June 5, 1928. 1,672,524

H. B. GRONINGER

FURNACE STRUCTURE

Filed Nov. 20, 1926 2 Sheets-Sheet 1

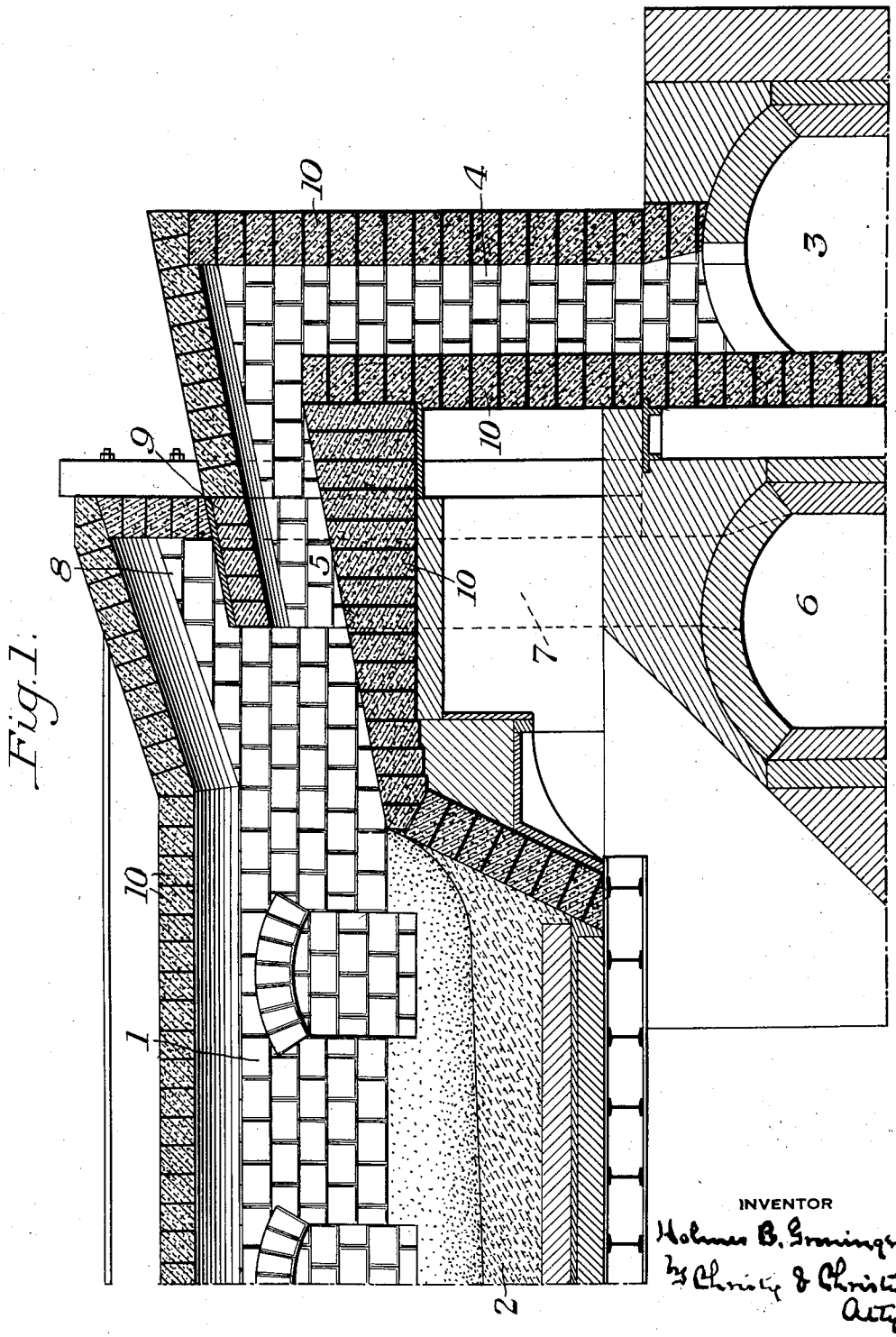


Fig. 1.

INVENTOR
Holmes B. Groninger,
by Christy & Christy,
Attys.

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Fig. 2.

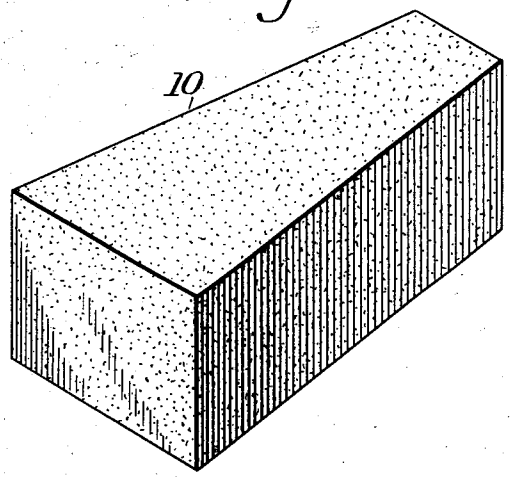


Fig. 3.

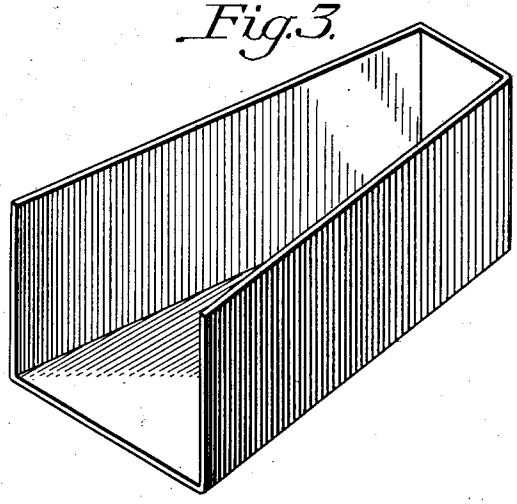
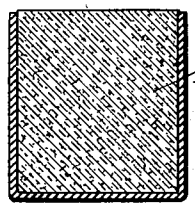


Fig. 4.



INVENTOR

Holmes B. Groninger,

by Christy & Christy,

Attys.

Patented June 5, 1928. 1,672,524

UNITED STATES PATENT OFFICE.

HOLMES B. GRONINGER, OF PORT ROYAL, PENNSYLVANIA.

FURNACE STRUCTURE.

Application filed November 20, 1926. Serial No. 149,668.

It is well known that in the construction of steel furnaces, such as open-hearth furnaces, the walls and roof of the furnace have usually been made of silica brick, while in basic steel furnaces the hearth has been made of a basic material, usually magnesite bricks covered by a lining of magnesite. Not only do the silica bricks in the walls and roof gradually wear or burn away under the high temperature to which they are exposed, but the silica melts and fuses with the iron oxid which is formed during the operation of the furnace, forming a silicate of iron, or slag, which attacks the basic hearth. A basic substance suitable to be formed into refractory bricks and tiles, such as magnesite, cannot be economically used for forming the roof and walls of the furnace, for the reason that the magnesite is friable and crumbles and spalls away under the high temperature.

In order to render possible the use of basic material, such as magnesite, there has been shown and described in United States Letters Patent No. 1,106,725, a furnace wall construction composed essentially of cylindrical containers of iron or steel into which magnesite and other basic or neutral materials are tamped, forming a non-acidic core in the container. These cylindrical composite structures are then employed to form the walls of the furnace.

It is the object of the present invention to improve upon the last named construction, and, briefly stated, it consists in providing a thin envelope of iron or steel to be slipped upon standard forms of manufactured bricks and tiles composed essentially of basic or neutral material, and particularly magnesite. The envelope may take a variety of forms, depending upon the shape of the brick or tile, of which there are many shapes made and commercially used in furnace construction. The envelope should be open on one end or on one side, as the case may be, in order to be slipped upon the molded tile.

In the accompanying drawings Figure 1 is a sectional elevation of a portion of a basic open-hearth steel furnace constructed in part of furnace bricks and tiles embodying the present invention. Figure 2 is a perspective view of a common form of commercial tile which is used in steel furnaces. Figure 3 shows in perspective a suitable metallic envelope for the tile of Figure 2. Figure 4 is a view in cross-section of the composite tile.

Referring to Figure 1, the melting chamber of the furnace is indicated by the numeral 1, and the basic hearth by the numeral 2. The gas flows from the regenerators designated by the numeral 3, through the conduit 4 and the port 5, and the air from the regenerators 6, through the conduit 7 and the port 8, the ports 5 and 8 being divided in the usual way by a bridge or arch 9.

Those portions of the furnace structure which are exposed to very high temperature, as for instance the side walls and roof and the masonry structure in and about the gas and air ports are, so far as desired, constructed of the composite bricks and tiles herein shown and described, as generally indicated in the drawings by the numeral 10.

The invention is particularly applicable for use in basic open-hearth and electrical furnaces. The metallic envelope holds the premolded brick or tile from disintegration, and as the maximum temperature of the furnace is reached, the metal in the envelopes included in the wall melts and fuses with the metal in adjacent envelopes and with the premolded tiles as well, and the wall or roof structure is integrated. No mortar need be used in building the walls and roof of the furnaces, and the result is a very durable and unitary structure.

I claim as my invention:

1. A composite brick or tile for use in steel furnaces comprising a premolded block of non-acidic material contained in a metallic sheath or envelope.

2. A basic steel furnace including in its structure a built-up body of composite bricks or tiles, each comprising a premolded block of non-acidic material and a metallic sheath, said body having been integrated under the high temperature of the furnace.

3. A casing for a furnace brick adapted to be laid with other encased brick in the building of a masonry structure, said casing being open on one side and by virtue of such open side adapted to receive a filling body, said open side so arranged as to be closed in the built structure by the casing of adjacent bricks.

In testimony whereof I have hereunto set my hand.

HOLMES B. GRONINGER.