

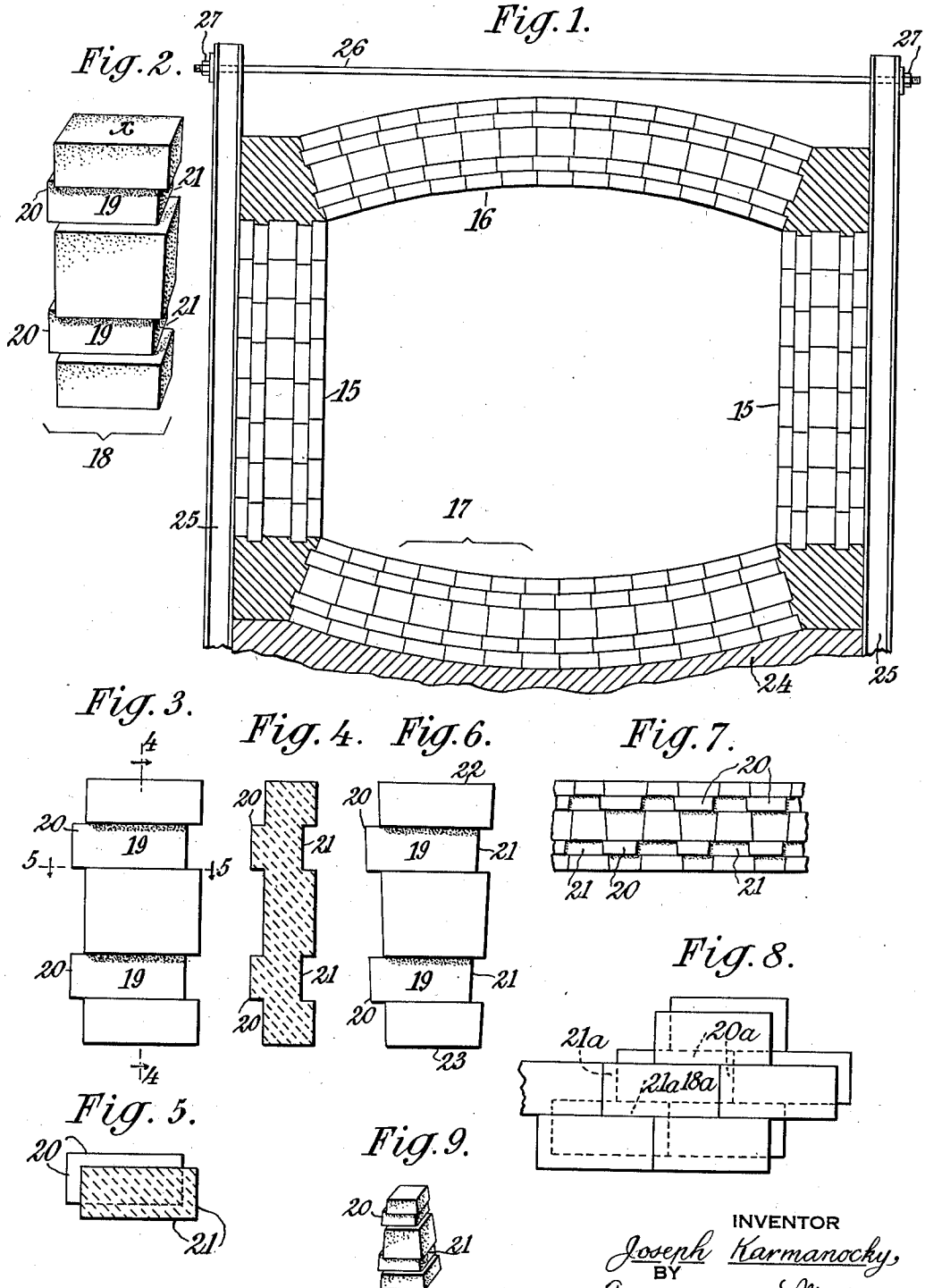
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FURNACE LINING

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FURNACE LINING

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This invention relates to wall structures of furnaces, and more particularly to a form of refractory brick or block which may be used for lining such furnaces.

5 It is an object of this invention to provide a refractory block or brick having a form such that when the blocks are laid in courses they will interlock with adjacent blocks; and as a further object, that such blocks will interlock not only with the
10 blocks in the same course, but also with blocks in adjoining other courses.

It is another object of the invention to provide a block having projections and recesses formed thereon which interlock with projections and
15 recesses of adjacently-disposed blocks and which is of such shape that it may be used for forming an arched roof, a curved floor, or for forming a straight side wall.

Other objects and various features of the invention will be more apparent from the following
20 description and claims, which are to be read in connection with the accompanying drawing, in which

Figure 1 is a sectional elevational view of a reverberatory furnace which may be lined with
25 blocks of my invention.

Fig. 2 is a perspective view of one form of refractory block including my invention.

Fig. 3 is a front elevational view of a modified
30 form of block similar to the block of Fig. 2.

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3.

Fig. 5 is a sectional view of the block of my invention taken on the line 5—5 of Fig. 3.

35 Fig. 6 is an elevational view of the block of Fig. 2.

Fig. 7 illustrates the manner in which blocks of the type shown in Fig. 6 may be laid to form a
40 straight wall.

Fig. 8 is a plan view showing the relation of the blocks constituting the floor of the furnace of
45 Fig. 1.

Fig. 9 is a perspective view of a modified form of the block of Fig. 2.

45 In general, furnaces of the type with which this invention is concerned comprise side walls 15, a roof 16 and a floor 17, all resting upon a suitable base. These wall structures, which term may be used to include the side wall, roof and floor, are
50 necessarily lined with a refractory material, the particular character of which is selected in accordance with the character of metal to be melted. In order to facilitate the process of lining and re-lining such furnaces, the wall structures are
55 usually formed from a plurality of bricks, or

blocks, of the desired refractory material. The bricks of such wall structures are usually held in their proper assembled relationship by suitable ironwork comprising, for example, a plurality of angle iron braces 25 which are joined at their opposite ends by buck stays 26, only one of which is here shown. The buck stays are usually threaded at their opposite ends and are provided with nuts 27 which may be used to adjust the tension on the stays. Thus, any undue strain which is placed upon the brickwork, and the stays, may be relieved by a proper adjustment of the nuts 27. When the furnace is constructed in this manner, and more particularly when the floor on which the molten metal lies is formed from a plurality
15 of blocks, it is evident that the molten metal will tend to seep into the joints between the blocks; and this seepage, of course, causes the floor to "grow" or buckle. The resulting stresses are transmitted to the side walls and frequently cause considerable damage. I have found that this seepage may be avoided, or very materially reduced, by forming the wall structures from blocks which interlock with each other in such manner that the interlocking elements constitute a plurality
20 of obstructions to the flow of metal through the joints that is, each joint becomes, in effect, a labyrinth-like passage.

A preferred form of block, generally designated by the numeral 18 is shown in Fig. 2 and comprises, in effect, a series of integrally formed substantially rectangular sections which are disposed in overlapping relationship. For the purpose of description, the cross-sectional area of the block, per se, may be defined by the surface x or
30 by the cross-hatched section of Fig. 5. In the light of this definition it then appears that the offset sections 19 provide a plurality of projections 20 and a like number of recesses 21. As can best be seen in Figs. 2 and 5, the projections 20 may
40 be regarded as being formed on two adjacent faces of the block, whereas the recesses 21 are formed on the remaining two faces; and the projections and recesses lie in planes which are disposed at right angles to the longitudinal extent of the
45 block. The dimensions of the projections and recesses, including the length, are substantially similar. Thus when the blocks are laid in courses, as shown in Fig. 8, a portion of the projection 20 of one block will fit into a portion of the recess 21
50 of a block in the same course; and also with a portion of the recess 21 in a block in another course. This arrangement of the recesses and projections permits the use of only one design for all of the blocks; and further, it permits a com-
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plete interlocking between the blocks. This latter feature can best be understood by an examination of block 18a of Fig. 8, which will disclose that the projection 20a and the recess 21a of block 18a interlock with the complementary parts of adjacent blocks without leaving any cut-out corner portions.

While the blocks may be laid in any desired relationship, I prefer to utilize an overlapping masonry bond, i. e., with the blocks of one course overlapping the joints of blocks in adjacent courses. Where the blocks are so laid, it becomes substantially impossible to find any point at which a joint extends through the wall structure without encountering one of the projections. Thus, at any point of abutment between any two adjacent blocks it will be found that the joint therebetween is of labyrinth-like character.

As was previously mentioned, certain of the wall structures, namely, the floor and roof of the furnace, are preferably curved. In order to obtain this curvature, I preferably provide a block which has a slight longitudinal taper whereby one end 22 is somewhat larger than the other end 23. In forming the concave floor surface the blocks are laid soldier fashion, that is, upon their ends, with the large end 22 resting upon a suitable base 26, which preferably is made of an impervious material; and in overlapping courses as shown in Fig. 8. The formation of the floor from tapered blocks, in effect, produces an inverted arch. It is quite evident that these same blocks may be used for forming the arched roof 16 of the furnace shown in Fig. 1. Here the blocks are disposed with their large ends 22 uppermost and their smaller ends constituting the inner surface of the furnace.

The blocks of Figs. 1 and 6, having a taper on two sides only, are not only useful in forming the curved roof and floor structures but they may also be used to form the straight side walls 15. To accomplish this, the blocks are laid, as shown in Fig. 7, with the large end 22 of one block adjoining the small end 23 of an adjacent block, the blocks being laid in courses which overlap along the short side of the block, rather than the long side. Thus, a brick of a single shape may be used for forming the entire wall structure. Preferably, however, the side walls 15 are formed from straight-sided blocks, as shown in Fig. 1. These blocks (Figs. 3, 4, and 5) are similar in all respects to the blocks of Figs. 2, 6, and 7, except that their opposite sides are parallel and at right angles to their ends.

The straight-sided blocks of Fig. 3 are not only

useful in forming straight walls but they may be combined with the tapered block of Fig. 6 to form arched floors and roofs of different curvatures. Thus, wall structures of varying size, shape and curvature may be made from only two shapes of brick.

As shown in Fig. 1, the roof 16 and the floor 17 are concave in only one direction; that is, they each comprise a segment of a cylinder. Hence, these structures are formed from blocks which have two opposite parallel sides, and two opposite tapered sides, as shown in Figs. 2 and 6. However, if it is desired to make them concave in all directions, i. e., each a section of a sphere, this may readily be done by tapering the four sides of the block, as shown in Fig. 9.

From the foregoing it is apparent that the blocks of my invention, irrespective of their shape, i. e., tapered or straight-sided, provide a complete interlock at several points along each abutting face of adjacent blocks, and that each joint between adjacent blocks becomes, in effect, a labyrinth-like passage which tends to restrict and retard the leakage of molten metal therethrough.

Since certain changes may be made in the positioning of the projections and of the recesses, and since the block may be modified in other ways, several of which have here been shown and described, it is apparent that the invention is subject to modification without in any way departing from the true scope thereof, and therefore it is intended that the foregoing description shall be construed in an illustrative rather than in a limiting sense.

What I claim is:

1. A block of the character described, comprising an elongated body portion, spaced small and large projections extending transversely of the longitudinal side faces of the body portion defining alternate recesses in the side faces with small projections and small recesses at the ends and with at least two transverse projections and two transverse recesses being spaced inwardly of the ends of the block and in the same transverse zone and of greater width than the remaining projections and recesses, with each of the two wider recesses adapted to receive two complete projections at adjacent ends of two associated interlocked blocks.

2. A block of the character described in claim 1, characterized by the block having a transverse projection at each end of two adjacent side faces thereof and a recess at each end of two other adjacent side faces.

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