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Ceramic brick

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(71) Applicant(s)
Dmitry Somichev

(72) Inventor(s)
Somichev, Dmitry;Popova, Elena;Skok, Galiya;Potapov, Anatoly

(74) Agent / Attorney
Davies Collison Cave, 1 Nicholson Street, Melbourne, VIC, 3000

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ABSTRACT

CERAMIC BRICK

Utility model is related with construction field, namely the production of constructive parts for building walls rising. Ceramic brick comprising clayish mass is implemented as solid body 1 out of clayish mass hardened after baking of clayish mass 2 including solid particles of clay at temperature not less than 800°C with adsorbed at clay particles the methylmetacrilat copolymer 3 (MMA) with 73-80% of metacryl acid (MA) with average molecular mass of 800 000.

Raw mixture for ceramic brick production includes following ingredients, mass %:

Clay	75-81
5,0% water mixture of metylmetacrylat copolymer (MMA) with 73-80% of metacryl acid (MA) with average molecular mass 800 000	1-3
Water	The other part.

At product elaboration the lower baking temperature was reached due to new components in product content saving other physical-mechanical indices of ceramic brick

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INNOVATION PATENT SPECIFICATION
(ORIGINAL)

Name of Applicant: DMITRY SOMICHEV
of RU, 191186, St. Petersburg
nab. reki Moiky, 24 - 20

Actual Inventor(s): Dmitry SOMICHEV, Elena POPOVA, Galiya SKOK, Anatoly POTAPOV

Address for Service: DAVIES COLLISON CAVE, Patent Attorneys,
1 Nicholson Street, Melbourne 3000, Victoria, Australia

Innovation Patent specification for the invention entitled:

"Ceramic brick"

The following statement is a full description of this invention, including the best method of performing it known to me:

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CERAMIC BRICK

Utility model is concerned with building field, namely the manufacturing of constructive units for structure walls erection.

Patent RF № 2095329 from 10.11.1997 is known as " Ceramic walling product and mode of its manufacturing from sand-clay mixtures", including preparing of raw mixture by means of dissolving and dispergation of clay component at 200÷300°C, mixing of clay component, quartz sand and shamotte and also moistening, pressing of workpieces, drying and baking with isothermal exposure. Mixture is refined till specific surface 2000 – 7000 sq.cm/g, is moistened by caustic soda solution, at that raw mixture contains, mass:

Clay component 50 85

Quartz sand 3 40

Shamotte 5 15

Caustic soda (in conversion to Na_2O) 0,2 15

Product baking is accomplished with isothermal exposure at 950 -1000°C during 3 -5 hours. Baking of ceramic product, implemented with isothermal exposure at 950 -1000°C during 3 -5 hrs, demonstrates rather high energy requirements of working process.

Utility model target is creation of ceramic brick of increased resistibility having reduced water absorption ability.

Technical result includes lowering of ceramic brick baking temperature and timing of product exposure in the furnace.

Stated task is reached by producing of ceramic brick including clayish mass in shape of solid body of clay mass hardened after baking, including solid particles of clay with adsorbed methylmetacrylate (MMA) copolymer with at clay particles with 73-80% of methacryl acid (MA) with average molecular mass 800 000.

Raw mixture for building ceramic brick manufacturing includes following ingredients, mass %:

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Clay	75-81
5,0% -th water solution of copolymer (MMA)	
c 73-80 % (MC) of average molecular mass 800 000	1-3
Water	The other part

Schematic picture of ceramic brick is shown at Fig.1 where 1 – solid body, 2 – particles of clay with methylmetacrilate (MMA) copolymer adsorbed onto clay particles and metacryle acid (MA) – 3.

Ceramic brick on the base of clay and copolymer of methylmetacrilate and metacryle acid provides the possibility of low-temperature baking of product.

For raw mixture setting 18 - 24 % - moistured quarry clay may be used, so as dry, grained previously. In that case dry clay pre-moisturing is not needed and copolymer solution is injected straightward.

Usage of copolymer water solutions allows to treat the clays of various qualities with plasticity from 6.2 and higher. At mixing stage copolymer is distributed homogenously in bulk mass volume and its absorbtion at solid particles surface rises the clay plasticity, providing creation of high-stability structure at drying stage and faster formation of ceramic body at 800°C during 2 hours. Mixtures are made by usual mixing of ingredients. Out from prepared bulk of 18-25 % moisture the brick samples with sides 60-52 mm are formed and then dryed by usual mode till sample moisture not more 2%, then baked in muffle furnace at following mode: till 800°C during three hours, than exposure at 800°C for two hours and 15-hours cooling.

In industry, time of brick exposure in furnace may be shortened at 10-30 % relative to existing baking technology at premise.

Optimal amount of input additives of copolymer water solutions is equal 1-3% mass. Its injection of 1 mass % does not provide sufficient plasticity or forming mass and products durability at baking temperature 800°C, so in that case baking at higher temperatures is required.

Putting of copolymer solution more than 3 % mass does not lead to further lowering of temperature and may rise output price.

Tables 2 and 3 demonstrate designed utility model. Table 2 shows raw mixture compounds for production of building ceramic product, namely brick.

Table 3 shows properties of baked samples in dependence of raw mixture composure, kiln temperature, timing of exposure at maximum temperature in relation with prototype; notions are as follows:

TS – total shrinkage, %;

WA – water absorption, %;

σ pr – stiffness limit at pressing, MPa;

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σ bd – stiffness limit at bending, MPa.

As seen at table 3, ceramic brick samples baked at 800°C and exposed during two hours did not spoiled its physical-chemical properties in relation to samples produced the same as samples but baked at higher temperature 920°C.

So more low temperature is reached for baking of claimed constructive products in comparison with prototype due to new components in product content, saving other physical-mechanical indexes.

Industrial application of said utility model on base of clayish mass and additive such as copolymer methylmetacrylat (MMA) and metacril acid (MA) would permit to lessen significantly the power consumption.

Lowering of baking temperature not higher than 800°C results not only in power input lessening, what in turn leads to self-cost decrease and has some ecological advantages (emissions of oxides of nitrogen, sulphur and hydrogen in environment are reduced , struggle with which also leads to manufacturing expenses rising).

Table 1

Compounds of ceramic clay-based masses.

Components	**Composure, mass %**		
	1	**2**	**3**
Clay	**75**	**78**	**81**
Additive 5 mass % Water solution of Copolymer	**3**	**2**	**1**
Water	**22**	**20**	**18**

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Table 2

Properties of baked samples: prototype-similar and said invention

As prototype:

Componenets	**Composure, мass %**			**Baking, 920°C** Exposure time - not mentioned				
	№3	**№4**	**№5**	**Compos.№**	**ОУ,%**	**ВП,%**	**σ pr, MPa**	**σ bd, MPa**
Clay plasticible	**68,0**	**76,5**	**80,0**	3	4,3	20	26,26	Not mention.
Additives: nonplastic	**30,0**	**15,0**	**30,0**	4	4,0	19	29,10	-«-
Waste from power-chemical industry	**2,0**	**3,5**	**5,0**	5	4,7	18	31,92	-«-

According to said invention:

	№1	**№2**	**№3**	**Baking 800°C** Exposure time - **2 hours**				
Clay	**75,0**	**78,0**	**81,0**	1	4,4	18,1	30,2	
Additive: 5% water sol. of copolymer	**3,0**	**2,0**	**1,0**	2	4,2	18,8	29,9	
Water	**22,0**	**20,0**	**18,0**	3	4,6	19,2	26,8	

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CLAIMS

1.Ceramic brick including clayish mass featured by accomplishment as solid body from clayish mass hardened after baking containing solid clay particles with methylmetacrylat copolymer (MMA) particles adsorbed on clay particles (MMA) with 73-80% and methacryle acid (MA) with average molecular mass 800 000.

2. Ceramic brick according to claim 1, wherein the raw mixture for ceramic brick production includes following ingredients, mass %:

Clay	75-81
5,0% copolymer water solution of methylmetacrylat (MMA) with 73-80 % of methacryl acid (MA) With average molecular mass 800 000	1-3
Water	The other part

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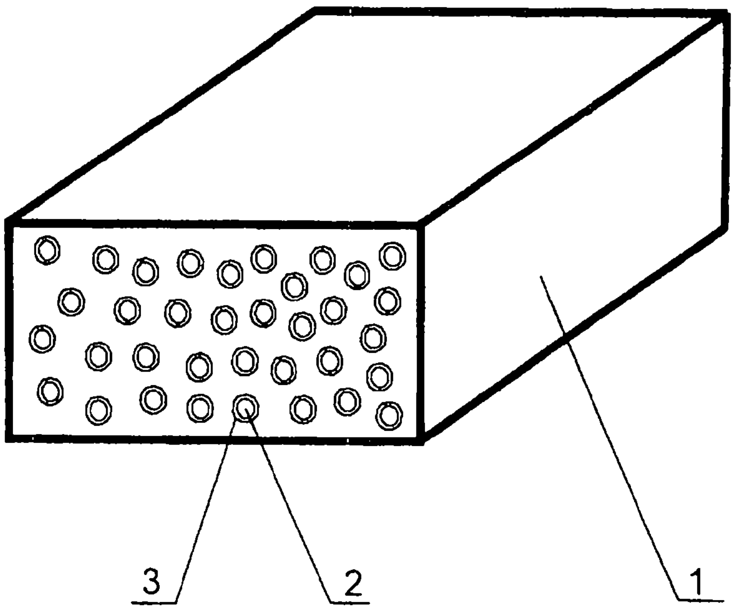

FIG. 1