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PROCESS OF MAKING A METALLIC REENFORCED REFRACTORY ARTICLE

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Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.
This invention relates to a process of making a fire brick for use at high temperature and under trying conditions wherein brick fail from unequal expansion and contraction and other causes, and which is generally known as "spalling." The object of this invention is a process of making a brick or refractory shape largely free from troubles from spalling, together with a method of making the same. Other objects may be noted herein. The principal feature of the refractory is the imbedded wire or rods, preferably metallic wires, and especially of heat-resisting metal, like nickel-chrome wire. The wires are integrally imbedded in the body of the brick and preserve the brick from falling to pieces from cracking under furnace conditions.

In Fig. 1, I have shown in cross section a brick of refractory material 1, and imbedded wires 2, placed in regular order. In Fig. 2 I have shown a brick 1, in which short wires 2 are present in no order, resulting from the molding of a mass containing short wires. In Fig. 3, I have shown a block 1, adapted for suspension by means of the wires 2, which are regularly spaced as shown and brought together at the top into a cable by twisting 3. Fig. 4 is a view of an arch formed by this process.

In the manufacture of brick in the ordinary kiln burning or other high heating process, wires would probably be destroyed by the heat.

In my process, I take suitable powdered refractory material, like ground fire brick, incorporate therewith a suitable chemical bonding agent like basic aluminum chloride solution, introduce the wires in the manner desired, and cure the product by suitable heating, to a temperature below that at which the wire would be seriously affected.

In service the face of the bricks gets too hot to make the maintenance of a metallic element of the structure remain intact, but this makes little difference, because the interior of the brick remains relatively cool and the tendency to check in the very hot surface layers is apt to be offset by a certain softness and toughness due to the heat, and in the interior where the strains and checking and spalling take place, and where such checking and spalling means a serious falling of refractories into the furnace, the wire is effective.

In my process of making such brick and refractory articles I have no shrinkage or change of volume, provided volume constant refractory material is used, so that the presence of metallic wire or rods does not make the product crack to pieces. Later, in service, such brick are not subject to shrinkage and change of volume, as are brick compounded with clay as bonding material.

In walls and arches, the arrangement of the wires is most effective when arranged perpendicular to the side intended to be used as the heated side, and this also applies when the wires project beyond the surface of the brick or block and are used to suspend the brick or block, or otherwise support it.

The product of this manufacture of refractory may be developed in the furnace in which it is used, by preparing a mortar containing wires similarly to the use of hair in mortar, and these wires may be added to the refractory mortar mix in short cuts and regularly distributed by mixing, and when a furnace is being built the mortar may be used in layers between fire bricks giving an unbreakable mortar which serves as a support for adjacent bricks. In Fig. 4, the arch of the furnace shown in cross section is made of refractory bricks 4, set in wire bound solidified refractory mortar 5, which functions as a general support, and if one of the blocks tends to check or spall, the crack is not communicable across the wire bond plastically applied intervening refractory, so that the possibility of whole s'abs of refractory splitting off, is largely or entirely overcome by the means employed and described.

The wire or wires referred to in the claims do not need to be of the ordinary round form of uniform cross section, but may be flat, uneven, crimped, uniform, and it is probable that the round uniform wire is the least favorable form of wire for the purpose.

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

1. Process of making metallic reinforced refractory article which consists in molding...
powdered refractory grain and metallic wire with a soluble bonding agent, and curing at a temperature below that at which said wires are seriously injured.

2. Process of making metallic reinforced refractory article which consists in molding refractory mix with imbedded wires and curing without change of volume sufficient to crack the product and at a lower temperature than that at which the said wires are materially and disadvantageously affected.

In testimony whereof I have hereunto signed my name.

ANSON G. BETTS.