A. N. H. STRALE.

FIRE BRICK WALL OR LINING FOR BLAST AND OTHER FURNACES.

APPLICATION FILED NOV. 9, 1910.

1,021,851.

Patented Apr. 2, 1912.

2 SHEETS—SHEET 1.

Fig. 1

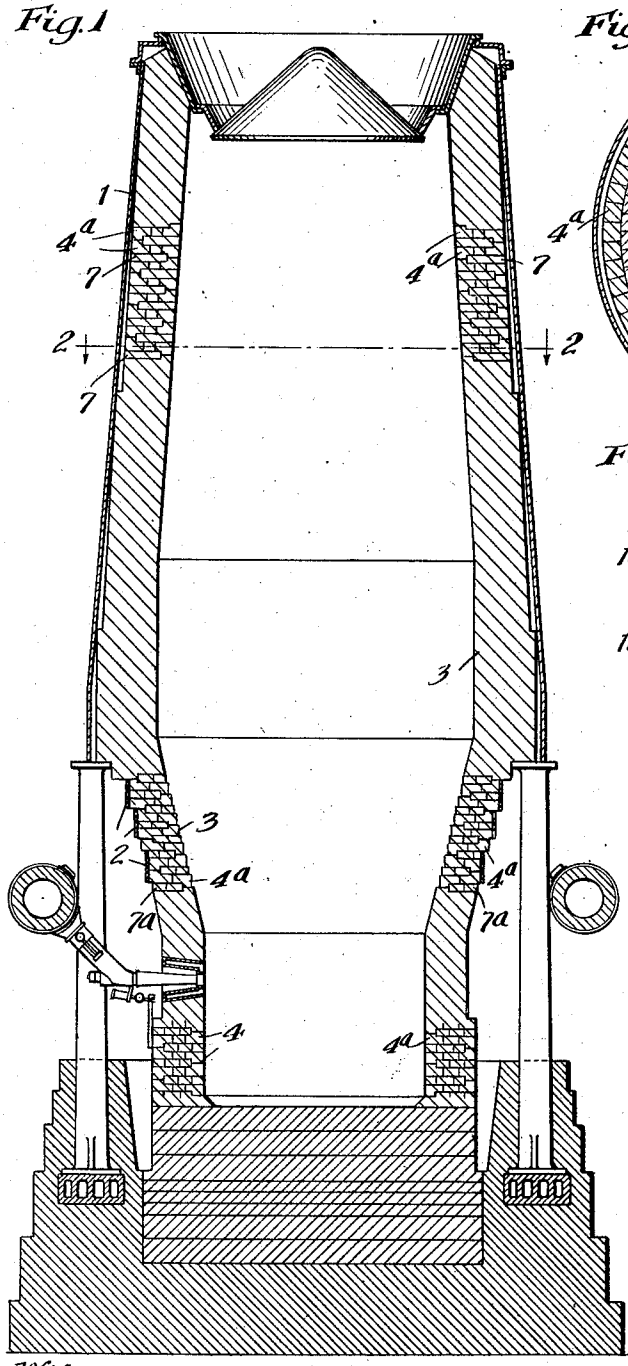

Fig. 2

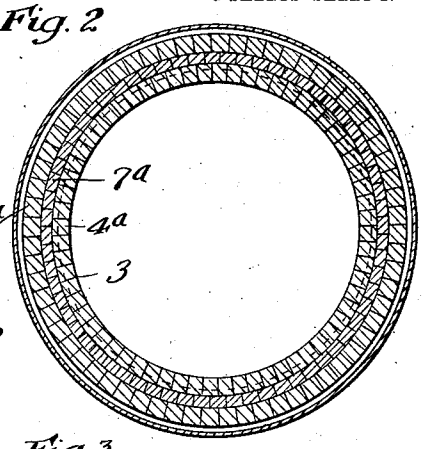

Fig. 3

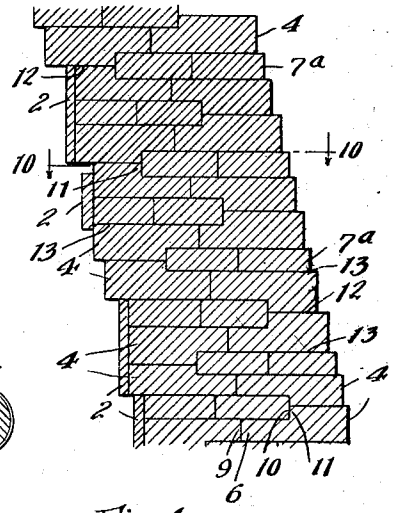

Fig. 4

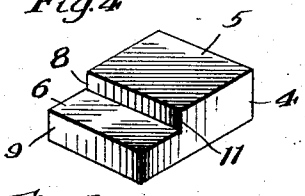

Fig. 5

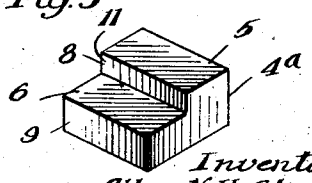

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Fig. 6

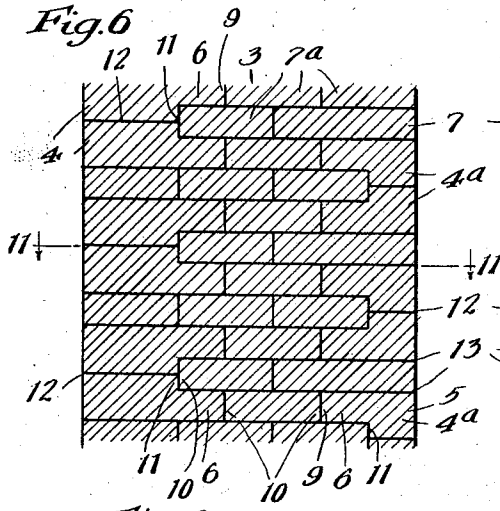


Fig. 7

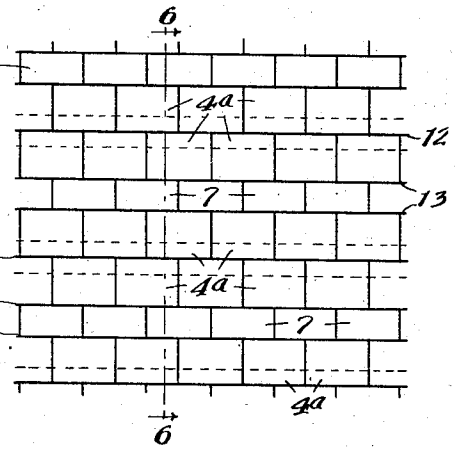


Fig. 8

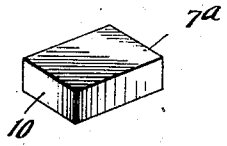


Fig. 9

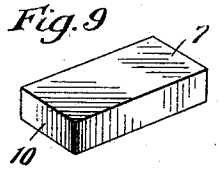


Fig. 10

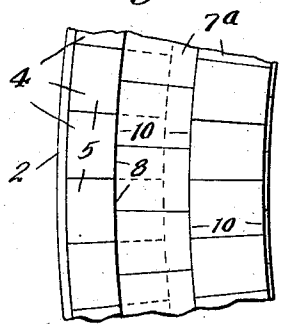
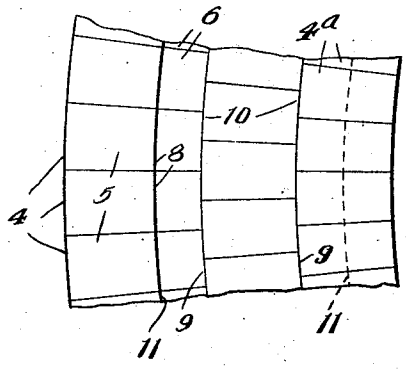


Fig. 11



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COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ALLAN N. H. STRALE, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO EMANUEL BLOCK, OF CHICAGO, ILLINOIS.

FIRE-BRICK WALL OR LINING FOR BLAST AND OTHER FURNACES.

1,021,851. Specification of Letters Patent. Patented Apr. 2, 1912.

Application filed November 9, 1910. Serial No. 591,408.

To all whom it may concern:

Be it known that I, ALLAN N. H. STRALE, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Fire-Brick Walls or Linings for Blast and other Furnaces, of which the following is a specification.

My invention relates to improvements in the construction of fire-brick walls or linings for blast furnaces or other furnaces.

Heretofore in the construction of fire-brick walls or linings for blast and other furnaces, and wherein, on account of the high heat and flame or gases to which they are subjected in practical use, the fire-brick or blocks cannot be laid in cement or mortar, but are laid simply in clay water, the fire-clay bricks or blocks have been of uniform thickness and laid in a manner to break the vertical joints, and thus bond the bricks or blocks together transversely and longitudinally or circumferentially of the wall. This construction leaves the horizontal joints between successive courses of the brick or blocks continuous and comparatively open, so that the heated gases under pressure can escape therethrough, especially after the wall becomes somewhat opened up by expansion and contraction in use, and under the constant fraying or disintegrating action of the escaping gases. This not only results in a material loss of heat and fuel, but also materially diminishes the life and durability of the furnace and its efficiency in operation.

The object of my invention is to provide an improved construction of fire-brick or block furnace wall or lining which will obviate the objections and difficulties heretofore experienced.

To practically accomplish this object or result, and herein my invention consists, I construct my firebrick furnace wall or lining of bricks or blocks having thick and thin portions, one of the portions being of a common or standard brick thickness, and the other of a different thickness, preferably a greater thickness, and in laying the wall, combine these bricks or blocks having such thick and thin portions with other brick or blocks of common or standard thickness or dimensions, thus causing the bricks or blocks to break and bond the horizontal joints, and the wall as a whole to be without any straight or continuous horizontal joints between successive courses.

In practice, when my improved blast furnace fire-brick wall is subjected to high heat, the heated bricks or blocks, in expanding, force or enlarge themselves outwardly against the surrounding and confining steel bands of the blast furnace, which resist the bursting pressure, while the arch shape of the wall in horizontal section prevents the bricks from giving or moving inwardly under such heat expansion. And, as a consequence, the heat expansion of the bricks or blocks closes the vertical joints between the bricks or blocks of my improved wall, and thus effectually prevents the heated gases from passing or escaping outward through the broken horizontal joints and thereby adds very greatly both to the durability and life of the furnace and to its economy in operation.

In the accompanying drawing forming a part of this specification, Figure 1 is a central, vertical section of a blast furnace fire-brick or block wall embodying my invention, the section, however, only showing the outline of the brick or blocks at small portions of the total height, and in this figure, the dimensions of the brick and horizontal thickness of the wall are relatively enlarged in respect to the total height of the blast furnace represented in the drawing, for greater clearness in illustration. Fig. 2 is a horizontal section on line 2—2 of Fig. 1. Fig. 3 is an enlarged, detail, vertical section through a part of the boshes portion of the furnace wall. Figs. 4 and 5 are detail perspective views of the rabbeted bricks or blocks having thick and thin portions. Fig. 6 is an enlarged, detail, vertical section on line 6—6 of Fig. 7. Fig. 7 is a detail elevation of a portion of a furnace wall. Figs. 8 and 9 are detail, perspective views of the filler bricks or blocks of common or standard thickness which are employed in laying a wall in combination with my bricks or blocks having thick or thin portions. Fig. 10 is a detail plan view of a small portion of the wall shown in Fig. 3 and Fig. 11 is a detail plan view of a small portion of the wall shown in Fig. 6.

In the drawing, I have represented my invention as applied to the construction of a blast furnace wall, but I desire it to be understood by those skilled in the art, that it

is applicable for use in the construction of other furnace walls.

In the drawing 1 represents a blast or other furnace and 2 the steel bands or rings which surround the furnace wall 3 to resist the bursting pressure to which it is subjected at the boshes portion thereof. The furnace is made of any well known construction familiar to those skilled in the art, and needs no special description.

The fire-brick wall 3 of the furnace is composed in part of fire clay blocks or notched or rabbeted bricks 4, having thick and thin portions 5, 6, one of said portions being of a standard or common brick thickness and the other of a different thickness. In practice, I prefer to make the thin portions 6 of each of these bricks 4 of the thickness of the standard or common brick or blocks 7, and the width and length of the bricks or blocks 4 may preferably correspond to the width and length of the standard or common brick. In practice, I prefer to employ common or standard brick or blocks of two different lengths, some, say, nine inches in length and others thirteen and one-half inches in length, and preferably of, say, six inches in width; and the thick and thin brick 4 are likewise preferably six inches in width and some thirteen and a half inches in length, and others nine to correspond to the dimensions of the standard or common brick 7. In the drawing, the shorter brick having the thick and thin portions 5 and 6 are marked 4^a, and the shorter common or standard dimension brick are marked 7^a. And the difference in thickness between the thick and thin portions of the bricks or blocks 4 and 4^a is preferably half the thickness of the common or standard brick 7 or 7^a. That is to say, for use with common or standard brick of the usual two inch thickness, the thick portion 5 of the bricks or blocks 4 and 4^a is three inches, and the thin portion 6, two inches, the depth of the notch 8 in the brick 4 and 4^a thus being one inch; and the length or dimension of this notch in the direction of the length of the brick or block may be varied as desired for more convenient use, according to the shape of the wall as flaring or upright in which they are to be used. Where the wall is substantially upright, as illustrated in Fig. 6 and the upper portion of Fig. 1, the depth of the notch 8 may preferably be four and one-half inches or half the length of the shorter of the common or standard brick 7. Where the wall is inclined or tapering, as for example, at the boshes portion of the furnace illustrated in Fig. 3, the depth of the notch 8 in the brick or blocks 4 may preferably be varied about as illustrated in Fig. 3. In laying or forming the wall, for example, at the boshes or flaring portion thereof, as illustrated in Fig. 3, the thick and thin brick 4 are laid with their notched faces together, and with common or standard brick 7 interposed between successive pairs of the thick and thin brick 4, the blocks 4 being employed on both the inside and outside of the wall with their thin ends 6 abutting directly together at the upright end faces 9 thereof; and the upright end faces 10 of the common brick 7 abutting directly against the upright notch faces 11 of the brick 4; so that all the horizontal joints 12 (between adjacent faces of the thick and thin brick 4) and 13 (between the common brick 7 and the thick and thin brick 4) break joints with each other, thereby producing a wall without any straight or continuous horizontal joints through it between the meeting faces of the bricks or blocks composing it. The bricks 4 and 7 are also laid to break the vertical joints between them and bond the bricks together transversely and longitudinally or circumferentially of the wall, as well as to break horizontal joints and bond them together vertically.

In forming or laying the wall at the upper portion of the furnace where the wall is thicker and also substantially upright instead of inclined or flaring, as shown in Fig. 6, I prefer to employ thick and thin brick of two different lengths, the longer ones 4, which are preferably thirteen and a half inches long, at one side, for example, the outside of the wall, in connection with the shorter ones 4^a at the other side of the wall, and which are preferably nine inches in length; common or standard brick 7 and 7^a being employed in conjunction therewith between successive pairs of the thick and thin brick alternately on opposite sides of the wall. And to give the wall additional thickness, common or standard brick 7 are interposed between the adjacent inner thin ends 6, 6 of the thick and thin bricks 4 and 4^a.

While in the drawing, I have illustrated my invention in connection with fire clay blocks or bricks of certain dimensions and having right angle faces, I wish it to be understood that my invention is not confined to any particular dimension or shape of the bricks or blocks, the essential principle being that the wall is composed in part of bricks or blocks having portions of different thicknesses, and combined with others to bond together and break joints horizontally as well as vertically at their meeting faces.

I claim:—

1. A fire-brick wall for furnaces composed in part of blocks each having one face thereof provided with portions extending in different planes and thereby forming a block with portions of different thicknesses, combined with other blocks corresponding in thickness to one of said portions and ar-

ranged to break the horizontal joints between adjacent blocks and bond the blocks together vertically, as well as to break the vertical joints and bond the blocks together transversely and longitudinally or circumferentially of the wall, substantially as specified.

2. A blast furnace fire-brick wall comprising blocks each having one face thereof provided with portions extending in different planes and thereby forming a block with portions of different thickness, combined with other blocks corresponding in thickness to one of said portions, and arranged to break the horizontal joints between adjacent blocks and bond the blocks together vertically as well as to break the vertical joints and bond the blocks together transversely and longitudinally or circumferentially of the wall, and bands surrounding said wall at the boshes portion of the furnace to confine said blocks from outward movement under heat and expansion and cause the vertical joints at the meeting end faces of the blocks to close up and prevent escape or passage of gas through the horizontal joints, substantially as specified.

3. A fire-brick wall for furnaces composed in part of rabbeted blocks having portions of different thicknesses, combined with other blocks corresponding in thickness to one of said portions and arranged to break the horizontal joints between adjacent blocks and bond the blocks together vertically as well as to break the vertical joints and bond the blocks together transversely and longitudinally or circumferentially of the wall, said rabbeted blocks being laid in pairs with their rabbets adjacent each other, substantially as specified.

4. A fire-brick wall for furnaces composed in part of rabbeted blocks having portions of different thicknesses, combined with other blocks corresponding in thickness to one of said portions and arranged to break the horizontal joints between adjacent blocks and bond the blocks together vertically, as well as to break the vertical joints and bond the blocks together transversely and longitudinally or circumferentially of the wall, said rabbeted blocks being laid in pairs with their rabbets adjacent each other, and said wall having said rabbeted blocks on both faces of the wall, substantially as specified.

5. A fire-brick wall for furnaces composed in part of rabbeted blocks having portions of different thicknesses, combined with other blocks corresponding in thickness to one of said portions and arranged to break the horizontal joints between adjacent blocks and bond the blocks together vertically, as well as to break the vertical joints and bond the blocks together transversely and longitudinally or circumferentially of the wall, said rabbeted blocks being laid in pairs with their rabbets adjacent each other, the length of the rabbets in said blocks corresponding to half the length of said other blocks, substantially as specified.

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Witnesses:
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