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F. H. WAITE ET AL
AIR COOLED FURNACE BLOCK

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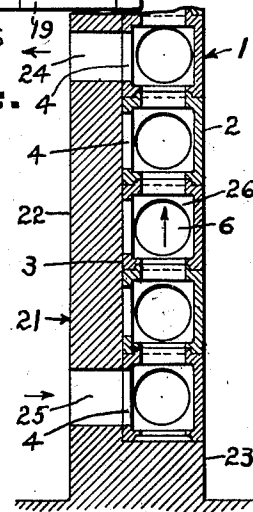
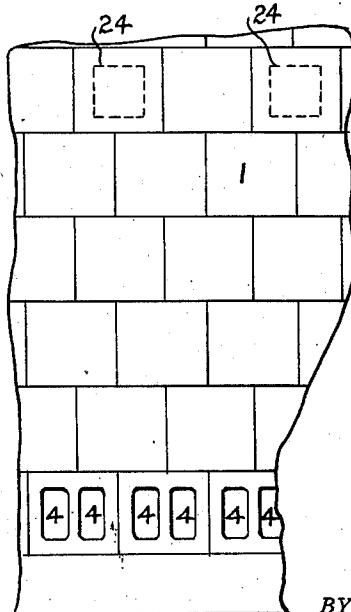
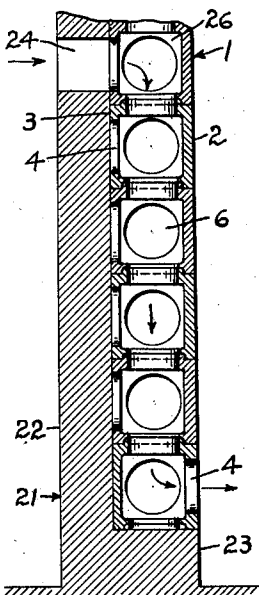
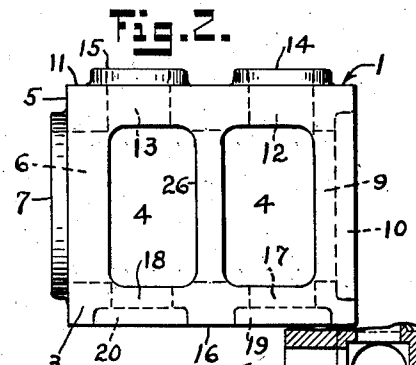
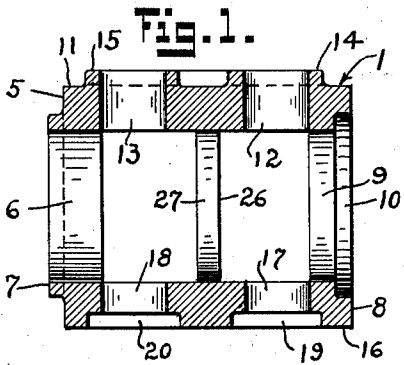
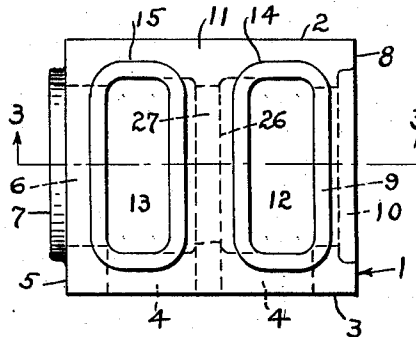
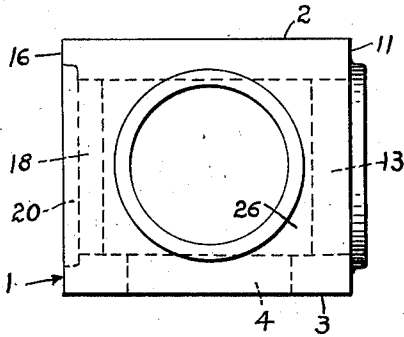


Fig. 5.

Fig. 6.

Fig. 7.
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UNITED STATES PATENT OFFICE

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AIR-COOLED FURNACE BLOCK

Application filed October 8, 1925. Serial No. 61,237.

Our invention relates to air cooled refractory blocks utilized in constructing the walls or linings of furnaces or the like and is more particularly concerned with sectional refractory structures built up of a series of superimposed, broken jointed, interlocking air cooled blocks adapted to transmit the maximum quantity of air throughout intercommunicating air passages therein.

One object of our invention is to provide walls of substantially rectangularly shaped interlockable, superimposed air cooled blocks of high refractory material, formed and positioned to provide, upon completion, a hollow wall, or one that is substantially composed of a series of horizontal and vertical intercommunicating flues or passages and the walls of said blocks being of the minimum thickness consistent with good engineering practice.

Another object of our invention is to provide air cooled blocks that will not deteriorate or disintegrate under extremely high temperatures, and when so heated will not adhere or cohere to any of the ash, cinders or clinkers that may come in contact with the said blocks.

A still further object of our invention is to provide a reversible or transposable unit, hollow, rectangular block with relatively thin walls, having means for interlocking with other similar units to form upon the completion of a wall a substantially gas tight thin wall of high refractory material adjacent to the combustion chamber of a furnace and forming the interior walls of a furnace.

One of the most valuable features of our invention consists of the adaptability of the air cooled high refractory blocks to be so positioned in the construction of a wall that any block or blocks will provide inlets or outlets into the intercommunicating flues formed in the wall.

Another valuable feature of our invention is to provide a furnace wall with a lining which allows high furnace temperatures or over rating of the boilers, increases the furnace capacity because of the absence of projecting clinker, gives a full, active grate surface, aids combustion, conserves the fuel, increases the life of the furnace wall, prevents

stoker breakage by eliminating clinker formation, eliminates the frequent shutdowns of the boilers due to repair, saves the labor of cleaning the walls of the furnace from clinker formations, insures high furnace efficiency, continuous operation, long life and a low maintenance cost in the settings.

We are aware that blocks containing passages have been patented and that blocks with jet openings and tapered holes therein, composed of non-ferrous compounds are used for various purposes but none of these blocks could be used for the specific purpose hereinafter described and illustrated in the drawings appended hereto.

In our application for patent filed September 11th, 1925, bearing Serial Number 55,752, the heat transfer function of a block is specifically illustrated, described and claimed, and the herein described block which is a development of the block in the aforesaid patent, has a similar function only to a greater degree.

That is to say the high refractory blocks herein referred to, preferably composed of silicon-carbide and alumina will transfer heat with greater rapidity than the block referred to in Serial Number 55,752 and the air passing throughout the blocks being of the maximum volume, there will be a corresponding greater transfer of heat thereto, the blocks will be cooled to a relatively lower temperature and more B. t. u's will be carried away from the walls and utilized in the furnace as preheated air.

There are other patents pending and allowed, which show solid blocks of refractory material provided with flues, both vertical and horizontal, but none comprise an interlockable, hollow, rectangular block, having but one closed side, nor are any adapted to be transposed and utilized for inlet or outlet means or to form a hollow wall.

The salient features of our invention hereinafter described and pointed out are illustrated in the accompanying drawings, wherein similar numerals refer to like parts throughout the several views, in which:—

Figure 1 is an end elevation of a block.

Figure 2 is a plan of a block.

Figure 3 is a longitudinal section of Figure 2 taken on line 3—3.

Figure 4 is a side elevation of a block.

Figure 5 is a cross section of a wall built up of the air cooled blocks illustrating how blocks may be reversed or transposed to form inlets into a furnace either above or below a grate.

Figure 6 is a part of an elevation showing the relative positions of the inlets and outlets, more in detail than in Figure 5.

Figure 7 is a cross section of a hollow wall built up of the air cooled blocks showing the circulation throughout and positions of the blocks when the inlet and outlet are on the outside of the wall.

The block 1, is a hollow rectangular body with sides substantially uniform in thickness, the front wall 2 being wholly closed in and solid as shown in Figures 1, 2, 5, 6 and 7.

The back face 3 shown in Figures 1, 2 and 4 is provided with two openings 4, which are rectangular in shape.

The end face 5 is provided with a round opening 6, and a boss 7 projecting beyond the plane of the face.

The end face 8 is provided with a round opening 9 and a countersunk portion 10 into which the boss 7 of an adjacent block fits in gas tight unity.

The upper face 11, is provided with two rectangular openings 12 and 13 each having a boss 14 and 15 respectively, projecting beyond the face 11.

The lower face 16, is provided with two rectangular openings 17 and 18 each having a countersunk portion 19 and 20 respectively, projecting into the face 16.

The bosses 14 and 15 on the upper face 11 fit in gas tight unity into the countersunk portion of an adjacent block similar to 19 and 20 of face 16.

The block 1 is provided with a centrally located wall 26 within the hollow interior which has a circular opening 27 therein, the said wall being utilized for reinforcing the walls of the hollow block as clearly shown in Figures 1, 2, 3, 4, 5 and 7.

The air cooled high refractory blocks 1, constitute upon their completion a wall of superimposed, broken jointed blocks with a solid front face 2 and form gas tight joints or connections on the ends, 5 and 8, top 11 and bottom 16.

Figures 5 and 7 illustrate a portion of a wall 21, having an outside portion 22, an inside portion 23 and a series of superimposed air cooled refractory blocks 1, integral with said wall.

In Figure 5 the lower course of blocks 1 are reversed or transposed relative to the other courses so that the openings 4 will communicate with the interior of the furnace or wall 23.

The wall in Figure 7 presents an unbroken

surface at 23, all of the blocks 1 being laid as shown with the face 2 of the blocks 1 comprising the make up of the wall 23.

In Figures 5 and 6, the inlet through the horizontal and vertical passages of the wall 21 is shown by 24.

The object of Figures 5 and 6 is to show how the air may be circulated throughout the blocks entering the inlets 24 passing downwardly throughout the hollow wall against the direction of flow of flaming gas in the furnace into the interior of the furnace through the openings 4 in the reversed or transposed blocks.

Figure 6 illustrates how the blocks 1 are laid in broken jointed relation to each other and the relative position of the inlets 24 and outlets 4.

In Figure 7 the blocks are laid to present an unbroken surface in the wall 23 and the circulation of air is directed upwardly within the hollow walls in a direction opposite to the flow of flaming gases within the furnace through the inlet 25 and outlet 24.

Having thus described and illustrated the preferred embodiment of our invention we do not desire to limit ourselves to the exact construction shown except so far as the same may be specifically claimed since it is evident that modifications may be made without departing from the spirit of the invention or scope of the claims.

We claim;—

1. An air cooled refractory furnace wall block having air ports extending thereinto from five faces all communicating within the block and adapted to make connection with parts of adjacent blocks, the sixth face being imperforate.

2. An air cooled refractory furnace wall block having air ports extending thereinto from five faces all communicating within the block, and interlocking means adapted to engage adjacent blocks, to cooperate therewith and with said ports to form continuous air passages in a wall built up of a plurality of blocks.

3. An air cooled refractory furnace wall block having air ports extending thereinto from five faces all communicating within the block, and interlocking means adapted to engage adjacent blocks, said means including a protruding rib around a port and a corresponding depression around another port adapted to form a substantially gas-tight connection between blocks.

4. An air cooled refractory furnace wall block having air ports extending thereinto from five faces all communicating within the block, and forming a chamber therein, and an apertured strengthening rib in said chamber.

5. An air cooled furnace wall construction comprising an outer wall, and an inner wall composed of superimposed courses of refrac-

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5 tory blocks, each block having ports through
five faces communicating with each other
within the block, and all of said blocks being
laid so that ports thereof are in communica-
tion with ports of adjacent blocks while cer-
tain of said blocks are laid so that a port
thereof opens through a side of the wall.

10 Signed at Long Island City in the county
of Queens and State of New York this 6th
day of October A. D. 1925.

FRANK H. WAITE.
GEORGE W. DAVEY.

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