to claim **1** wherein said first coating is not more than about 0.010 inch thick.

9. The invention according to claim **1** wherein said first coating is between 0.005 and 0.010 inch thick.

10. The invention according to claim **1** wherein said second coating covers from 50% to 90% of said face of said base member and said first coating covers from 50% to 10% of the face of said base member, and wherein said first coating is not more than about 0.010 inch thick.

11. The invention according to claim **1** wherein said second coating covers from 50% to 90% of said face of said base member and said first coating covers from 50% to 10% of the face of said base member, wherein said

first coating is not more than about 0.010 inch thick, wherein said article of manufacture is a brick, and wherein said first and second coatings are colored in substantially the same color.

12. The invention according to claim **1** wherein said second coating covers from 70% to 90% of said face of said base member and said first coating covers from 30% to 10% of said face of said base member, wherein said first coating is between 0.005 and 0.010 inch thick, wherein said article of manufacture is a brick, and wherein said first and second coatings are colored in substantially the same color.

13. The invention according to claim **1** wherein said second coating covers from 50% to 90% of said face of said base member and said first coating covers from 50% to 10% of the face of said base member, wherein said first coating is not more than about 0.010 inch thick, wherein said article of manufacture is a brick, and wherein said first and second coatings are colored differently.

14. The invention according to claim **1** wherein said second coating covers from 50% to 90% of said face of said base member and said first coating covers from 50% to 10% of the face of said base member, wherein said first coating is not more than about 0.010 inch thick, wherein said article of manufacture is a tile, and wherein said first and second coatings are colored in substantially the same color.

15. An article of manufacture which comprises; a fired, clay-containing, moisture and gas-permeable, ceramic base member; a first coating of a fired, clay and flux-containing, moisture and gas-permeable ceramic material bonded to at least one face of said base member, the amount of said flux in said first coating being up to 15% by weight of said first coating; and a second coating bonded to said face of said base member at spaced-apart areas, extending through said first coating and having spaced-apart portions thereof of a moisture-impermeable, hard, glass-like material raised above the surface of said first coating, the spaces between said spaced-apart portions of said second coating and between the surface of said first coating and said face of said base member being occupied by said first coating.

16. An article of manufacture which comprises; a fired, clay-containing, moisture and gas-permeable, ceramic base member; a first coating of a fired, clay and flux-containing, moisture and gas-permeable ceramic material bonded to at least one face of said base member, the amount of said flux in said first coating being up to 15% by weight of said first coating; and a second coating of a moisture-impermeable, hard, glass-like material, said second coating being in the form of islands extending through said first coating and bonded to said face of said base member with portions of said islands raised above the surface of said first coating; said first coating forming lakes between said islands.

17. A method of manufacturing a decorative ceramic article which comprises; coating at least one face of a clay-containing base member adapted upon firing to form a moisture and gas-permeable ceramic base member with a continuous first coating of a clay and flux-containing material adapted upon firing to form a moisture and gas-permeable ceramic coating and to bond to said base member, the amount of said flux in said first coating being up to 15% by weight of said first coating; applying to spaced-apart areas of said continuous coating a second coating of a material adapted upon firing to form a moisture-impermeable, hard, glass-like material, and thereafter firing the coated article.

18. A method according to claim **17** wherein said second coating is applied to cover from 50% to 90% of said continuous coating.

19. A method according to claim **17** wherein not more than about 0.010 inch of said continuous coating are applied to said face of said base member.

20. A method according to claim **17** wherein said first and second coatings are colored in substantially the same color.

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